AI GAMECHANGERS 2022

REALIZING INDIA'S AI PROMISE

A COMPENDIUM OF AI INNOVATION STORIES

INNOVATION PARTNER

Microsoft

ACADEMIC PARTNER

GOLD PARTNER

EY Building a better working world

Preface

Debjani Ghosh
President, NASSCOM

AI no longer remains confined within the walls of the research labs; it's out of the cocoon and making its impact felt across industries such as healthcare, transportation, agriculture, education, retail, governance, environment, and manufacturing. As the world grappled with the unprecedented COVID-19 crisis, India reported a 45 per cent increase in AI usage among corporations and organisations, the highest among all the countries. To further accelerate India's AI journey, we have conceptualised the NASSCOM AI Gamechangers Awards Program as part of the NASSCOM 'AI for India' mission to spread awareness about AI usage and innovation. The compendium showcases the best of India's IT sector by showing the most effective and innovative uses of Artificial Intelligence to address today's most pressing economic and societal concerns. The solutions' versatility reflects India's appetite for AI and the will to innovate further. I hope you enjoy reading these stories that cover the most innovative AI solutions by some of the best minds in our country to place India on the world AI map firmly.

Anant Maheshwari
President, Microsoft India

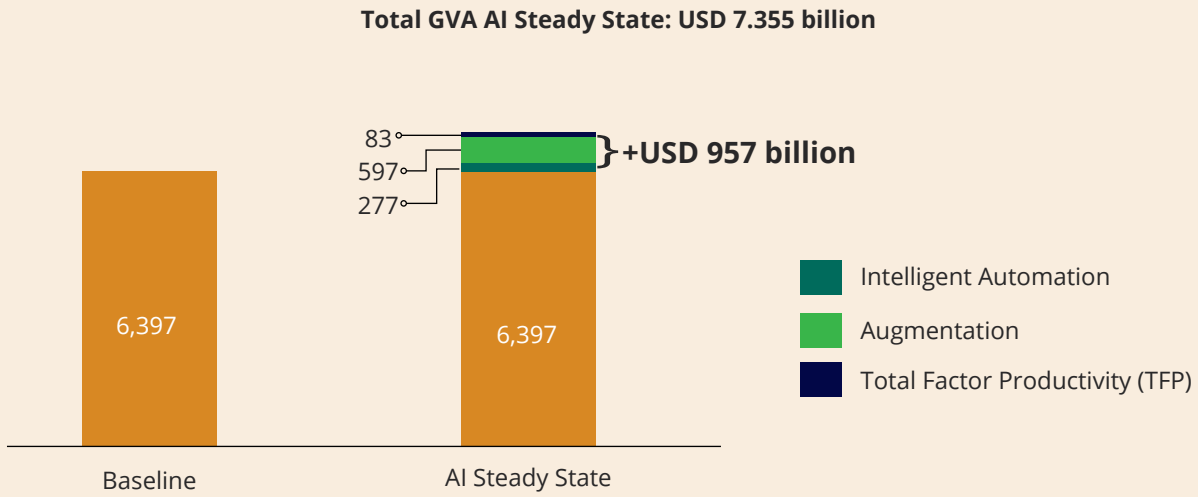
Artificial Intelligence is all around us today, transforming industries, businesses, societies, and nations. Adopting AI is a strategic advantage that can drive India's next decade of growth and innovation. Microsoft is proud to partner with NASSCOM for initiatives like the AI Gamechangers Program and the AI Adoption Index. These initiatives aim to strengthen AI innovation and adoption in the country. The second year of the AI Gamechanger saw impactful AI use cases from the grassroots to large enterprises with over 370 applications from a variety of sectors. In addition, this year's entries saw several nominations for using AI for social good and transformation. As we wait to announce the winners of AI Gamechangers Edition 2, I want to extend my thanks and appreciation to all the AI innovators. We look forward to you enabling meaningful change with AI.

Vijay Bhaskaran
EY India Automation and Artificial Intelligence Leader

EY has partnered with NASSCOM on various AI for India initiatives to shape India's opportunity to become a significant player in the AI world. More recently, we have developed first of a kind AI Index to track and measure AI adoption in India. EY is pleased to sponsor the AI Gamechangers Award - an important initiative to recognise innovators who are making significant contributions to the AI for India mission. The innovations are creating an impact across technology, social, talent, and business operations overall. Being a part of the selection panel, I have had an opportunity to interact with the innovators personally, understand their solutions, experience the passion for AI, and how their solutions are creating a meaningful impact for India. My heartiest congratulations to all the participants and the winners of the AI Gamechanger Awards 2022.

As we enter deeper into the Techade, Artificial Intelligence technologies are set to play a critical role in transforming India's digital economy in the coming decades. AI is expected to raise India's annual growth rate by 1.3% by 2035, which amounts to an addition of USD 957 billion, or 15% of current GVA (gross value added) to India's economy.

India's GVA in 2035 (USD Billion)



Source: Accenture report 'Rewire For Success: Boosting India's AIQ

In the last few years, we also witnessed India becoming global player in the AI space. Today, as per a study by the Brookings Institutions, India features in the top 10 countries in terms of technological advancements and funding in AI.

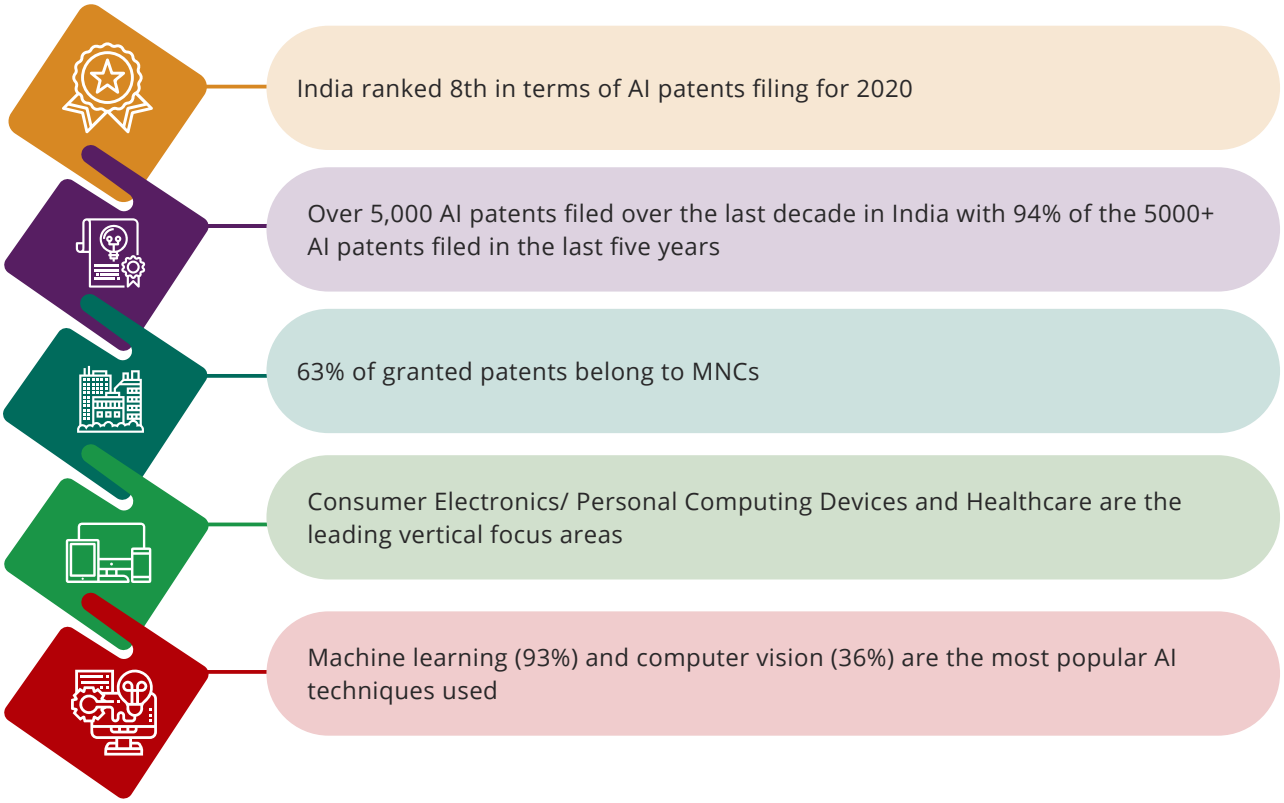
Country	Rank
USA	1
China	2
UK	3
France	4
Japan	5
Germany	6
India	**7**
Canada	8
South Korea	9
Italy	10

Furthermore, India is only behind China and US in terms of AI research and significantly ahead in AI talent and skill penetration. As per study, Bangalore features in the top five cities with the largest AI talent pool.

India also witnessed more than ten AI start-ups entering the Unicorn Club in 2021.

City	Rank
San Francisco	1
New York	2
Boston	3
Seattle	4
Bangalore	**5**
Los Angeles	6
London	7
Beijing	8
Chicago	9
Washington, DC	10

As a result, India is emerging as a key destination for AI innovation. More than 70% of the technology patents filed in India relate to one or more emerging technology domain. As per INDIAai report on AI patents, in 2021, India ranked 8th in terms of AI patent filings, with over 5,000 AI patents filed. Of these, 94% have been filed in the last five years.



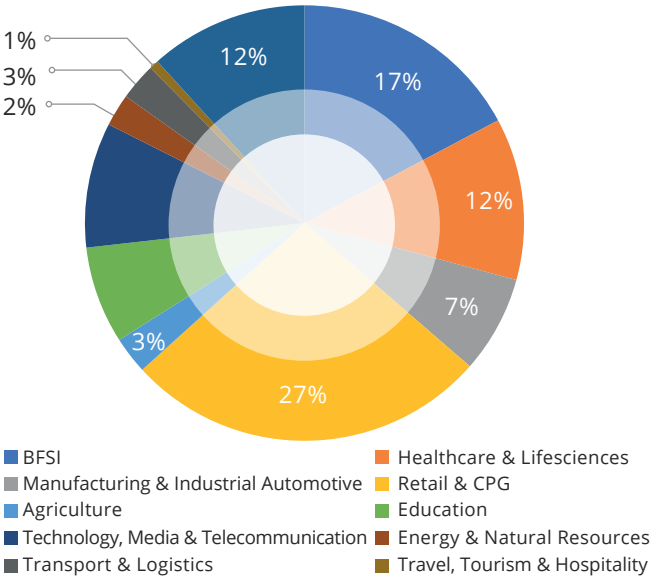
Recognising this tremendous potential AI offers, NASSCOM has built its 'AI for India' mission that focuses on key drivers of change that are needed as we move ahead. 'AI adoption' is an essential pillar of the mission from which the 'AI Gamechangers' programme has spawned.

AI Gamechangers was conceptualised to seed awareness and enthusiasm around this wonderful technology and encourage others to emulate the successes in the ecosystem. Furthermore, the programme aims to recognise innovative and impactful use cases that solve important problems across various sectors and industries.

The second edition of the programme received considerable traction with 300+ AI use cases from multiple stakeholders such as enterprises, start-ups, government bodies, academic institutes, and NGOs.

359 use cases have been submitted this year, which have applicability across multiple industry verticals as depicted below.

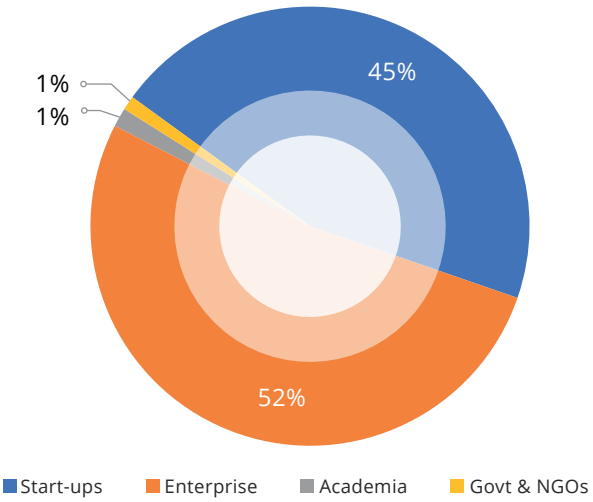
Applicant Snapshot - By Sector



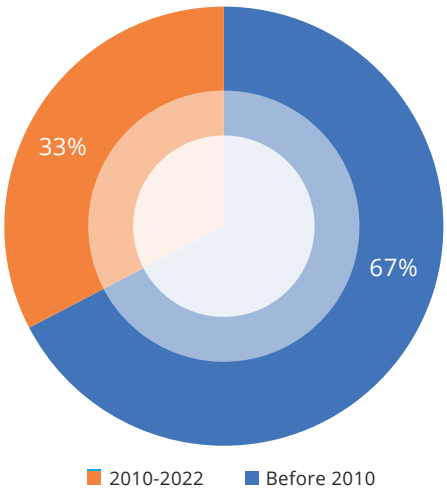
There is almost an equal representation of startup's and enterprises, and more than 60% of the startup's applied were founded between 2010-2022.

More than 60% of start-up applicants were founded between 2010-2022.

Applicant Snapshot - Entity Type



Applicant Snapshot - Founding Year

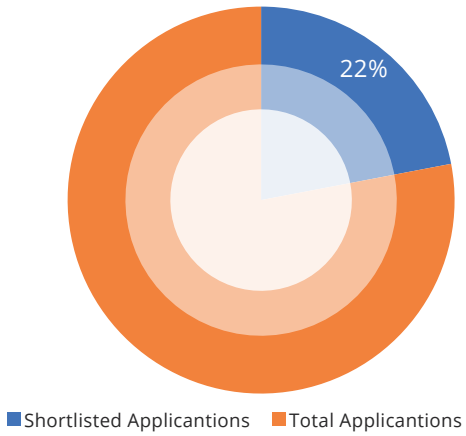


Shortlisted Applicants

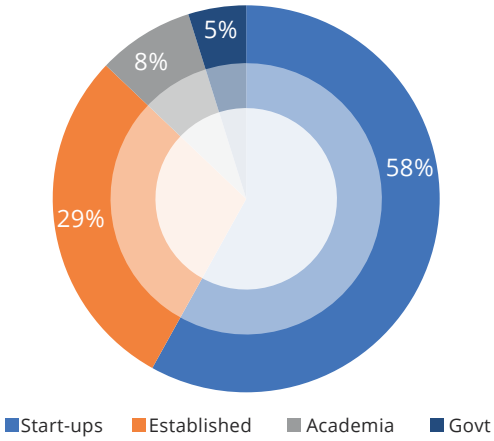
From the total application, 22% of them made it the final round.

Out of the shortlisted applicants, close to 60% were start-ups followed by established enterprises and academia.

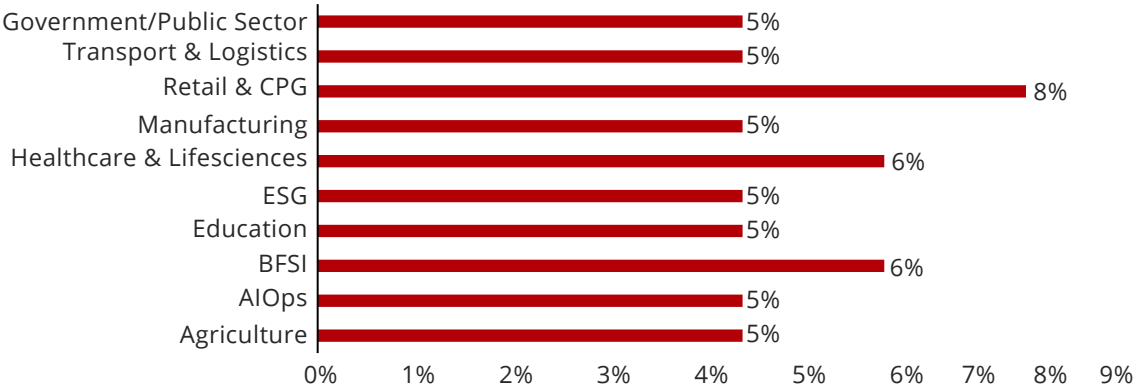
Applicant Snapshot



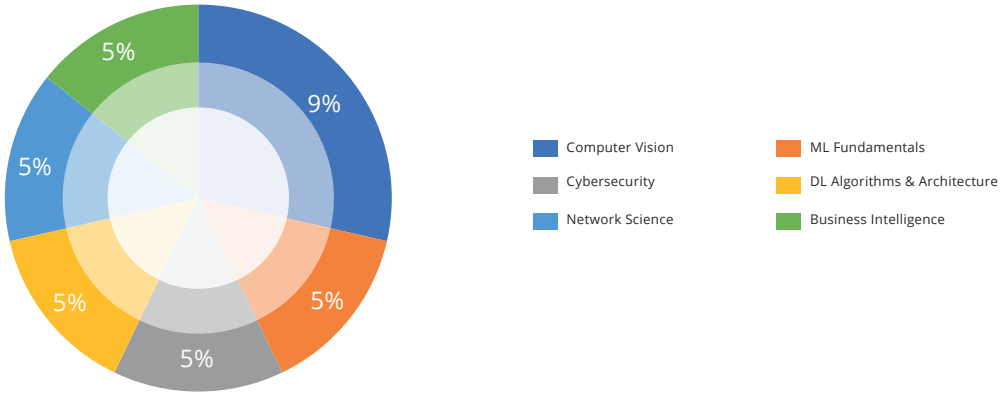
Applicant Snapshot - Entity Type



From sector perspective, there has been an equal representation, except for Retail & CPG. And from technical perspective, computer vision.



Shortlisted candidates by award categories.



AI Gamechanger 2022 focuses on 16 use case categories that comprise of 7 sectors, 2 functions, 3 technologies and 4 themes. In addition to this, there are 3 research categories which are AI application, ML Fundamentals and DL Algorithms & Architecture that have also been featured.

AI Gamechangers 2022 - Categories

16 Use-Case based Categories

7 Sectors

- Agriculture
- BFSI
- Education
- Healthcare
- Manufacturing
- Retail & CPG
- Transport & Logistics

2 Functions

- Cybersecurity
- Business Intelligence

3 Technologies

- AIOps
- Computer Vision
- Network Science

4 Themes

- AI for Next Billion
- ESG
- High Potential
- Govt. Showcase

3 AI Research Categories

AI Application | **ML Fundamentals** | **DL Algorithms & Architecture**

These use cases have been classified as

Gamechangers | **Challengers** | **Exemplars** | **Innovators**

We have defined Gamechangers as the winners, Challengers as the first runner-up and Innovators as the second runner-up. Impactful government use-cases have been categorized as Exemplars.

The first three have been covered as featured stories, while the Innovator use case details have been tabulated at the end. Moreover, one 'Special Mentions' have also been featured.

The AI Gamechangers compendium offers a sneak peek into the thriving Indian AI ecosystem. The collection will serve as a ready reckoner to know the pulse of India's AI adoption in 2022. We hope this compendium will inspire, motivate, and ignite more invention and innovation in AI as a multiplier for our fast-growing digital economy.

Screening framework

359
Nominations

Nomination Submission

- The initial screening was done on the basis of quality and originality of the entry.
- Selected solutions advanced to the first round for further evaluation.

Round 1: Initial Scoring

- This round focused on assessing solutions against three parameters with varying contribution to the total score – problem identification, solution innovation, and impact and scale.
- High-scoring solutions were identified to be critically examined in Round 2.

Round 2: Panel Review

- 10 expert panels were instituted. Each panel constituted three members, involving industry veteran or/and subject matter experts, for evaluating applications.
- As a part of this round, NASSCOM shared a presentation template with finalists to present their respective solutions to their assigned set of panel.
- This round also focused on assessing solutions against three parameters with equal contribution to the total score – problem identification, solution innovation, and impact and scale.
- Based on the assessment, 65 contenders were recognised under one of the following categories:

17	18	3	1	19
Gamechangers	Challengers	Exemplars	Special Mention	Innovators

FEATURED STORIES

SECTORAL USE CASES

MANUFACTURING
GAMECHANGER

UptimeAI: AI-based virtual expert for machine operations and maintenance

- **Virtual Assistant**

Its not long ago that we were discussing how to utilise AI in our lives and now here we are with Artificial intelligence and Machine Learning embedded in most of the imaginable industry at various levels.

Power efficiency is a big focus area globally and AI is providing efficiency and effectiveness to this sector. UptimeAI is such a work towards solving equipment reliability and energy efficiency issues 4X faster like the experts we trust and know. With proprietary self-learning workflows, built-in domain knowledge framework, and big data processing, UptimeAI can detect issues early, explain them and get smarter by learning from each action. The result is a virtual expert that can resolve issues at scale with speed while learning from operators – the corner stone of autonomous operations.

UptimeAI was started by Mr. Jagdish Gattu (Founder & CEO) and Vamsi Yalamanchili (Co-Founder & CTO) with a mission to build an expert system that is a trusted advisor of every machine operator in achieving operational excellence. The team is a mix of gray hairs – subject matter experts with 200+ years of combined experience, and young talent – data scientists and software engineers from top universities.

Experts are the gold standard for machine operations. Current digital solutions stop at KPIs and alerts. Experts manually diagnose, explain, suggest mitigations, and learn continuously. While enterprises have adopted remote monitoring to handle shortage of experts, these centers have reached their limits. With more experts retiring, aging equipment, and the market demands to increase profitability, how can businesses achieve higher O&M efficiency, solve problems faster both at the remote centers and in the field?

Experts are the doctors of machines in industries. They diagnose machine problems and fix them. With 50% of experts already retired in last 5 years, industry cannot run profitably. UptimeAI addresses this challenge with the first AI based virtual expert that empowers even less experienced engineers to minimize failures and maximize efficiency faster like the experts we trust.

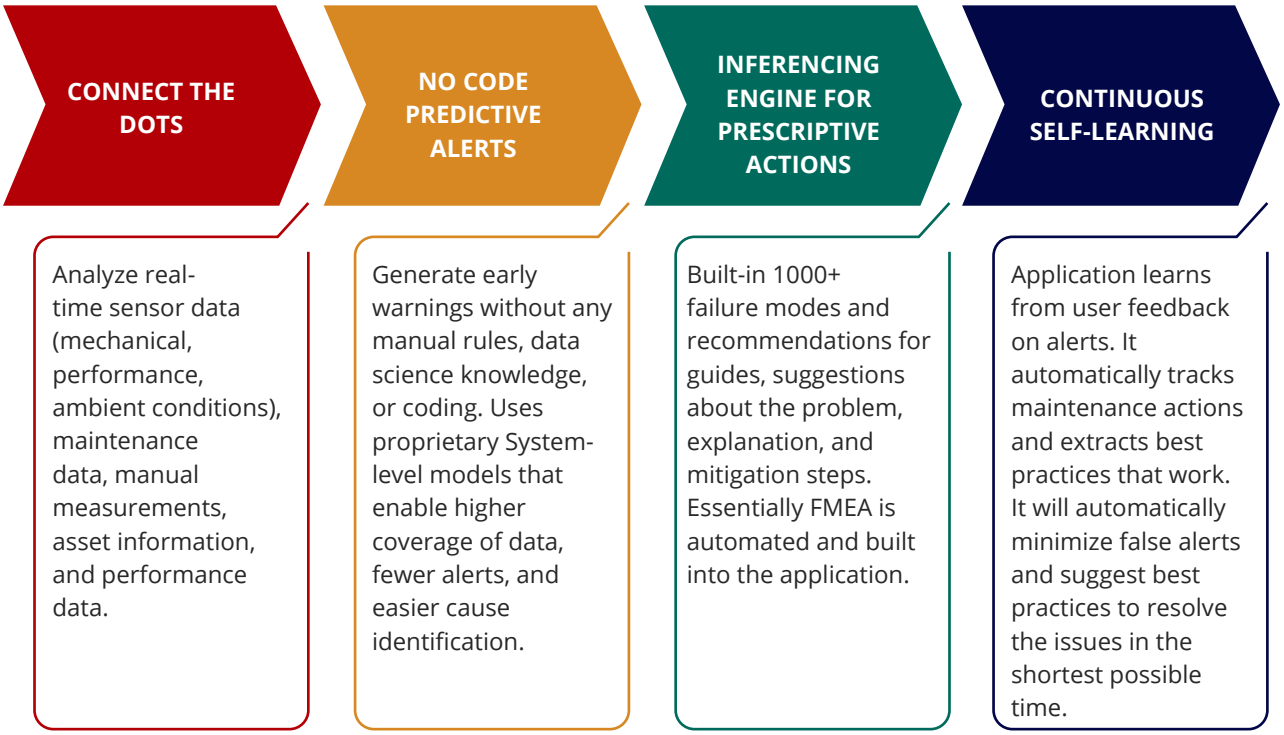
> “Experts are the doctors of machines in industries. They diagnose machine problems and fix them. With 50% of experts already retired in last 5 years, industry cannot run profitably. UptimeAI addresses this challenge with the first AI based virtual expert that empowers even less experienced engineers to minimize failures and maximize efficiency faster like the experts we trust.”

Jagadish Gattu
Founder & CEO, UptimeAI

Note that while industrial revolution brought mechanization, control systems brought more automation, IT systems like SAP brought efficiency by information management, UptimeAI is bringing such intelligence for the first time to plant operations.

The idea is to shorten this cycle from detecting an issue to resolving it and fully operationalise the process. By bridging the gap between AI and deep domain knowledge, UptimeAI software mimics the experts while scaling the compute to process billions of data. The result is lower operational costs (energy & maintenance reduction), higher generation, and increased people productivity. UptimeAI’s solution detect operational problems before they cause losses, diagnose the issue using built-in 1000+ failure modes (FMEA), suggests mitigation steps, and learns from operator actions to get better and more precise.

UptimeAI's solution has four modules:



Combining these four, UptimeAI mimics experts and makes it available to all users via a scalable digital assistant, and paves the path towards autonomous operations. While "AI Assistants" are available in other industries (Eg: Grammarly), UptimeAI brings such technology for the first time to manufacturing and heavy asset operations.

The proposed solution has a low-touch predictive maintenance that gives early warnings without high data science efforts with fewer alarms and high coverage. The solution integrates all contextual data by connecting mechanical, performance, instrument, and maintenance data.

UptimeAI is one of its kind solution which is using AI virtual assistant for manufacturing. With the fast problem fixing and lesser annual effort, UptimeAI saves a lot of money and effort. The comapny is currently catering to sectors such as Manufacturing, Wind, Solar, Power generation, Oil & Gas, Chemicals, Cement, and Metals. Some distinguished clients that the company is working with are TATA Power, HPCL, BASF, Cleanmax, & NovaScotia.

The company is set to expand into the North American market with new capabilities like guided step-by-step directions for maintenance teams to fix issues, chatbot that answers operator questions about machine problems and maintenance by learning from documentation, root cause analysis, etc. The idea is to detect improvements in maintenance driven anomalies, detect personnel who need further training by analysing maintenance practices along with expanding into discrete industries (food and beverages, electronics, edible oils etc.).

This is quite a wonderful to see how young minds are coming forward and changing the way things were done conventionally. The problems of the past have hope ahead with newer and promising technologies like AI. More young minds and students must come forward and be aware of various initiatives by global and Indian governments with an aim to make this world a better place.

MANUFACTURING
CHALLENGER

Hindalco Industries Limited: Predictive asset maintenance with AI and ML

- **Predictive Maintenance**

In a manufacturing ecosystem, there isn't a single day that goes by without failures and breakdowns. For a field that primarily works with equipment and technology designed to perform repetitive activities, the cost of equipment failures resulting from defects or poor maintenance can be massive. The goal of most manufacturing businesses, therefore, is to reduce this margin of error to the point where it allows them to reach high-efficiency requirements while also delivering quality goods.

An AI-based solution that identifies machine degradation during the early stages can serve as an early detector and a cost-saver especially for shop floor personnel and the organization respectively.

Trepidations of traditional preventive asset maintenance

Before predictive maintenance came along, manufacturers had to use the reactive maintenance model, in which they would fix a unit only after it broke down. In this case, the manufacturing industry not only had to pay a lot for maintenance but also had to deal with long periods of unplanned downtime that slowed the entire manufacturing process. This would eventually affect the quality of the goods produced by the machine costing the business its reputation.

Hindalco, one of the leading players in Aluminum & Copper, manages 15 critical sites and tens of thousands of assets. The initial predictive analysis rollout identified 150 critical assets as a test case. For one of the Hindalco sites, the minimum value of a few critical pieces of equipment is about 200 crores. Every unplanned downtime is a potential production loss. And, every unscheduled downtime is followed by an unscheduled ramp-up and urgent resource allocation. This causes people to work too hard until the real problem is found and also wastes time, resources & energy (all three critical for the business).

> We aim to introduce Data Democratization for our shop floor users. This ensures the trust and adoption of AI wherein AI becomes an add-on to make their lives easier.
>
> **Akshay Jain**
> Hindalco.

Saving 3 hours in downtime for a boiler at one of Hindalco's plants could boost annual production by 110 tonnes and add INR 35 lacs in revenue.

Streamlining the process with machine learning

Companies no longer need to rely on primitive procedures such as entering data into spreadsheets and manually analyzing insights. Machine learning is considered akin to magic at the rate at which it is revolutionizing industries and disrupting businesses and the manufacturing sector is no different. According to a 2019 Global Market Insights, Inc. report, the use of AI in the manufacturing market is poised to ramp up from USD 1 billion in 2018 to over USD 16 billion by 2025.

Machine Learning was used at Hindalco sites to let the AI accept a process parameter as input and correlate and form relationships with CBM data. The outcome was they could predict the condition of the equipment, hence giving the shop floor professionals enough advance time to repair the equipment and prevent future breakdowns during the manufacturing process. This came as a huge respite and reduced downtime considerably.

The effect

The primary impact was a 5-hour improvement in three plants where the initial deployment was carried out. A savings improvement of INR 30 lacs was achieved for a few pieces of equipment. Reduced ramp up time resulted from improved uptime, resulting in reduced emissions and subsequent treatment. Based on alerts received by the application, operators started following maintenance schedules. In many places where an average of 120 PMs (preventive maintenance) tasks were done, the tasks have been reduced by 5–10%, depending on how the plant functions. This also made it easier to keep track of the actions taken for shutdown and repairs, with each time going through an audit trail.

Additionally, data privacy and security is ensured throughout the process. The database access is limited by organisation ADS and the devices are VPN enabled. Any modifications done in the AI parameters are recorded at every step. When the AI models are functioning, it is ensured that no changes can be made during the process.

How is it unique?

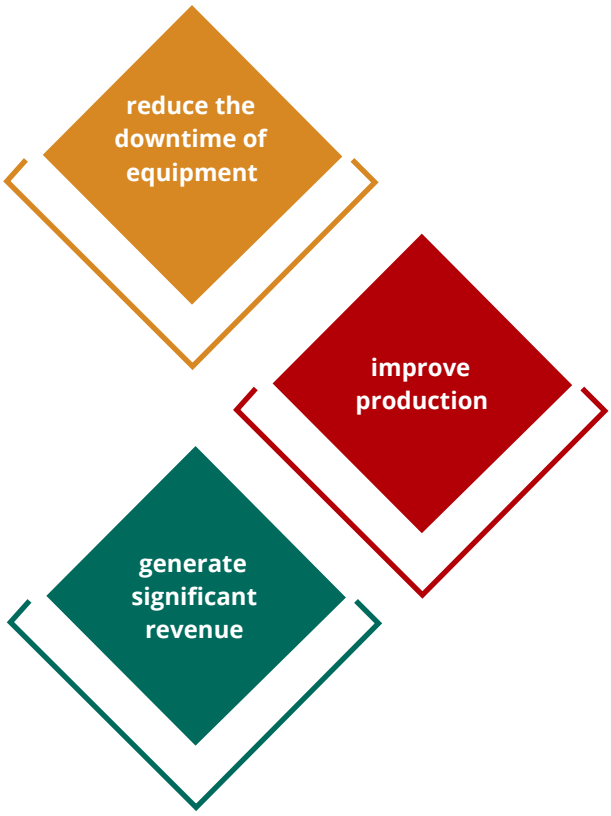
Predictive Maintenance is traditionally conducted via technologies such as preventive maintenance checklists, offline conditional monitoring, reliability curves, RCM, sensor analysis of Vibration Curves, and FFT, among others. This approach of maintenance is distinctive in that users train machine learning models to predict anomalies and failure signatures using the previously specified process sensors in addition to those listed previously, such as temperature, pressure, pH levels, gauge thickness, etc.

The models employed are not limited to rotating equipment alone; they may also be applied to static equipment such as furnaces, boilers, heat exchangers, cooling tower equipment, catalytic beds, tube shell boilers, smelting furnaces, and cranes. One of the striking features is its functionality and ease of usage. Without a programming or data science experience, it is possible to deploy 10 to 20 Assets on the application.

By integrating Machine Learning in Predictive Asset Maintenance, the users can quickly gain insights from various data sources and process data in real-time and large volumes.

The way forward

By applying ML in Predictive Maintenance, Hindalco can:



Access to the ML algorithm data points reduces bias and enables users to make impartial decisions, thereby contributing to an efficient manufacturing process. Concrete measures are taken to ensure data privacy and security, thus making it a reliable ML algorithm to work with.

Additionally, besides monetary benefit, ML prevents unnecessary energy consumption, aligning to Hindalco's goals of taking steps towards building a greener and sustainable planet.

BFSI

GAMECHANGER

eClerx Services Limited: Artificial Intelligence for KYC

• Risk Management

It is extremely critical for financial organizations to identify sanctions, Politically Exposed Persons (PEP), and adverse media references associated with their existing and prospective clients. This information forms the base for assessing the risk associated with doing business with respective entities. Without a robust KYC-AML Screening process, financial organizations stand a high risk of violating sanctions and increased risk exposure, which would in turn lead to penalties and brand image dilution. Given the fact that relevant and material information would be spread across a wide range of sources such as databases, watch lists, social media, blog posts, press releases, etc., the process is cost-intensive, slow, and unreliable.

To manage these complex requirements while mitigating risk, eClerx, a leading provider of business processing has launched an AI-powered Know Your Customer (KYC) solution. Offered in a three-tier system, the solution offers an end-to-end solution for KYC Screening from automated data sourcing to entity recognition, materiality identification, risk scoring, and workflow for manual reviews.

> “Collection of data with respect to the specific entity, combining different datasets to increase the volume, and labeling/ annotating the data accordingly was a challenge. Processing large volumes of unstructured data while maintaining a high level of availability and performance benchmarks had been a challenge. Setting up of scalable infrastructure and robust data management practices helped us over these challenges.”
>
> **Ashwini Bhole**
> Associate Principal, Head of Product Development for Financial Markets - eClerx

The KYC solution is extremely robust and efficient and boasts cutting-edge features like:

- AML Screening workflow to process entities in bulk or on-demand, provision to accept/ reject risk and screening results to the AML officers and override the system decision or commentary
- AI-based automated data sourcing from a wide range of sources to provide structured/ unstructured data using APIs, Robotics in combination with AI based text mining, using different techniques such as fuzzy matching, clustering, and computer vision to identify the right entity and data points
- NLP-based Material News Identification on large volumes of unstructured news articles for entity identification, co-reference resolution, and sentiment analysis to identify material articles related to AML and derive inferences from the extraction information
- AI-based fuzzy matching algorithm to identify true hits and the entity in scope
- AI Entity Summarizer component summarizes the rationale for risk calculation of each KYC entity and justification for the materiality of the entity in scope for decision making
- Risk scoring algorithm that auto-calculates the risk score based on materiality and severity scores across different articles based on reputational, geographic, and sanctions as the major key factors. This algorithm ensures that it learns and improves iteratively based on manual reviews

The screening application helps in reducing the turnaround time for case processing and provides clear visibility on how the inferences are drawn. It, thus, managed to garner high confidence from the customers. The application has increased the output by 85% while reducing the turnaround time by 75%. It has also brought the overall cost savings to the tune of USD 4.5 million for large banks to USD 0.75 million for smaller asset managers.

The organization plans to onboard more of its existing KYC clients on its screening platform, and add more data sources and multi-language support to attract other geographic markets. To achieve that, it has set up continuous learning models to make its AI components more robust and reliable.

Talking about the challenges the team said, "Huge volume and a wide variety of data sources and data formats is the key factor that makes the AML screening process extremely challenging and time-consuming in the client onboarding process. While some part of the data is structured, most of the volume comprises unstructured data, which calls for intelligent data processing. Given the size of organizations we serve, the volume of data processed runs into many TBs on daily basis."

"Collection of data with respect to the specific entity, combining different datasets to increase the volume, and labeling/annotating the data accordingly was a challenge. Processing large volumes of unstructured data while maintaining a high level of availability and performance benchmarks had been a challenge. Setting up of scalable infrastructure and robust data management practices helped us overcome these challenges", the team added.

> Our vision is to offer the most reliable AI-enabled screening solution for organizations of various types and sizes. Through this solution we want to enable financial institutions to consider a wide variety of datasets to identify potential risks.
>
> **Ashwini Bhole**
> Associate Principal, Head of Product Development for Financial Markets - eClerx

EDUCATION
GAMECHANGER

Smartail Private Limited: AI Grading of handwritten descriptive responses

- **Computer Vision**

India has always been known for its bright minds and scholars across the globe. Indian education has been applauded on several occasions. Education is rightly called the door to a better future.

COVID-19 taught us how we need to create an education system that is not confined to the school classrooms. Teaching and learnings needs a new dimension with the help of technology. This amalgamation of technology and education is changing the education landscape.

One such EdTech startup, Smartail Pvt Ltd, was incorporated in Nov 2019 in Bangalore. The passionate team of industry experts from software development domain and academia at Smartail are working to solve the real pain points of education community with respect to assessment, grading and learning gaps with the help of Artificial Intelligence.

On an average 3 out of 5 educators/teachers clock 50+ hours a week, 30-40% of their time is spent on assessment planning, evaluation, grading, feedback and resulting in reduced time towards direct interaction with students. This leads to an impact on overall teaching-learning process, quality, remedial on learning gaps and pedagogical decision-making.

> Though there have been huge advancements everywhere. The methodology that has been adopted in the school sector hasn't changed much despite the multitude of content that is available in the market. Our aim is to deliver the power of Decision science to educators through Artificial intelligence. We intend to provide them with never-before-seen data and insights to educators so that they can make data driven decisions.
>
> **Swaminathan Ganesan**
> Co-Founder & CEO, Smartail Private Limited

AI in Smartails

Smartails' DeepGrade is an AI based global product that streamlines learning, pedagogical decision making, assessment, grading, and feedback for educational institutions. DeepGrade's USP is that it is a blend of technologies such as CV, Deep Learning, NLP and is capable of grading handwritten descriptive answers/content/student responses. The software is one of its kinds which claims to be a pioneer in young adult handwriting recognition.

The solution provides deep insights into real learnings gaps, understanding pin-pointed gaps and conceptual gaps along with spelling, grammatical errors from what is being taught by the educator to both educator and learner. Additionally, it also helps plan remedial

> Deepgrade app is very useful to our teachers, we are able to easily understand what students need now using this app. Moreover, students also use this app and find it easy to connect with us like doing homeworking and checking results.
>
> **Arul Kanmani T**
> Science - Teacher Maranna Gowder Matriculation School, Coimbatore-1, Tamil Nadu

actions, upskilling and overall quality improvement with the help of AI.

Swaminathan Ganesan, Co-founder and Chief Executive Officer of Smartail, is a solution based technology specialist and a product leader. He is the architect of the product's strategic direction and is leading Smartail through the transformation that is defining a new era in the Education industry with AI.

Aslam Sherieff Jahir Basha is the Co-Founder and Chief Growth Officer of Smartail, who is working towards the increased product adoption and overall revenue growth in the Global Market.

Kannan Ganesan, Chief Technology Officer of Smartail, is a solutions architect specialized in leading the practice and introducing design, describing, and managing the solution engineering in relation to specific business problems in the IT industry.

DeepGrade can evaluate both handwritten and digital content. It also allows you to create your question repository more efficiently. The intelligently crafted scoring schema will enable near human grading of student content.

The solution is crafted by keeping both the teachers and students in mind and it allows students to submit their homework, assignments, worksheets even from their smart phones. The product brings the power of AI in improving daily classroom studying, teaching, exam, test, and home work. This allows teachers a window for quality time spent with students in better concept clearing and student interactions.

Natural language Processing (NLP) powered context grading methodology of DeepGrade evaluates each content for its intent, meaning, similarity and many such parameters to provide near human accuracy in content Grading.

> Deepgrade gives a unique identity to our teaching. It supports teachers in every way like sharing auto gradable homework, AI Grading for exams and more.
>
> **D. Azhaghu Prabha**
> B.Sc., B.Ed., Mathematics -Teacher Maranna Gowder Matriculation School, Coimbatore-1, Tamil Nadu

Smartail's vision

Smartail believes that "One size fits all" methodology in teaching is gone and we need to understand that each student is skilled in different subject areas. Traditional way of teaching and assessment with no insights about students doesn't bring out the real strength of students. AI assisted assessments help teachers, students and administrators to bring out the best in students, thus taking the overall quality of education to a new different level.

With DeepGrade's learning assessment module, one can diagnose the results of the teachings with assessment. This provides the ability to measure concept understanding and identify learning gaps to improve learning.

The startup recently got selected for #RevvUpcohort2 startup acceleration program by the Telangana AI Mission (T-AIM) & NASSCOM AI mission.

The solution is already under trial in 70+ schools with 16+ paying customers. The product has been implemented as a pan India product, urban and rural in Tier1 and Tier 3 towns and is looking to gain traction and momentum in international market for early adoption (CBSE Schools – Middle East).

AI has taken the Education Sector to a new level where it adds immense value by providing deep insights about Teachers' teaching methodology, Students' learning methodology, identifies learning gaps fast and accurately, helps administrators in efficiently managing their tasks and much more.

The nation needs more scholars who can compete at global levels, requiring top-notch and innovative teaching and learning methodologies. The learning process will be enriching and exciting with such initiatives and increasing awareness.

EDUCATION
CHALLENGER

CogEdS:
Upskilling India's language skills

- **NLP**

India has one of the largest education systems with over 32 crore ESL students. Although this base is technically sound, they face the brunt when it comes to communication. Communicating effectively and confidently in English is the biggest nightmare for the majority of Indian students and the biggest hurdle preventing them from achieving their dreams.

The current communication and training model in India has the following loopholes:

Besides providing a speech coach to all the learners is not cost-effective and scalable. To overcome these challenges, CogEdS has developed an AI powered-on-demand-personalized communication coaching platform.

What is the solution?

CogEdS Orai is an AI-powered on-demand personalized Communication Coaching platform that combines cutting-edge technology with cognitive psychology and provides solutions that are robust, reliable, and resilient.

The AI-powered algorithm learns from more than one crore voice samples across the globe to improve accuracy. The tool measures communication scores based on speech disfluency metrics viz. Pace, filler, energy, clarity, conciseness, and confidence. It then analyzes users' disfluencies and delivers tailor-made solutions.

The tool looks at the use of language, repetition of points, and phrasing to eliminate verbosity. It also looks for multiple signals in a speech and offers feedback and refinement modules.

How does the solution scale?

The AI-powered solution measures and improves oral communication skills and helps with interview preparation. The app provides:

- Instantaneous score
- Personalized feedback
- Instantaneous feedback immediately after recording based on six speech metrics i.e., conciseness, confidence, filler words, energy, pace, and confidence
- State-of-the-art facial recognition feature to gauge if the user was happy, neutral or sad while delivering the speech
- Scalable and affordable professional speech and interview coaching
- A practice platform and AI-driven feedback to close the learning loop

What is the impact of the solution?

The solutions have been implemented in colleges and corporates across India and offered 17 to 24 % improvement in their oral communication skills within a month.

CogEdS aims to be the next billion-dollar company in the segment of oral communication. When asked about the organization's future plans, a representative quoted, "There are two key things in our product roadmap. One, we want to make our platform the Grammarly for oral communication. Two, build a communication/interview Metaverse to onboard more web users and increase the learner engagement."

The organization's mission is to take the application to 32 crore students across India and help them communicate with confidence and job-ready.

What are the unique features of the solution?

Data Center and Network Security

Orai hosts all of its software and data with industry-standard providers such as AWS and Google Cloud's facilities in the USA. All of Orai servers are located within Orai's own virtual private cloud (VPC), protected by restricted security groups, allowing only the minimal required communication to and between the servers. Orai conducts third-party network vulnerability scans at least annually.

Data Security

All connections to Orai are encrypted using SSL. Any attempt to connect over HTTP is redirected to HTTPS. Data access and authorizations are provided on a need-to-know basis and based on the principle of least privilege. Access to the production system is restricted to authorized personnel and is carried out using a VPN. Orai enterprise customers may configure a custom data retention duration with us.

> In a country like India, students are good technically but when it comes to articulating their thoughts orally, they find it really difficult. Hiring a speech coach for every student is not scalable and cost-effective so we wanted to build an application/platform which can replicate what a speech coach does and quantify this soft skill called communication and give it a number without any bias.
>
> **Kaushik Murali**
> CogEds

Application Security

Web application architecture and implementation follow OWASP guidelines. Orai login requires strong passwords. User passwords are salted, irreversibly hashed, and stored in Orai's database. Audit logging lets administrators see when users last logged in.

Application Monitoring

All access to Orai applications is logged and audited. Logs are kept for at least one year. Orai maintains a formal incident response plan for major events and a publicly available system-status webpage which includes system availability details, scheduled maintenance, service incident history, and relevant security events.

HEALTHCARE & LIFESCIENCES
GAMECHANGER

Datafoundry:
DF mSafety AI: Automated & AI-powered Safety Platform

- **Pharmaceutical**

Datafoundry's integrated solution has - DF mSafety AI, which is based on secure, scalable, resilient and compliant cloud services with advanced machine learning and deep learning capabilities that enable pharma companies and CROs (Contract Research Organizations) to overcome the challenges they face with legacy Safety systems.

Datafoundry brings the power of AI/ML to the Life Sciences and Healthcare industry for better health outcomes. The team of experts, data scientists and software developers built best-in-class AI models to deliver insights and process automation to crucial business processes to enable the digital transformation of Life Sciences companies.
The company's current focus areas include Pharmacovigilance, Literature Research, Labelling, and Real-World Studies.

The past two years, as the world struggled with the COVID-19 pandemic, it brought to the forefront the importance of healthcare and Life Science as the need of the hour, giving companies opportunities to execute efficiently, engage effectively, and innovate new products and services. At present, the global health trends indicate a greater need for patient-centric strategies to ensure safer treatments and better health outcomes. The impact on patient safety due to weak and largely manual safety vigilance for drugs, cosmetics and medical devices needed to be addressed.

Global pharma majors spend billions of dollars each year on product recalls, labeling issues and failed clinical trials due to safety issues. The timelines for safety case processing and submission are not being met, leading to poor risk management and a greater risk of adverse events affecting the patients and increasing health issues. Datafoundry observed that

> I believe in 'making data simple' to solve real-world problems. With our leadership team's background in Life Sciences and technology, we believe that using AI can help improve health outcomes and increase the productivity of all stakeholders, moving them up the value chain. The domain of drug safety/pharmacovigilance requires the intervention of technology. AI/ML to make drugs safer. Hence, the focus on AI-driven automation for safety vigilance.
>
> **Vivek Kalagara**
> CEO, Datafoundry AI

one of the biggest problems was the inaccuracies in safety case intake impacting the causality assessment and further actions to protect patients. In countries like India, the increase in the volume of adverse events was far more than in other countries across

the world. There was also a lack of structured data hampering process automation and insights, which were observed by the team of Datafoundry.

The one-point solution that could address this problem was the adoption of AI-driven automation and an integrated approach to Safety Vigilance.

The product overview

Datafoundry developed a product called DF mSafety AI utilising AI-driven automation and digitalization capabilities to deliver the core functionalities of the Safety system. The program gets the case intake from multiple sources, which is then automated using the ML models for OCR, NLP & text analysis. The solution utilizes RPA to create automated case workflows, NLG for automated narrative writing, Automation of Seriousness Prediction, Causality Assessment and Expectedness, and ML-assisted medical coding using WHO-DD & MedDRA drug dictionaries. It also uses ML models for signal detection from Real-World Data (RWD) and OCR and NER models for monitoring medical literature articles for Safety Vigilance.

The challenges faced

The startup, Datafoundry, also faced a challenge in Pharmacovigilance which is the long process of collecting data for a safety case and the multiple review cycles to ensure the data is credible. In addition, to automate this process, organizations need to have structured data sets in place, which is not the case with most Pharma, Bio-tech, and Cosmetics companies. AI-driven automation and advanced analytics powered by ML models can deliver quick insights and predictions, which can help reduce the cycle time, improve compliance, and enable regulatory and other functions with insights on improving the safety and efficacy of the products. In such a case, analytics solutions work well when there is enormous data of good quality and there is a need to derive metrics and insights from the data for decision making.

Benefits of the solution

Datafoundry's integrated solution has - DF mSafety AI, which is based on secure, scalable, resilient and compliant cloud services with advanced machine learning and deep learning capabilities that enable pharma companies and CROs (Contract Research Organizations) to overcome the challenges they face with legacy Safety systems.

The AI components enable process automation and deliver analytics and insights to create efficiencies in the entire process - more gets done with minor human intervention. The solution allows medical reviewers to focus on severe cases and their causality and follow-up actions required instead of administrative tasks.

> Datafoundry's mSafety solution is quite user friendly and enabled reduction of human effort by 50% while allowing faster processing and more quality intake of safety cases. We are now looking forward to implement Datafoundry's Signal Management system for Safety.
>
> **Safety department head of a global Cosmetics company**

DF leveraged cloud services and data sets from US FDA and EMA adverse event databases and customer-provided data sets.

ML models and accuracy

While the ML models were built for safety case creation, it was a challenge to convert the business logic of Seriousness and Causality Assessment into a combination of rules-driven + ML model-based algorithms and deliver the required level of accuracy.

For case creation and narrative generation, the models work well with the test data sets, with close to 95% accuracy. As more data is fed into the ML models and continuous learning happens in a production-class environment, accuracy would improve further.

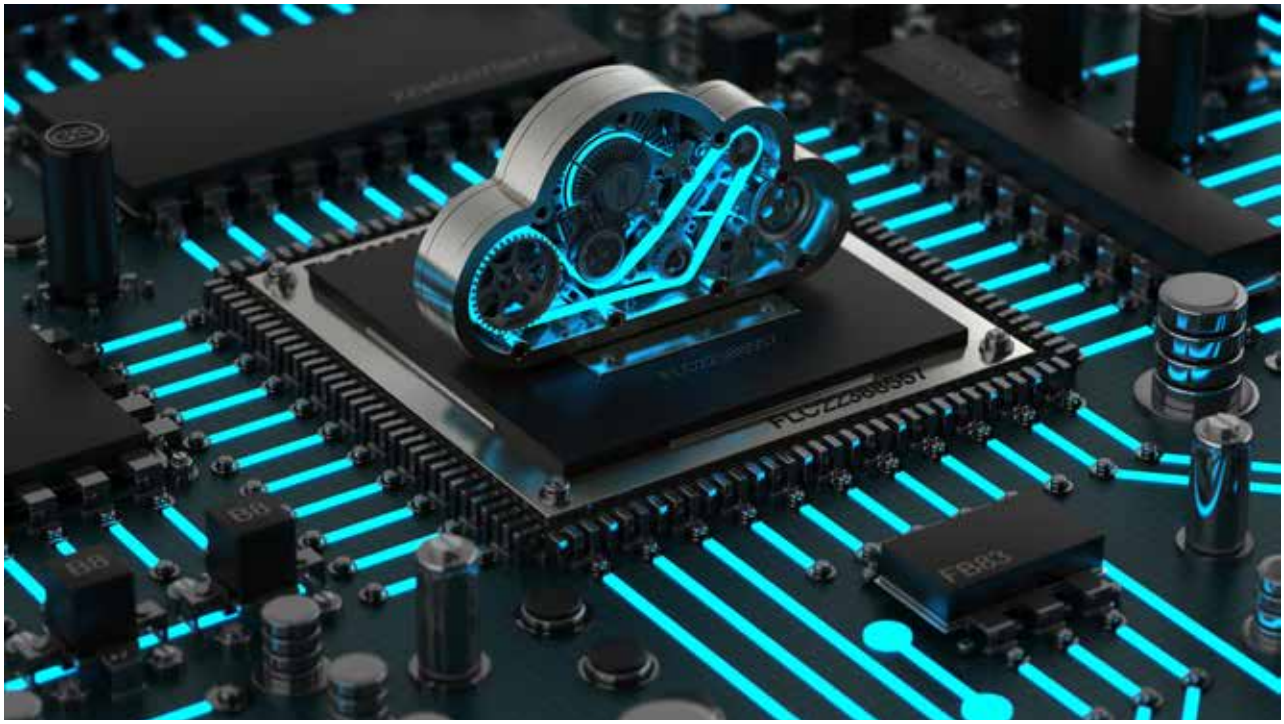
System's translation capabilities

This is part of the product's roadmap but is required for global implementation. Currently, the product supports English only but Datafoundry aims to provide a Safety system that can work with multiple languages/countries, including India.

The solution boasts of the first of its kind AI-powered automation to their customers. According to Datafoundry, the incumbent solutions cost millions of dollars to implement and are built on 20+ year old technologies. They require a system integrator and usually, the 'Go Live' milestone takes

more than 2-3 years. Small and medium-sized companies use manual processes, including Excel sheets, costing them time and resources. However, DF mSafety AI's implementation is inexpensive. It is a SaaS solution and does not require a system integrator service except for integrating in-house systems with the safety platform. DF mSafety AI offers best-in-class AI models to all companies needing Pharmacovigilance at an affordable and flexible model.

Datafoundry has implemented a robust Quality Management System (QMS), which includes processes for risk management, governance, Architecture and Design Reviews and formal ML Ops processes. It leverages the IaaS and PaaS services offered by leading Cloud Providers such as Microsoft Azure and AWS to ensure the technology infrastructure can efficiently handle the workloads and any security vulnerabilities immediately be addressed.



HEALTHCARE & LIFESCIENCES
CHALLENGER

InMed Prognostics Pvt. Ltd: Enhanced brain health with AI

- **Deep Learning**

In-Med Prognostics is a health-tech firm that develops artificial intelligence and machine learning-based tools to help neuro-radiologists, neuro physicians and psychiatrists understand the brain better and the effects of different conditions. The tool developed by In-Med Prognostics has developed a Health Tech tool to provide volumetric analysis of the brain MRI. This tool could benefit doctors in determining Anaemia and other non-communicable diseases in the pre-screening stage.

Once the Volumetric analysis of the brain is done, it permits brain scientists and doctors to measure brain volume in patients suffering from medical conditions known to cause volume loss in the brain. The doctors then compare those patients' MRI scans to the database of theoretically regular patients to see whether volume loss has occurred, giving them a better understanding of the situation and helping them make the soundest medical decisions.

The problems diagnosed by In-Med Prognostics

Volumetric Analysis of brain MRI images is a crucial step in assessing various Neurological diseases. However, the assessment is performed through naked eyes or time-consuming manual segmentation. This assessment can be subjective with poor reproducibility of reconstructive surgery techniques. Owing to this problem, In-Med Prognostics developed a tool that delivers fast, accurate, and objective analysis of the Brain. MRI images are necessary to act as a clinical decision support tool for Neuro-Physicians.

The neurologist to general population ratio across the world is 1: 85000. India approximately has only 3666 registered Neurologists (members of the Neurological Society of India and the Indian Academy of Neurology) to cater to a Neuro diseased population of over 30 million estimated.

The team at the startup claimed that as longevity increases in India, the number of patients who have dementia, Parkinson's disease, strokes, and other age-linked diseases is expected to increase exponentially. Therefore, moving brain health into the preventative space can normalize mental health. An objective and faster analysis have the potential to save millions of lives, which In-Med Prognostics has developed.

AI in the model

Artificial Intelligence is at the heart of the solution built by In-Med Prognostics. The tool utilizes 3D MRI images instead of a considerable amount of time to manually process these images and derive any information from them otherwise.

With the introduction of AI and Deep Learning, the tool can automate these processes and do statistical and mathematical operations on data quickly and efficiently. Also, AI allows the tool to make the algorithms complex at the low level while

making them simple and easy to fine-tune at the higher level.

Moreover, an analytics-based approach assumes the existence of a function to map the inputs to outputs. However, the In-Med Prognostics data is highly complex to extract quantitative information from 3D MRIs. Considering the situation, the tool needed an intelligent algorithm that could learn heterogeneities by itself from the multitudes of data collected through Deep Learning.

Features of the model

The tool is a web-based solution with cloud storage to save multiple files and MRI scans. The solution provides ethnic Specific Comparisons and is IoT-enabled and clinically validated.

Neuro-Shield is an automated quantifying analytics tool or a cloud platform that uses AI and provides insights to physicians as a clinical decision support tool. It uses 3D brain MRI images, calculates volumes and atrophy percentages, and identifies patterns compared to its proprietary Indian reference ranges. The proprietary algorithms are developed using deep nets and trained to identify the specific features and extract the same from 3D MRIs of the brain using NVIDAs GPU. The solution is deployed on its cloud by deploying state-of-the-art infrastructure to deal with medical data and integrate seamlessly with the hospital's radiology departments.

A scan of the challenges faced by In-Med Prognostics

Since there are multiple vendors and different MRI fields strengths like 1.5T and 3T, the datasets from these other machines bring inherent characteristics that must be considered and neutralized without affecting the quality of the image.

Being 3D in nature and having different resolutions and matrices, the data requires special pre-processing before anyone can use it.

What makes the solution stand out?

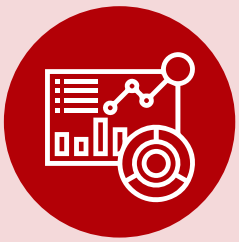
The uniqueness of Neuroshield lies in the fact that it compares the volumetric information of the MRI with the reference range developed exclusively for the Indian population by In-Med Prognostics. This is one of the reasons India didn't adopt other products, as the reference data was not relevant to the solution.

This ethnicity-based reference is a new cost-effective approach to using data analytics relevant to different populations, making it accessible to all and helping improve the diagnosis of brain-related diseases.

TRANSPORT & LOGISTICS
GAMECHANGER

Chaob Technologies: Revolutionizing the motor industry with Carscan

- **AR & VR**



Carscan is an AI & AR-based vehicle damage inspection app that provides tamper-proof vehicle health records on Crypto Ledger. It has an AI (Computer vision) on Edge for mobile browsers enabling augmented reality/Web3. Carscan can create Data-Synthesis and data automation.

Carscan, a first-of-its-kind Vehicle Inspection Technology in the motor industry, is an intuitive application that uses computer vision and ML to scan vehicle damages and furnish real-time vehicle health conditions and repair estimates. In addition, it minimizes the time required to complete analysis and submissions due to a lack of quality images of the vehicle condition or communication between the customer and enterprise. Now, one can detect and analyze vehicle exterior, wheels, and glass damage with one scan from your smartphone.

For a car enthusiast, it is imperative to keep track of the vehicle's condition to get a fair resale value or even claim insurance. Carscan puts this worry to ease as it is designed to track the visible state of cars throughout their lifecycle. The company's AI-enabled application creates an accurate and traceable digital record of a vehicle, enabling automotive ecosystems to buy, sell, rent, service, insure, finance, and auction cars confidently.

Roadmap of problems identified

The team at Carscan found out that there was an absence of accurate imagery and tamper-proof data of the vehicles available in the public domain. Automotive damage to the vehicle validates a transaction while buying, selling, insuring, maintaining, trading, renting, leasing, hiring, or auctioning. There was also a lack of an intuitive

> Mostly my passion for innovation and wanting to build an innovative product that can really make a huge difference in the world. Co- founder Chander and I were working in the property industry when we started looking into the automotive space. We realised most people spend a lot of their savings on an expensive asset, which is their car. So, it's very important to take care of such assets. I wanted to utilize my skill sets in data and AI which I have spent most of my career with as a base and noticing a gap in the market and filling that gap in the market.
>
> **Daniella Kofsky**
> Marketing Executive

application to create a hassle-free experience for the customer and minimize the time required to complete a successful submission due to the lack of quality images of the vehicle's condition and the customer's understanding of what is required by the enterprise.

Due to fragmented solutions, there was also a lack of a consolidated solution in the automotive industry for proper estimations, valuation, finance, parts, health certificates, trade-in offers, lending, and vehicle history. In addition, there was no vehicle profiling to get qualified lead with exact needs across the ecosystem.

A walkthrough of the technical description

- It is an AI-assisted browser-based vehicle damage inspection app
- Carscan is a SaaS-based app
- It Uses AR to handhold the user through the entire successful assessment process
- Records details of the vehicle's exterior, interior, tyres, and windscreen over 120 data points
- Validates the presence of blur, noise, and inadequate lighting to ensure the quality of images
- It validates the angle and distance of the car to assist AI for better accuracy on the vehicle's health condition
- It identifies the presence of obstacles
- It consolidates the vehicle data from multiple touchpoints in automotive eco-system
- Carscan provides AI-generated real-time inspections and reports to identify irregularities in the health condition of the vehicle
- It generates insights from the vehicle health data, identifies service requests, and then connects it to the right supplier
- Suppliers seamlessly integrate into the platform to use the vehicle health data to provide their services
- The platform assists Motor Insurance, Fleet Management, and Car buy and sell companies to expedite their claims, reconditioning, and trade-in processes by 90%, saving 30% of their cost, respectively
- Carscan is a vehicle data marketplace that allows sharing of an accurate, reliable, agnostic, and traceable digital record of the vehicle
- Carscan minimizes fraud, governance, and industry risks by integrating quantum ledger and blockchain technology
- It provides the user with accurate and tamper-proof data, a marketplace and a seamless integration experience

Obstacles that Carscan faced

The Carscan team needed a lot of data and a variety of data to understand a problem and solve it or automate it through artificial intelligence. Carscan tried to streamline the manual inspection process by using uncontrolled sources such as mobile phones.

> After using Carscan, nothing matched the flexibility and scalability, it provides us high value service at a low price point. We got what we were looking for as it's outstanding, powerful and easy to use. Carscan is an amazing App it has brought so much joy to our business. We love the user-friendliness and the AI capabilities. Well done team you guys are surely champions.
>
> **Dudley Davids**
> Director, PRTUMA

The first challenge was that every person takes pictures of cars differently. For example, lighting conditions may vary, it may have reflection glares, different camera angles, varying sunlight while clicking photos, rain droplets or dirt on the vehicle may also affect the photos, dirt on the car, etc.

The team also stated that training the model by collecting data for all scenarios is not always feasible, especially to accommodate for many scenarios. GPU infrastructure was very expensive, and a limited amount of time was available with cost constraints. Curating and protecting the large image dataset as well as a lack of data for each car model and colour vehicle.

How Carscan reached its Terminus

Carscan is an AI & AR-based vehicle damage inspection app that provides tamper-proof vehicle health records on Crypto Ledger. It has an AI (Computer vision) on Edge for mobile browsers enabling augmented reality/Web3. Carscan can create Data-Synthesis and data automation. It also gives feedback-based learning, including automotive Data – exterior, interior, mechanical, windscreen, bikes, trucks, and data insights – leads across the ecosystem, data marketplace for seamless integration platform for enterprise and suppliers.

The entire solution is unbiased and provides data privacy and security by masking all the necessary information. All personal information is masked, complying with international privacy regulations.

RETAIL & CPG
GAMECHANGER

Tango IT Solutions:
AI model to help drive increase in sales conversions

- **Computer Vision**

Chennai-based TangoEye has brought out an innovative solution — an AI-powered SaaS product for in-store video analytics. With their expertise, the startup helps brands understand shopper patterns in offline stores, thereby driving an increase in sales conversions at storefronts.

The problem at hand

Although several brands have taken a digital route, their physical presence cannot be neglected. In fact, large amounts of money have been spent on retailing and physical stores in the past. However, the issue is the lack of availability of efficiency tools and measurable metrics that can otherwise be accessed to assess e-commerce platforms. No wonder, there is a gap that exists today, which has cost brands big time, especially with regard to conversion metrics, lost sale opportunities, and employee efficiency at stores.

While engaging in research, the team at TangoEye realized that analytics is not enough, which is why they built an end-to-end software for retailers that helps track offline stores and maps them online via a mobile app. This is helpful to spur lead generation, customer retention, as well as allowance-based employee sales.

The solution

TangoEye, with the help of its solution, is helping retailers achieve their sale targets, improve their operational efficiency as well as have a secure environment to avert any emergencies that may happen at storefronts. What's interesting is that the plug-and-play solution doesn't require any capex investment in store.

> Our goal is to iron out friction with our initial set of clients in India and release it globally as a downloadable SaaS product. The product features will be beneficial for all retailers, be it small or large, or single store to multi-store. This will make every retailer a potential user of the software.
>
> **Surender Gounder**
> Founder, TangoEye

They leverage advances in AI in most aspects of their product. TangoEye's primary use case is around vision AI, wherein they use a number of neural net algorithms to convert video and image data into a digital system of record. Essentially, a digital copy of the physical activities is recorded in the store space.

Following this process, they derive insights from various ML and logical algorithms.

They have developed a solution that can help retailers solve the following problems:

Retail Eye	Customer analytics and insights to increase sales conversion at storefronts
Manager Eye	Staff analytics to benchmark and improve employee performance (beta)
Secure Eye	Real-time alerts of suspicious behavior to reduce shoplifting (under development)

A cloud-based product, TangoEye has an analytics layer that consumes data from the data lake, driving insights for their customers based on their consumption patterns. There is also a dashboard that covers the key features of the complete shopper journey, starting from the footfall up to the conversion. Additionally, they provide the validation of the data on the UI itself to build confidence and showcase the accuracy of the product.

Scale and impact

Initially, TangoEye had faced several infrastructural issues, which led them to zero in on a cloud-based solution that addresses challenges around data maintenance, processing, security, etc. Today, they have an end-to-end monitoring tool that tracks the sanctity and security of every bit of data on their platform. They also have policies in place that cover data lifecycle in various forms and stages. In addition, they are particular about data protection, apart from having segregated processing for clients.

> Retail remains one of the most vital drivers of modern trade. Adding intelligence and deep tech to one of the most essential aspects of retail, which is offline stores and store performance, seemed like the need of the hour.
>
> **Surender Gounder**
> Founder. TangoEye

Its solution is being heavily utilized by several reputed brands across industries like retail, hospitality, cloud kitchens, healthcare, and more. Nykaa, which is one of their most prominent clients has leveraged its tech to enhance the customer experience. “Accurately tracking our customer’s journey within the store has helped us optimize both the customer experience as well as our in-store operations and strategies. TangoEye has helped us make this happen,” says Mantosh Roy, Vice President, and Head, Retail Operations, Nykaa.

Currently, their tech has been deployed in 10,000 active stores; in the future, their vision is to tap into diverse markets globally. Having successfully built the first layer of accurate data tracking and analytics, they want to take a step further and help brands optimize store revenues and incentivize staff performance.

As a hardware-free SaaS product, TangoEye’s solutions are highly scalable. The entire product, right from the onboarding, validation, and analytics has been built to scale and address a need in the global market.

RETAIL & CPG
CHALLENGER

Absolutdata Research and Analytics Solutions: Planogram compliance enablement with artificial eyes and AI

- **Food & Beverage**

Absolutdata Research and Analytics is a robust, fully automated, and scalable solution that generates business insights for reducing the myriad man-hours spent on regulatory compliance of positioning and placement of retail goods. In addition, the data collected, business insights generated, and compliance intelligence can be shared with the relevant stakeholders immediately.

Beneficiaries:

A Global Food and Beverage giant in its Mexico unit (Sales Team)

Problems in stock:

Millions of dollars are spent in the CPG retail stores by manually monitoring the aisles, racks and equipment to check for availability, product facings, stock-out situations, etc. The process is expensive, time-consuming and manually taxing. Due to sub-optimized monitoring and limitations of human inputs, the stock-out situations and inadequate placement of products lead to significant unearned revenue. Moreover, the wide variety and distribution of products require training for sales representatives, which is challenging.

Manual compliance of planograms has ancillary challenges like friction between store owners and sales representatives regarding the compliance discrepancy.

The manual maintenance and adjustment of specific planograms are rarely a realistic alternative.

Solutions in-store:

01 The AI-led automated solution is equipped with advanced image processing methods and modern deep-learning-based computations to study the planogram, out-of-stock cases, gap scan, shelf coverage and SKU performance. The solution can use artificial eyes (cameras and images) and artificial intelligence to mine the data for several use cases.

02 The AI-led automated real-time Retail Shelf Monitoring enables the supply chain stakeholders to take an informed and judicious call in time for replenishment/replacement of stocks. It also helps remove and replace the manual operation of sales representatives.

Role of AI and technical specifications

This state-of-the-art image intelligence solution uses Deep Learning (AI) techniques to provide a scalable, self-learning and self-service solution for the auditors or sales representatives that utilizes multiple modules, each powered by cutting-edge computer vision-based object detection and classification algorithms. Furthermore, as the model components are modular, they are readily usable and can be deployed in a client's environment with a plug-and-play approach. Besides, it helps gather more frequent and accurate data with limited human guardrails.

The Computer Vision solution comprises multiple modules, including Pre-processing, Exploratory Data Analysis, Deep Learning modelling, Post-model processing, and Production Pipelining, powered by cutting-edge object detection and classification algorithms, including ResNetV2 and YOLOv5.

Every module is a part of the high-end Azure Compute Pipeline, which uses GPU compute engines at the back-end. The complete solution can run a Docker container.

The detection model determines the location of products, racks and rack rows. This spatial information is further processed and passed into a Classification model determining the type of product in the rack. Finally, the interim output goes through the post-model processing module and other checks (for image quality, missing entities and edge cases). After that, it is further passed into the Compliance module, which ascertains the degree of planogram compliance by combining the spatial and product information and comparing the location and type of the products with the actual image.

Impact:

This image-based in-store retail rack insights and compliance generation solution has rendered astonishing results to the client with minimal supervision. In addition, it has worked with internal sales (POS) and CRM data to amplify recommendations and quickly evaluate the productivity of owned assets.

> Working on this project was a journey toward gaining, implementing and validating complete ML, DL, & MLOps knowledge. The freshness and complexity of the project helped the entire team go above and beyond for R&D and application. In addition, this project enabled us to see the holistic technique of how a slight change in an algorithm or an Ops process significantly impacts a business metric. We at Absolutdata offer add-on values with our solutions and products by supplying what is best for them through our expertise.
>
> **Richa Kapoor**
> Global Lead - Marketing and Communication, Absolutdata Analytics

Revenue optimization:
Real-time inventory management, so no sales loss because of out-of-stock situations.

Operational efficiency:
With lesser human resources and man-hours, a single sales representative can target more shops.

Customer experience:

1. Reduces chances of the store going out-of-stock.
2. Planogram enforcement creates awareness of product spatial information among customers, so it's easier for them to find their favorite product, as the location of products in the racks is standardized.

AGRICULTURE
GAMECHANGER

Praman AI:
Transforming agri-trade with AI

- **Computer Vision**

Praman AI is India's first Horticulture Exchange, with advanced AI-based technological solutions to streamline quality processes across the Cardamom trade. It creates an equitable and systematic trading market between buyers and sellers to promote the best quality products to the buyers and yield good returns for the seller. The solution has been designed to set the path to automation and standardization in the cardamom industry.

Colour is the most crucial aspect to consider for the quality check of cardamom, one of the oldest known spices globally.

Earlier cardamom trading followed a traditional physical auction system riddled with information asymmetry. There were many difficulties in trading cardamom for the sellers and buyers. To end these crises, Praman AI powered by Intello Labs, came up with one of its kind solutions and the first in India post-harvest Quality assaying of cardamom to enable digital trading.

Challenges Faced By Farmers And Auditors

The Praman Exchange, an Agritech Startup launched in 2021, has facilities of spot trading, e-auctioning and reserve auctioning that can make trading of the commodity simple for the buyers and sellers.

- Before the arrival of Praman Exchange, there were limited buyers due to licensing and geographic constraints of the trading process.
- The growers and sellers faced declining profit margins due to price disparities and a lack of quality control.

> We are pleased to give the cardamom trading process a digital makeover, driving geographic expansion and market outreach. This initiative is a step further in establishing Praman AI as a leader in the agritech space. We've set the path to automation and standardization in the cardamom industry. The revolutionary Exchange addresses all the pain points of buyers and sellers and corrects the traditional procedures by providing transparency in transactions, promoting price discovery via market linkage.
>
> **Saurabh S**
> CEO, Praman AI

- Since cardamom is a commodity that absorbs moisture from the atmosphere and fades its

colour on exposure to sunlight, the quality of the sample may deteriorate if not appropriately distributed in the stipulated time.

- Moreover, the trader typically gets 7 to 10 seconds to observe and assess the quality of the spice and bid on it. There is a potential margin of error owing to manual subjectivity and further complicated price discovery.
- Malpractice like the artificial coloring of the spice may also go on, which leaves the buyer cheated and with a low-grade cardamom lot. The buyers also complained that the value addition process of cardamom is labour intensive and it becomes difficult to supervise the process accurately.

Seeing these challenges, Praman AI came up with a unique solution that features a digital platform augmented with innovative design and new age data integration through constant wisdom from the current industry best practices.

AI in the model

1. The cardamom application is web-based and can be accessed from anywhere.
2. Praman's Ontello Grade Machine possesses cutting-edge AI and computer vision technology to grade each pod of the sample to provide quick, objective and accurate distribution of pods across the size, color, litter weight, and health spectrum used for the bidding process.
3. The platform is designed to allow smooth auctions at multiple locations, potentially increasing the buyer numbers to all registered members with the auctioneer. The buyers can also access accurate and real-time quality grading through Praman's proprietary technology.
4. Compared to manual methods that are only 70 % accurate in grading the quality of the spice, Praman's quality assaying technology is 95 % accurate.
5. Besides having the largest repository of images (over 300 million) for quality mapping, Praman AI also offers several different assessment tools that give a 360° view of the pod to assess the size, colour, litter weight and defects.
6. Praman AI with over Rs 5000 crores in annualized trade value, also facilitates spot trading, e-auctioning and reserve-auctioning for other commodities. This includes fruits and vegetables like onion and apple. It also uniquely underwrites the quality risk of the traders and guarantees settlements through smart contracts.

Impressive outcomes

In the next 6-24 months, Praman AI plans to capture similar trade markets of commodities such as cumin, black pepper, area nuts, cashew, and almonds.

By ensuring a quality mapped cardamom trade, Praman Exchange, in a short span, is able to achieve:

- Zero produce loss trade in 99% of smart contracts
- Provided 12 % higher price realization to farmers
- Settled over 15400 Tennessee of cardamom trade in domestic markets dominating over 70% market share of cardamom trade in India

AGRICULTURE
CHALLENGER

Cropin Technology Solutions: A geospatial AI tool for monitoring food security

- **Demand Forecasting**

Cropin, a private entity, has built the world's most extensive farming data insights over a decade, spearheading a global 'Ag-intelligence' movement with a knowledge graph of 488 crops and 10000 crop varieties in 56 countries. With its AI/ML platform tailor-made for the agriculture ecosystem, Cropin has computed 0.2 billion acres of farmland in 12 countries, covering 24 major commodities.

Since childhood, we are taught not to waste food, but we live on a planet where entire nations consume food wastefully while millions die excruciating deaths with not a grain to eat. Nutrition is vital for existence, and agriculture was the first significant accomplishment for humans toward building a civilized society. According to Cropin, the world population will grow to upwards of 10 billion by mid-century. This growth combined with urbanization will require food production to double to succeed. We now need innovative solutions for food, feed, and fiber.

To fight the future hunger crisis, Cropin Technology Solutions developed an AI platform that is globally scalable. Incorporated in August 2010, the company has been determined to compute 1/3rd of the world's agriculture assets by 2025, creating a planet-scale impact in the agriculture and food sector. Cropin's passion is to develop and deliver the kind of multi-dimensional predictive intelligence that could transform the entire Agro/food ecosystem. Cropin caters to Food, Agriculture, Governments, Retail, and FMCG beneficiaries.

Cultivating problems identified by Cropin:

Cropin works with the Nigerian government and closely observed that wheat is a vital food crop in Nigeria.

> When we started Cropin in 2010, there wasn't a category out there called Agritech. This was despite the fact that there were a host of unaddressed and deep rooted challenges faced by the farmers and the agriculture sector in general. Out of this inherent need, Cropin was born based on our philosophy to transform the agri-food industry by bringing intelligence into the traditional farming practices. The core of our existence is to help in accelerating progress in the agriculture ecosystem every day. Cropin's decade-long journey started with a small office space in Bengaluru and our outreach expanded to 6 continents now. Over the last decade, Cropin has built the world's largest farming data insights, spearheading a global 'ag-intelligence' movement hosting knowledge of 488 crops, 10000 crop varieties in 56 countries.
>
> **Krishna Kumar**
> Co-Founder & CEO, Cropin

Despite favourable climatic and edaphic conditions, wheat production in Nigeria was minimal, with legacy systems and traditional farming practices followed. Moreover, Nigeria continues to rely heavily on wheat imports and the country is in dire need of accelerating domestic wheat production. *According to a recent report by FAO, 19.4 million Nigerians will face food insecurity by August 2022.* To grow Nigeria's wheat value chain, the Federal Ministry of Agriculture and Rural Development has to develop a national and systematic data collection on where and how wheat is grown across the country.

How AI puts food on the table:

As a case study to highlight the role of AI in estimating food security, Cropin took Nigeria projecting the risk and is ranked from minimal insecurity to Famine. Cropin discovered that the north-eastern part of Nigeria is especially in crisis and emergency.

Acreage and yield of crops can give an idea of the current food security production and if it meets the current population needs. These are usually estimated by a distributed sampling of fields across the country or a region and extrapolating that information to the entire region. The process involves intense coordination, including field training for staff.

Thanks to Cropin's Ag-intelligence platform, it's now possible to understand the ground realities from space. A fundamental challenge is the identification of crops from optical and radar satellite images.

Cropin's platform is built on years of digitised farmland information collected over a decade from across the globe and combined with deep agronomy knowledge and AI.

- The company used the framework to predict and forecast the yield/production of the wheat crop for 13 states in Nigeria's Northern region.
- It then calibrated the wheat crop signature pattern recognition and ML algorithm for this new geography.
- The yield is then estimated using a biophysical model that combines remote sensing data and weather data.
- The tool uses country-level multispectral optical satellite data (Sentinel 2A/B) for crop detection, ground-truthing, and crop-specific knowledge. The yield model was predicted by evaluating weather data, daily weather data obtained from a weather station, which provides complete meteorological variables such as precipitation, temperature, wind speed, humidity, and other auxiliary data.

Food security puts forward an unsolved global challenge low yield and crop failure:

It is predicted that vegetable and legumes yield will drop by 35% by 2100 due to water scarcity and increased salinity. Currently, 35-50% of food produced goes waste annually, resulting in 25% freshwater wastage. Given the complex challenges in the food and agriculture industry, it is essential to enable Food Safety for billions of people by providing Productivity, Predictability & Traceability solutions.

Responsible AI is the answer to this critical global problem.

Cropin's AI model brings predictive intelligence to every acre of the world's cultivable land to build true 21st-century agriculture. With its AI/ML platform tailor-made for the agriculture ecosystem, Cropin has computed 0.2 billion acres of farmland in 12 countries, covering 24 major commodities.

Cropin's Technical Expertise

Uses Platform Architecture Medium Resolution Optical.

Radar satellite data (10m resolution) are used as input (spectral and spatial data) and overlaid on the geo-fenced farm plots (>1Ha), which are part of the Smart-Farm Cloud database having crop type and lifecycle information across geographies.

A master trained model is deployed on the Cloud on the newly acquired satellite data and the crops are identified along with yield estimated.

BUSINESS INTELLIGENCE
GAMECHANGER

Tenzai Systems:
AI based procurement planning and funding solution

- **Procurement Planning**

When we watch movies like the Terminator or I-Robot, one common theme we observe is the use of Artificial Intelligence as the central plot. While these may have seemed like a fantasy once upon a time, these are far from being fictitious now. We are already heading towards an AI-enabled society, or safe to say, we have already stepped into the Artificially Intelligent ecosphere. After all, the majority of people own AI-powered Android phones/ devices.

The global market value for Artificial Intelligence is projected to grow from USD 387.45 billion in 2022 to USD 1394.3 billion. Not just that, AI will be the reason for the Global Economy surge by USD 15.7 trillion US Dollars by the year 2030. Today, more and more companies are investing in AI technology.

Less than 15% of businesses are deploying AI capabilities in their work and business processes. The reason is businesses know AI can help solve most of the business challenges, but the burning question is HOW?

Purpose-driven AI

The true potential of AI can be extracted to get powerful outcomes when we realize AI is more than technology. The expectations can become reality in business when you ask the right questions to find answers amidst the chaos. All the data that is churned out can only make sense when you approach it with a purpose. And that's where Tenzai comes to the rescue.

Tenzai was founded to use the transformative power of data science and assist businesses to meet strategic and operational objectives alongside optimizing costs, revenue, customer experience, and profitability. For

> Today more than 80% of AI projects fail or don't meet expectations. We realized to make AI impactful, you need to move beyond a tool-based approach. Enterprises need a comprehensive approach that ranges from AI strategy to implementation and change management. Purpose-Driven Framework is a collection of tools, accelerators, best practices, and blueprints that ensure our customers' seamless implementation and adoption of AI.
>
> **Senthil**
> Co-Founder, Tenzai AI

instance, Tenzai is helping businesses in automating most of the manual processes to reduce processing costs and timelines. Data gained from the automation provide powerful insights to decision-makers in making crucial changes and help them stay ahead in the game.

The Tenzai approach

The 4-view approach of Tenzai, sets them apart allowing them to understand current challenges and offer feasible, realistic, and progressive solutions. Some of the features and benefits that stand out include:

01

Purpose Built
Tenzai focuses on developing AI solutions with the right design, architecture, and processes that are truly aligned to the core purpose of the business. Their purpose-driven engineering ensures that the data and AI are in line to demonstrate tangible outcomes and measurable impact.

02

Empowering Users
Tenzai approaches the AI solution development with the end-user in mind. At the end of the day, it is the companies who are going to be integrating this into the business systems and need to be comfortable using it. Tenzai drives end-user adoption by engineering user experience from the ground up and does not overwhelm them in the process. AI simplifies the day-to-day tasks allowing the users to concentrate on long-term planning for new ventures and activities.

03

Responsible AI
Tenzai fosters the responsible development of systems for 100% transparency, and custom Model Management & Governance application to help the client monitor model performance and governance.

04

Scalable Solutions
Tenzai develops scalable AI algorithms and architecture to accommodate growing business dynamics with ease.

This unique approach to solution and services have benefitted fortune 1000 organizations across different verticals like -Retail, Consumer, Product Goods, Financial Services, and Healthcare to address complex business challenges.

AI-based Procurement Planning & Funding Solution adoption for a major commodity trading firm saw a 20% reduction in default transactions, an 18% reduction in procurement timelines, and a 7 times reduction in time spent on manual processes. The traditional cocoa procurement planning and funding process is long, inefficient, and erroneous due to the manual tasks involved. Roughly it takes two to three days for the entire process with a 6% total revenue loss due to organizational and external factors.

To address the identified problems, Tenzai developed an AI solution incorporating the following features:

Descriptive Analytics to keep an eye on the procurement activities and funding details

Automating the manual processes to reduce processing timelines and decision errors

Decision augmentation provides business users with insights and recommendations to make sound decisions.

Towards a digitized & data driven approach

The AI solution developed has ten-layer stacked models to source data from nine different sources. Before the AI solution was integrated the procurement data was scattered and the fund transactions were hard to retrace. However, Tenzai's AI solution has allowed 100% transparency and traceability of funds across procurement cycles, along with a change in the mindset of adoption of AI-driven analytics and solutions. Particularly, it allows more time for business users to make critical decisions and focus on strategic initiatives for future business ideas and operations.

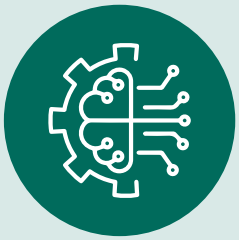
While numerous companies have developed advanced AI solutions for improving yield efficiency, digitizing yield management, warehouse management, shipping, and trading, Tenzai stands out. It focuses on not only digitizing the processes but also bringing in insights and predictions for digitizing workflows and assisting the business users in making smart, data-driven, reliable decisions. It may be challenging to keep track manually, however, Tenzai's AI-driven solutions make it possible. The AI solution can help businesses in identifying farmers and agents where the supply chain involves a lot of mediators.

If future scalability is the goal then the clients can easily replicate the operations across geographical areas and save resources both human and financial, in the process.

BUSINESS INTELLIGENCE
CHALLENGER

Accenture Solutions: A B2B Artificial Intelligent Revenue Growth Engine

- **Sales & Marketing**



Accenture Solutions' AI-driven Industry Revenue Growth(IRG) solution also aims to catalyze government initiatives by helping clients penetrate the Indian market, empower SMBs to boost their growth and help them sift through the challenges, thus enabling them to continue to be the backbone of our country's growth.

In the wake of the COVID-19 pandemic, the world is shifting to a new normal where digital platforms enable the entire ecosystem. Advancements in artificial intelligence (AI) and machine learning (ML) driven technologies are assisting the whole business pipeline in discovery, conversations, transactions, and fulfillment for intelligent decision making.

Realizing the significance of Industry 4.0 on business, countries worldwide are becoming increasingly aware of the potential economic and social benefits of developing and applying AI. India, too is fully committed to providing impetus to AI and developing it as a mode of production to be leveraged to alleviate its economy. There is a renewed focus from the Government of India on supporting the MSMEs and trying to convert the crisis driven by COVID-19 into an opportunity. In 2020, the Ministry of MSME introduced Artificial Intelligence (AI) and Machine Learning (ML), strengthening its Single Window System Portal 'Champions' to assist MSMEs of the country.

The Government of India is taking several actions and implementing various schemes to develop and promote MSMEs across the country. Accenture Solutions' AI-driven Industry Revenue Growth(IRG) solution also aims

> B2B Growth is an AI-powered solution accelerating the digital transformation of MSMEs.
>
> **Sundar Ramamoorthy**
> Managing Director – Accenture S&C, Global AI Hub, India, Global Solution.AI Delivery Lead

to catalyze government initiatives by helping clients to penetrate the Indian market, empower SMBs to boost their growth and help them sift through the challenges thus enabling them to continue to be the backbone of our country's growth.

Numerous surveys suggest that small and medium-sized enterprises face challenges ranging from inadequate access to technology, unavailability of credit and scarcity of infrastructure resources. Thus, an E2E AI & Analytics-driven solution must empower small businesses and support them to sift through the challenges.

What does the solution entail?

Accenture's solution ensures intelligent lead generation, lead prioritization, facilitates digital marketing, and drives effective sales closure.

Lead generation from third party and other organic web sources accompanied by AI sensing algorithms generates and enriches the leads with 200+ signals.

Translated insights from various these signals are passed through ML Propensity models to predict onboarding propensity. This helps to prioritize and target niche small and medium businesses.

An array of digital channels are set up to warm up the leads and generate genuine interest, including SMS, WhatsApp, Email, Microsite, Facebook Campaigns, and LinkedIn.

Mobilized pods of sales agents then utilize the intelligence on prospects drawn for providing tailored offerings and drive sales closure through tele-calling, 1:1 presentations and exclusive webinars in collaboration with clients.

What makes the solution unique?

Accenture Solutions ensures that there are multiple touchpoints across the customer value chain to provide real-time sensing signals that target the right SMBs at the right time with the right offer. Thus, they offer a robust end-to-end solution.

They are the only end-to-end service provider with the full suite of Customer Operations capabilities. With partnerships spanning from third-party data vendors for multiple signals such as Technographics, Intent, Digital Maturity, etc., to cloud platform providers to activation and sales platforms, Accenture Solutions are future-ready to build and deploy the solution at pace.

They also enable exponential growth for their clients through intelligent use of data and measurement for business insight and action. They approach development through a few key levers that include new acquisition, upsell/cross-sell, retention, pricing, and referrals, using proprietary assets.

Not only this, the larger vision is to build an AI community that fosters accelerated digitization and boosts SMB growth. They help enterprises adapt to changing work behavior through a digital transformation at a faster pace and enable them to penetrate the domestic and international market for higher revenue.

The team hosts a collection of AI solutions that have been designed to unlock new efficiencies and growth, enable new ways of working and facilitate game-changing innovation for enterprises. They have consistently delivered high-quality impact for their clients by optimizing revenues, driving operational efficiency, and reducing churn.

COMPUTER VISION
GAMECHANGER

Quidich Innovation Labs:
Real-time player tracking for cricket

- **Computer Vision**

In a country where people worship cricket as a religion, Qudich Tracker aims to change how matches are viewed on television through an innovative approach that uniquely bridges the gaps in storytelling around fielding and fielding strategies.

As cricket fans, there is an innate desire to know what is happening on the pitch during critical moments of the match. Fielding positions are changed, and a lot of drama occurs near the boundary lines. But the camera cannot show us all these events in one frame. Fans are largely deprived of all the storytelling around fielding strategy.

The existing setup of viewing a cricket match offers no visual cues about the field placements and fielding changes. Broadcasters had no reliable visual to represent fielding strategy and changes. Viewers are clueless about the rationale that warrants bowlers to bowl a particular line or length. They also do not get the batsmen's viewpoint when they choose to play a shot in a specific direction. This accounts for a relatively poor viewing experience. The teams and coaches also do not have any fielding data and manually log basic information.

The only possible way to achieve this in real-time with a single camera was to train a computer vision algorithm based on real data from a cricket field. Using any analytics-based solution would not have delivered the flexibility and accuracy required for a live broadcast.

The core AI behind QT is a computer vision-based deep learning algorithm trained on over 750k curated images. It provides a highly accurate detection and tracking module that tracks every player on the field 25 times in a second.

> Cricket is the second most followed sport globally and by far the most popular sport in India. As there has been notable growth in the television viewership of the game, sports broadcasters and leagues have been motivated to constantly innovate and bring new visual technologies to their fans. However, the majority of the answers were centered around batting and bowling and neglected fielding, which is an equally important element of the sport. With a limitation of showing the entire field in one frame, viewers were always disconnected from the strategy of how a field was being set for a particular batsman and bowler combination. This existing gap in storytelling related to fielding and fielding strategies motivated us to develop a real-time player tracking solution for cricket, Quidich Tracker (QT).
>
> **Rahat Kulshreshtha**
> Founder and CEO, Quidich Innovation Labs

It also generates over 5 million data points per T20 game which can be used for further analysis. All the analytics and visualization is performed real time at 25 FPS with only a 4-frame delay that's less than 1/5th of a second.

This AI-based solution is best suited for the problem as it solves multiple issues like details like variations in conditions, including light changes, team jersey colors, and color of the grass, which an analytics-based approach cannot capture. Additionally, the overall accuracy and the requirement of being real-time in a live scenario make any analytical solution redundant.

What makes QT unique?

The Quidich Tracker tracks all the players' live positions and movements on a cricket field. The television viewers can visualize the real-time field plot of the entire cricket ground in the form of a 3D digital replica of the stadium with dots representing the players during the live broadcast.

The architecture of the tracker is designed in a manner where 4k video input is taken via a capture card. A capture card is a hardware input device that converts video signals to digital data that can then be uploaded to the internet. The pixel coordinates are then captured by a detection and tracking module, which then gets converted into real-world coordinates. This finally gives the visualization of a 3D model of the stadium.

Highly accurate detection, heuristics-based approach to manage occlusions, single-camera solution, and minimal requirement of physical resources make Quicich Tracker a unique solution. Unlike manual plot, QT is always-live available at the director's command whenever there is a field change. It also offers several features like real-time distances, gaps etc. to enhance storytelling and viewer's understanding of fielding strategy.

Its impact

In the past few years, there has been high adoption of QT. It is now an integral part of every significant cricket broadcast worldwide (ICC World Cups, IPL, CPL, and Bilateral Cricket Series).

On its debut at ICC World Test Championships Final, QT was used more than 200 times during the match.

It also substantially helped increase discussions and analysis by commentators on live fielding changes and respective fielding strategies . Teams are now using fielding data to improve their performance and strategy.

The road ahead for Quidich Tracker

01

Scaling across the entire cricket ecosystem (adding new geographies, formats, and competitions)

02

A "Historical Data" platform provides fielding data which can be drilled down to a ball by ball level; showing the positions of 11 players at the point of release of each ball for analytics and improved team strategy and workload management.

03

An integrated 'no ball' decision-making system based on field restrictions during the game of cricket. For example, during a power play, only two fielders can be outside the 30-yard circle at the ball's release point.

COMPUTER VISION
CHALLENGER

Shopsense Retail Technologies: Easy background removal with Erase.bg

- **E-Commerce**

Erase.bg is an AI-powered tool that removes image backgrounds automatically in just 5 seconds. They enable individuals, agencies, and e-commerce companies from across the globe to increase their productivity and revenue with our bulk AI design tools.

Product images on e-commerce websites follow particular background standards e.g., all product images on Amazon are on a white background. To fulfill these requirements, online sellers hire image editors to manually remove the background from their studio-clicked photography and then replace it with the appropriate background for that platform. However, it is a manual and cumbersome process. This also hinders timelines if thousands of images are to be processed manually within a short turnaround time. Additionally, masking complex details like human hair is an arduous and time-consuming task. These issues further strengthen the case for an automated background removal service.

Content creators consistently use background removal in their work. While social media influencers, photographers, and image editors use it to edit images and prepare marketing content and social media posts.

With the rapid increase in e-commerce and the number of product listings worldwide, the issue of image background removal poses a significant challenge. Thus, background removal is an essential tool for most image processing. Organizations like Hopscotch process 3000 images per day, and Jiomart processes around 100,000. Background removal websites receive about 80 million monthly users like content creators, social media influencers, photographers, image editors, and startups trying to make their images ready for online commerce.

> Online platforms today require clear and high-quality images to improve their appeal to their visitors. E-commerce websites need good sharp images to increase conversion rates. Therefore, our team at Fynd decided to build an AI tool that can produce higher-quality images, increasing resolution and Upscale.media was born.
>
> **Farooq Adam**
> Co-Founder, Fynd

Role of AI in the solution

The solution uses around seven different models to create a robust pipeline. The challenges are diversity and accuracy. As categories are dynamic, image segmentation and object saliency detection are used to identify and extract the central foreground. Post that, image matting is used to refine the edges and predict transparency values of semi-transparent details like hair and furs.

A robust data annotation and model pipeline have been embedded into the solution to tackle the issue of getting thousands of diverse product images and the need to generalize them.

Mission and vision

Erase.bg works on a mission that is not only limited to revolutionizing the photo editing workflow but also increasing productivity. The solution helps organizations and individuals rethink the design and photography business in general and provides an API so others can integrate the solution in building top-notch products for the AI era.

The larger vision is to empower customers to work on their ambitious ideas. Erase.bg is an innovative tool for automated background removal at the best accuracy and lowest price. The solution assists all designers in producing excellent images without any worries. They also provide professionals and big businesses with all the help required to create an efficient workflow. In addition to all that, Erase.bg supports developers in removing image backgrounds through API.

What is so unique about the solution?

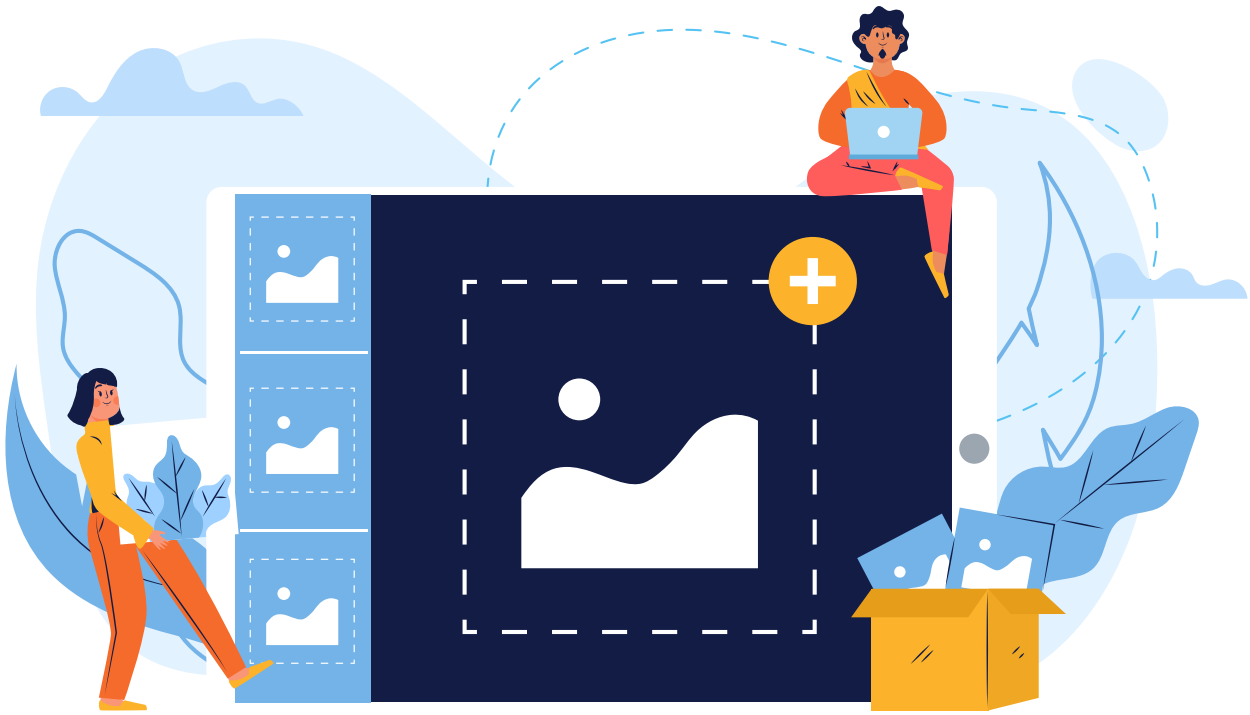
With Erase.bg, anyone can now remove the background from any image, whether a professional photographer or a novice. It is one of the fastest, most intuitive AI-powered background removal tools in the market today. It can remove backgrounds from images and doesn't require any technical knowledge.

This tool also helps create engaging, professional image backgrounds for social media accounts, blogs, websites, or any other projects. The customer feels in complete control with the advanced AI model that seamlessly gives them a transparent background.

To catch up with the recent advances in Visual AI around the world, the team has been equipped with highly experienced machine learning engineers. They have developed a model to make complex technology simple and easy. From freelancers or individuals to MSMEs to big e-commerce companies, multiple clients currently use the power of the background removal tool.

Overall, Erase.bg can boast of driving operational efficiency in their clients. They helped improve the efficiency for both individual buyers and retailers in removing background for their product images. The solution also optimized revenue by reducing the costs associated with the tedious manual annotation process currently used by many retailers.

In a world connected by images, posts, and reels, removing the background from photos can be the difference between a standard image and an attractive one. However, it doesn't have to be time-consuming or complicated, as Erase.bg provides just the right solution.



COMPUTER VISION
INNOVATOR

Welspun India Limited:
The story of AI revolutionizing texturing industry

- **Retail &CPG**

Welspun is Asia's largest and the 2nd largest terry towel producer in the world, beside terry towels we also manufacture bed sheets, rugs and carpets. They export more than 94% of their home textiles products to more than 50 countries.

The story of the company started with Welspun Winilon Mills in the district of Palghar in 1985. We were a small texturizing unit in a small, sleepy town between Mumbai and Gujarat. Six years down the line, in 1991, Welspun Polyester India Limited went public with its IPO and subsequently became Welspun India Limited. They have expanded their global presence in over 50 countries and a strong team of over 26,000 home textile manufacturers in India.

The problem at hand

The size of Welspun's manufacturing units also has led to a plethora of ongoing challenges. Due to the large scale of units manufacturing close to 6 lakh pieces of towels everyday, we were faced with a range of operational issues. This included the difficulty in counting the number of towels manually in between manufacturing process given the extreme high speed of machines (more than 100 m/minute).

Thus, they resorted to either weighing the towel roll or measuring the towel roll in meters and theoretically calculating the number of towels building inefficiencies in the system. Due to manual dependencies, defects like knotting and gaiting were passed on to the next manufacturing process creating other operational issues.

These inefficiencies resulted in high shortfall, low A grade%, high aging and inventories. The results did not fare well for the company. Owing to counting difference, either they were producing a shortfall or an extra number of towels. An average monthly shortfall was almost 60 in number and for every shortfall financial loss was close to Rs 43000. Eventually extra pieces were sold in the domestic market in a loss of approximately Rs 175/Kg.

> This is one of the projects which is very close to my heart. The problem statement was well known to all team members but the AI platform provided the accuracy and stability which we were envisaged. The system we developed is scalable and reliable.
>
> **Amish Vaja**
> Vice President & Business head (Terry Towel)

Proposed Solution and it's impact

In order to address the challenges they were facing, Python based CV algorithms which were built in house and were extensively leveraged on Graphics Processing Unit (GPU) servers.

This AI system was integrated with a Camera Software Development Kit (SDK), Network ecosystem and SAP system. Counting and tracking algorithms built in house provided actionable insights as part of analytics and reporting with PowerBI capabilities.

The application also came with a few high Level features that included Automatic Towel Counting, Operator friendly graphical user interface, SAP integration and effective analytical insights. The solution was successfully implemented and scaled to all five greige folding machines. This resulted in operational efficiency and cost optimization.

The number of shortfalls reduced by 66% from earlier 60 instances per month to now close to 20 shortfalls per month. A grade generation increased from 97.9% to 98.7%. Significant reduction in WIP inventory was also witnessed and overall there were no Instances of waste like knotting and gaiting transferred to the next process.

CYBERSECURITY
GAMECHANGER

Sectrio: An AI-based adaptive threat intelligence solution

- **Digital Twin**

Sectrio, which is the Cybersecurity division of Subex, is an Adaptive Threat defence and adversary engagement that detects and patterns cyberattacks. Sectrio provides a solution by protecting assets at the reconnaissance stage and deflecting the cyberattack.

Cyberattacks have become very common these days that damage a business' reputation and erode the trust it has built with the customers. This potentially leads to the loss of a sale to a company or the loss of its customers. Sectrio is a one-step solution to avoid this and secure a business from these attacks.

The path travelled by sectrio

The 32-member team of Sectrio has analysed and studied the kind of cyberattacks that a company could fall prey to.

According to Sectrio, **cyberattacks occur at two levels- reconnaissance and actual attacks.** In the first case, bad actors try to infiltrate a network of interest with stealthy malware and snoop on traffic and security measures. The malware then sends all these details to a command-and-control server that collates the data and helps the actor plan an actual cyberattack.

Suppose the stealthy malware is tied up at the reconnaissance stage through deception. In that case, the attack will be delayed (giving cybersecurity teams more time to prepare), but the command-and-control server is fed the wrong information on the asset landscape. Thus, the malware reconnaissance time stretches from a working week to almost 10-15 days. By this time, the security team can ramp up their security measures while also breaking down the digital signatures of the malware used for reconnaissance to understand the probable tactic the bad actor may use during an actual cyberattack. This is what Sectrio's Adaptive Threat Defense Solution does.

> Sectrio's Adaptive Threat Intelligence Solution was developed with the belief that enterprises must evolve their cyber defenses to stay well ahead of sophisticated cyber adversaries and stealthy and persistent threats. The innovation behind the solution is a modest one, yet it is transformative enough to enable enterprises to adopt a more robust and resilient cybersecurity posture.
>
> **Prayukth K V**
> Head of Marketing, Sectrio

It creates an endless digital topology and topography complete with a seemingly infinite series of devices and fake entry points for an actual attack that is entirely outside the existing digital landscape being protected.

Cyber risk is business risk

Based on the company's research, a third of global companies have suffered a reconnaissance attack in the last six months. Every cyberattack that is successful causes loss of lives, data, reputation, productivity, revenue and erosion of cash reserves.

Cyberattacks cause an ongoing and critical risk for Banks, prominent manufacturers, and critical infrastructure operators.

How is sectrio containing the risk

Sectrio provides a solution by protecting assets at the reconnaissance stage and deflecting the cyberattack.

Each time the AI-based adaptive threat intelligence solution detects a vector, it studies its operational behavior, traffic signals and other information to collate a digital signature. Based on what the vector is looking for, the solution creates a complete virtual landscape complete with digital twins accurate at the architecture level and communications to complete the digital mimicry.

The solution relies on AI for detecting and patterning cyberattacks and baselining network traffic and activity to isolate anomalies. The solution also creates a digital decoy landscape complete with communications and active ports designed to trick the malware. The solution deploys appropriate countermeasures if the reconnaissance attack is upgraded to an actual attack by the bad actors.

Sequence of action by Sectrio

After the malware enters the network, the spiders surround the center of the anomaly while expanding the digital twining at a faster rate. Even if the malware continues to probe fake assets or launch a cyberattack on decoys, the actual asset remains safe and away from this activity, ultimately breaking the decoy links. This converts the malware and its surrounding digital areas into a vault that locks the malware out into quarantine.

Sectrio, on average, blocked about 2-5 million cyber-attacks each day since 2017 after its launch. **The solution could save the annual cost of a company anywhere above USD 250,000.** Assuming the average price of ransom and capital costs saved per successful cyberattack is USD 300,000. This is without factoring in the loss of credibility, businesses, revenue and other expenses.

FEATURED STORIES

TOPICAL USE CASES

ML FUNDAMENTALS
GAMECHANGER

IIT Bombay:
Active assessment of prediction services as accuracy surface over attribute combinations

Authors: Vihari Piratla, Soumen Chakrabarti, Sunita Sarawag

- **AI Research**

Machine learning is becoming more popular as massive data and computational resources become more concentrated (MLaaS). The most effective natural language processing, speech, image, and video recognition techniques are now available as network services. Unfortunately, MLaaS comes with little accuracy criteria or service level agreements, possibly only leaderboard numbers from benchmarks that may or may not be to the deployment data distributions of most clients. As a result, the client finds it impossible to identify the ideal service without extensive pilot trials.

Diverse clients may require the service to be on very different data distributions, with varying accuracy. In such cases, the researchers propose that a service provider or a service standardization agency publish the accuracy of the classifier as a surface defined on a space of input instance attributes that captures the variability of consumer expectations, rather than a single or few aggregate numbers. For example, indoor/outdoor, day/night, and urban/rural are all possible input image qualities for visual object recognition tasks. For voice recognition tasks, speaker age, gender, and ethnicity/accent maybe features of input audio. A set of qualities in Cartesian space is to as an arm (borrowing from bandit terminology). The service provider's labelled instances may not accurately represent or encompass the space of attributes of interest to subscribers. In addition, labelled data may be confidential and unavailable to potential customers and standardizing organizations.

Use case overview

The objective is to evaluate the correctness of a black-box classification model not as a single aggregate on a given distribution of test data but as a surface over many combinations of characteristics characterizing numerous test data distributions. When machine learning models are a service, where the training data distribution from customers and various clients may be interested in different portions of the data distribution, such attributed accuracy measures become crucial. Attributed Accuracy Assay (AAA) is a Gaussian Process (GP)-based probabilistic estimator for such an accuracy surface developed by the researchers. Each attribute combination, referred to as an 'arm,' is coupled with a Beta density.

Problem identification

Detailed view of the opportunity

Researchers anticipate that the GP will smooth the parameters of the Beta density across related arms to reduce sparsity. However, they demonstrate that straightforward use of GPs cannot address the difficulty of heteroscedastic uncertainty over a vast, sparsely and unevenly populated attribute space. In response, the researchers propose two improvements: pooling sparse observations and regularizing the scale parameter of the Beta density distributions. After incorporating these changes, the researchers conduct extensive tests and analyses to determine the usefulness of AAA in estimating accuracy and exploration efficiency.

Solution innovation

Description of the proposed solution

- Daily, the researchers use Machine Learning-based applications.
- Due to data and technology constraints, researchers rely on models hosted through Machine Learning as a Service (MLaaS) APIs.
- MLaaS APIs are available from almost all major technology companies.

Role of AI and technical specifications

- Computer vision: Amazon Rekognition, Azure Custom Vision, Google Cloud Vision API
- Speech recognition : Amazon Transcribe, Azure Custom Speech Service, Google Dialogflow Enterprise Edition
- Natural language processing: Amazon Comprehend, Azure Web Language Model API, Google Cloud Natural Language API, IBM Watson

Challenges and known risks

- It's not easy to choose task-relevant attributes.
- Researchers cannot always use attributes to characterize data distributions. Interpretable qualities cannot catch small changes in word usage, style, or punctuation in the text.

Impact and scale

Impact metrics and solution scalability

- The estimation method can handle millions of arms.
- Extend to text-like applications where data describing qualities are difficult to define.

To pursue related problem formulations:
(1) identify data regions of the worst performance
(2) alternative data describing attribute definitions

The researchers presented AAA, a new method for estimating the accuracy of a categorization service as a surface over a set of attributes rather than a single number (arms). AAA uses a Beta distribution at each arm to characterize uncertainty, then regresses these parameters using two Gaussian Processes to capture smoothness and generalize to unseen arms. In addition, the researchers developed an additional Dirichlet likelihood to address an over-smoothing problem with GP's estimation of Beta distributions' scale parameters.

Moreover, the researchers also propose using an observation pooling method to safeguard these high-capacity GPs from inaccurate observations in sparsely populated arms. Finally, they demonstrate how to deal with noisy attribute labels via a joint recalibration strategy. AAA's efficacy in estimating and exploration quality has been demonstrated using real-world datasets and categorization services.

HIGH POTENTIAL
GAMECHANGER

BrainSightAI: Precision Psychiatry enabling accurate neurological insights

- **Healthcare**

The brain is one of the largest and most complex organs in the human body. It comprises more than 100 billion nerves within an interconnected network. BrainSight AI, founded by Dr. Rimjhim Agarwal and Liana Emanual, has envisioned Connectomics profiling of a patient done in a matter of minutes with the most advanced connectomics tool called the VolexBox -GCT. This provides better clinical analysis and research analysis for better decisions than the disparate tools used currently to create a basic connectomics profile of a patient through outdated tractography, rs-fMRI processing, and sMRI processing methods.

According to Brainsight AI, the Diffusion tensor imaging tractography is based on Deterministic tractography. Fragmented fibers with no correction for gyral bias or eddy currents lead to minimal information. However, VolexBox provides Probabilistic tractography, advanced thresholding, Eddy Current Correction, and clear values to understand fiber fragmentation.

The prevailing situation

Brainsight AI also claims that in fMRI, the current method requires a number of software to analyze. Moreover, it takes a year to set up data pipelines and has a fragmented QA/QC process, leading to the patient leaving the table mid way.

The 15-member company stated that running AI on neuroscience data requires immense computational power, often unavailable in clinical settings. However, with advanced AI methods of VolexBox, AI checks on the cloud, and its connectomics data combined with advanced analytics and deep human expertise uncover breakthrough insights for better clinical decision making.

Brainsight had its share of challenges as they are category creators in their space. Hence, the neuroimaging protocols which form the basis of their work are not very popular due to which the data availability was a challenge that the team overcame.

Usability in numerology

The applications of VolexBox are three-layered: Pharma, clinical, and research in the fields of Neurosurgical, Neurological, and Psychiatry.

Accurate tracking for drug development is the most critical aspect that VolexBox deals in. In clinical feats of VolexBox, it provides functional mapping for pre-surgical decisions in Neurosurgery and personalizes the Neuro-modulation for epilepsy and brain tumors.

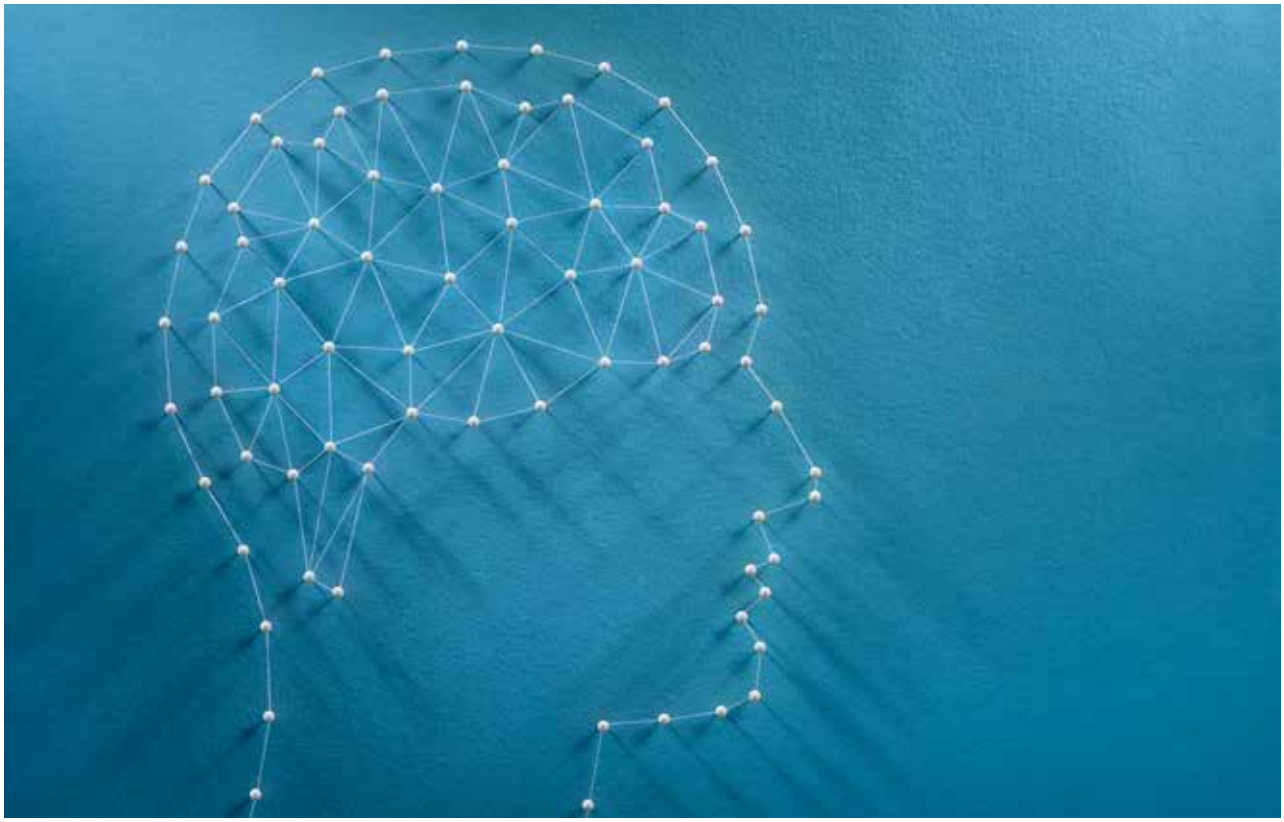
- In Neurology, it provides functional mapping as a clinical aid for more precise neuromodulation for movement disorders.
- In Psychiatry, the VolexBox provides functional mapping as a clinical aid for Neuro-modulation of schizophrenia and bipolar disease.
- VoloxBox also provides research and investigation into tumor lesion mapping, consciousness, and traumatic brain injury in Neurosurgery.

Brainsight AI uses its Snowdropp App, which focuses on intersectionality to ensure fairness. They are building towards ISO-13485 to ensure data privacy and security. They convert all AI-based modules into 3D modules to see that they can be explained through the images for better analyses and decision making and provide the patient a 100 percent surety that their problems are being addressed and cured.

The team also claimed that they use FDA-compliant Software to collect every piece of data, and it is transparent so that it could be easily auditable. It also uses an HPA-compliant cloud to store the data to be accessible.

> Building neuroscience-based solutions for addressing neuro-psychiatric problems to me is like 'ikigai'. It tickles my intellectual curiosity for understanding hard stuff, satisfies my need for impact in my life, and makes for a great business! Building this company pushes me every day, but it brings me great joy, and I wouldn't give it up for anything else.
>
> **Laina Emmanuel**
> CEO, Brainsight AI

> A 35-year-old man came to us with headaches and some speech disturbances and his MRI showed a glioma in the temporoparietal region. He was extremely agitated to go through a functional MRI, making it difficult to map language lateralisation and the fibre tracts around the tumour. BrainSightAI's VoxelBox helped me plan my surgery more precisely. We used an rs-fMRI where the patient does not have to perform any tasks. VoxelBox AI-generated the language lateralisation, which showed the patient was left-lateralised. This gave me the confidence to reset the whole tumour safely without affecting language function.
>
> **Dr. Mazda Turel**
> Wockhardt Hospital, Mumbai (Doctor, the final clinical decision-maker)



HIGH POTENTIAL
CHALLENGER

Docturnal:
Non-invasive screening of infectious pulmonary ailments

- **Healthcare**

The use of AI in medicine has already proved its value. The technology is set to transform and improve the medicine to cope up with the changing lifestyle and other requirements. The COVID-19 crisis in the last few years has exhibited that technology has great potential. The usage of AI in India specifically witnessed a growth of around 45% among businesses and organisations.

AI Gamechangers 2022 with the theme "Realizing India's AI Promise" is all set to recognize AI Innovations from grass roots to large enterprises that are impactful and scalable. Applicants from Enterprises, Startups, Government bodies, Academic Institutes and NGOs came together and showcased their innovative ideas to the world.

One such amazing AI application that caught attention and created an impression in the field of MedTech is Docturnal Private Limited's TimBre. TimBre is a multidirectional screening solution that screens and monitors Pulmonary TB, Pneumonia/ COVID-19, COPD and Asthma leveraging Acoustic Epidemiology & AI/ML.

The idea is to facilitate early screening and monitoring of lung ailments that are Infectious & non-Infectious providing real-time & explainable results. TimBre is a TB Screening app, where the sound of cough of an individual is recorded by a medical practitioner along with their demographic, clinical and socio-economic variables and processed in real time, leveraging machine learning to detect if the cough is TB positive or negative.

Docturnal Private Limited was established in April 2016, with a mission to create point-of-care, non-invasive and real-time results driven solutions leveraging AI/Deep Learning under the umbrella of telemedicine. Docturnal aims to create products and solutions that are designed to make detection of diseases accessible and affordable to the last mile.

The company was founded by Mr. Rahul Pathri who believes in offering accessibility, affordability, effectiveness & pro-activeness in the filed of medicine.

Rahul shared his personal experience in undergoing existing TB tests and realising that the tests were time consuming & invasive. He said, "keen interest in acoustics shaped up the Acoustic Epidemiology approach that was complemented by the AI/ML background which I obtained as a software developer focused on databases."

Tuberculosis (TB) is India's most severe health crisis. According to the National Strategic Plan for Tuberculosis Elimination 2017–2025 report, TB kills approximately 480,000 Indians every year. That is a whopping 1,400 every single day. Not just in India, Tuberculosis (TB) is one of the top 10 causes of death worldwide. The World Health Organisation (WHO) estimates that over 95% of TB deaths happen in low and middle income countries.

There have been developments in and around TB medicine. However, the issue at the core is

accessibility and affordability. Even after new medicines entering the market the solution and action is advanced diagnostic tests. The unfortunate experiences that Rahul Pathri had with TB led him to conceive the idea of a smartphone application that records the sound of a person's cough to detect TB.

When a cough is pathological in nature, it has a certain pattern and characteristic to it. Analysing the sound wave, its energy or amplitude in a low or high frequency can determine if it is pathological in nature or not.

The solution has been piloted at several districts in state of Telangana and has been well received by both Public Health Stakeholders and the beneficiaries. The ease of screening, quick availability of results and the low-cost subscription-based screening has made this solution stand out. The solution addresses bias by using objective input data collection, wherein the data is encrypted during transit and at rest, while storing them on a HIPAA compliant cloud service.

Talking about the future, Rahul shared his plans of scaling up via deploying on Google Playstore & Apple App Store. "Until now, we've been providing private APKs. The AI models have been clinically validated on a third party Microphone array alongside a few mobile device models. Extending to additional device models is the scalability plan", he added.

TimBre is working in Partnerships with public health entities in India & a few international entities that are focused on TB. The app is available in many Indian and global languages. Interestingly, it also addresses explainability and interpretability for non-Physics savvy users too.

The process for screening includes recording through a microphone array with a filter while the person coughs with a surgical mask. The results after being processed come on portal, SMS and on the Mobile Phone.

The tech stack for the app includes, AWS/IBMCloud/ Azure/GCP, Matlab, Python Ensemble Models, deep learning, Native Android Development, and PHP.

India has been witnessing an alarming number of unidentified cases of TB along with 3M cases out of 10M being from India. Solutions like TimBre bring ease and create awareness among people and deal with the social stigma attached. The boost that AI is providing to the incredible ideas bring a lot of hope for better tomorrow in MedTech.

NETWORK SCIENCE
GAMECHANGER

Crediwatch Information Analytics:
AI powered insights for lenders and businesses

- **BFSI**

Crediwatch have built an easy way to connect the world of business and financial data and convert them into analytics-powered insights for quick and effective decision-making. Businesses and Lenders can integrate their private datasets into Crediwatch's platform to analyze the companies that matter most to them. Companies can share these insights with potential lenders and partners.

Crediwatch has built the easiest way to connect the world of business and data to convert them into analytics-powered insights for quick and effective business-related decisions. CW does this with no human intervention by deploying the latest practical Artificial Intelligence (AI) technology tools that provide the most reliable real-time inputs possible.

The informal sector contributes significantly to India's growing economy. The MSME contributes a total 30% of the GDP in the Indian economy. They contribute significantly to the GDP and generate mass employment across the length and breadth of the country.

However, the outbreak of the COVID-19 pandemic largely disrupted the progress made by MSMEs and severely impacted their growth. In addition, these small and medium businesses are fraught with many challenges like lack of required credit, access to new technology, and cumbersome regulatory practices. With the Centre's push to increase the contribution of small and medium businesses from 30% to 50%, it is imperative to address these existing bottlenecks.

Businesses lose 6-10 percent of capital invested to friction costs caused by a lack of insights and high credit costs. The estimated loss due to friction costs in India is USD100 billion annually. It is getting in the way of doing business with ease and economic progress. The need of the hour is to amplify digital trust and transparency across the credit and trading ecosystem.

Crediwatch attempts to solve the trade and credit challenges for small and medium businesses while simultaneously providing growth opportunities to both financial institutions and SMBs. The network effects of the two-sided model will create positive reinforcement and incentivize firms and lenders to share data and insights with each other.They have built an easy way to connect the world of business and financial data and convert them into analytics-powered insights for quick and effective decision-making. Businesses and Lenders can integrate their private datasets into Crediwatch's platform to analyze the companies that matter most to them. Companies can share these insights with potential lenders and partners.

Impact of the solution

With the implementation of AI to develop credit/risk reports that are more efficient and effective, CW has increased the throughput lenders can achieve by a factor of 10. With capacity, this can translate to revenue growth of 8x-10x as well. Also, the monitoring solutions deployed resulted in savings by reduction in NPA.

CW has also been able to drive operational efficiency by developing in-house AI models that can complete model building on a new dataset within two weeks. This is four times shorter in terms of turnaround time. With several of the evaluation and decision-making steps automated, CW has been able to bring in more efficient operations for their clients.

The pace of product delivery and accuracy of solutions have also ensured a pleasant customer experience. The solution has also addressed aspects of responsible AI through Unbiased processes, adherence to data privacy, and explainable AI/ML models.

Successful client experiences

The current key enterprise clients include big names like RBL Bank, SBI, Deutsche Bank, Aditya Birla Financial Services to name a few.

After Crediwatch EWS was deployed at one of the banks, a declining quarterly trend was observed in the gross non-performing assets. The bank's numbers dropped from 9.17% (in June 2019) to 7.85% (in March 2021).

With prudent credit controls and Crediwatch risk analytics, one of their corporate clients managed to take their non-payment percentage to 0.15-0.25 compared to 0.5% previously.

Scope of scale in the future

Crediwatch currently monitors 23,000 companies per month with a total portfolio size of ~Rs.1,75,000 Cr. They have also provided over 2 million insights to date on around 1.25 lac businesses.

Crediwatch envisions to scale in the near future through the addition of new sources, higher demographic coverage, and targeting a more extensive market through strategic partnerships and collaborations.

> 96% of businesses don't have a formal credit rating and the SME lending gap is a USD 1T opportunity. The idea behind Crediwatch is to enable access to capital and growth to businesses of all shapes and sizes.
>
> **Meghna Suryakumar**
> CEO & Co-Founder, Crediwatch

NETWORK SCIENCE
CHALLENGER

PayPal:
Fair credit underwriting using graph embeddings

- **BFSI**

By leveraging technology to make financial services and commerce more convenient, affordable, and secure, the PayPal platform empowers people and businesses to join and thrive in the global economy.

The lending market is witnessing a paradigm shift towards digitalization across the globe. As a result, a new category of digital lenders has emerged, leveraging modern technologies to make the day-to-day life of the consumers easy and frictionless.

The lending landscape in India has changed drastically in the last decade. The industry has transformed its lending process, including a quicker, more stable, and streamlined customer borrowing experience. The major factors which have led to a spurt in the growth of digital lenders are – an increase in rampant adoption of technology by users, better digital connectivity, and a keen eye for innovation.

Traditionally, underwriting a consumer for lenders has been an extensive, time-consuming, and complicated process involving manual underwriting and paperwork. It has also been fraught with a few challenges that include- a) declining customers who are very good but are borderline on creditworthiness and b) credit underwriting for new markets where there isn't sufficient data. In addition, a large section of consumers worldwide is 'financially underserved,' meaning they can't access financial services like availing of credit cards or loans. This is primarily because traditional credit assessments conducted by banks require a long economic history which they lack.

PayPal envisions addressing this barrier. They aim to do it by using alternate data and advanced

> AI is not simply about improving revenue/margins for an organization. It can also enable a positive social change.
>
> **Team Leader**

AI techniques to provide an accurate credit assessment score for this underserved segment, enabling them to access credit & achieve financial inclusion.

How does the solution work?

PayPal proposes a solution, Deepgrass, that uses a graph and sequence-based embedding learned from large-scale transaction data that captures the customer's multiple cross-sectional and temporal aspects. Henceforth, evidence generated for this model is used to predict many customers who are excellent but borderline on creditworthy features. It also works well on customers in new markets with very little data to learn, thus leading to fair credit underwriting.

The graph embeddings are calculated based on the transaction graph based on the last five transactions

of the customer. These embeddings measure two customers that are similar in terms of the customer-merchant-product dimension.

The sequential embeddings are calculated based on the last transactions at the individual level of the customer using features created from the product description of the transactions. These embeddings provide information about the short-term spending behaviour of the customer.

Potential for impact and scalability

DeepGrass is a blend of multi-dimensional views of the customer's transaction in space and time, allowing fair credit to be more accessible to customers.

Most individual customers and small businesses run the risk of inadequate access to credit. The solution, thus, looks at customers' transaction behaviour from multiple dimensions. First, they try to give the customers a fair chance to access credit. The attempt is to open the gates of opportunity for the underserved population.

This solution does not depend on country-specific data but instead uses a customer's transaction history, which is consistent across countries. Thus, it was scaled across multiple geographies where PayPal has a presence.

Since the graph and sequence embeddings are unsupervised, they can be applied across various functional use-cases apart from the credit, viz. marketing response, fraud risk assessment, predicting customer value, etc.

As they step towards the future, PayPal's real-time/ near-real-time graph changes would benefit fraud identification use cases.

AI APPLICATION
GAMECHANGER

AIRA Matrix:
A Deep Learning system for prostate cancer diagnosis

- **Healthcare**

A deep learning system for prostate cancer diagnosis and grading in whole slide images of core needle biopsies.

Authors: Nitin Singhal, Shailesh Soni, Saikiran Bonthu, Nilanjan Chattopadhyay, Pranab Samanta, Uttara Joshi, Amit Jojera, Taher Chharchhodawala, Ankur Agarwal, Mahesh Desai, Arvind Ganpule

Use case overview

Gleason grading is a risk stratification procedure for prostate cancer that is subjective and based on the reporting pathologist's experience and skill. Deep Learning (DL) algorithms have shown potential in improving Gleason's grading objectivity and efficiency. However, DL networks offer domain shift and poor performance on Whole Slide Images (WSI) from a source other than training data.

Problem identification

Detailed view of the opportunity

- Gleason grading is one of the most effective risk stratification measures and prognostic markers in prostate cancer.
- However, Gleason grading is expertise-dependent and subjective, with considerable inter-and intra-observer variability resulting in over-or underdiagnosis.
- Studies have demonstrated that computational pathology and Deep Learning algorithms can expert-level pathology diagnosis with enhanced reproducibility.
- The researchers present a Deep Learning method for identifying cancerous regions and predicting Gleason grades in digital Whole Slide Images of prostate core needle biopsy.
- Their semi-supervised method uses Active Learning and uncertainty assessments to pick samples for annotation.
- Also mentioned is a Convolutional Neural Network (CNN) architecture that learns domain-independent features for improved generalization.

Solution innovation

Description of the proposed solution

- Proposed Multi-Task Model for Learning Color Variations in Histopathology Images
- The model acquires knowledge from three supervisory signals during the training phase: reconstruction loss between the raw and colour-augmented picture, KL divergence loss between the raw and colour-augmented image logits, and segmentation DICE loss.

Role of AI and technical specifications

Using a unique training process that learns domain agnostic characteristics, the researchers suggest a DL approach for segmenting and grading epithelial tissue. In this retrospective analysis, the researchers looked at WSI from three groups of prostate cancer patients. Three thousand seven hundred forty-one core needle biopsies (CNBs) from two different sites for training.

Challenges and known risks

The researchers use the t-distributed stochastic neighbour embedding (t-SNE) data visualization to evaluate the influence of domain agnostic training methods on the output feature vectors from the activation layer of the FCN network. The scatter plots are t-SNE embeddings of 745 randomly chosen image tiles, with typical patches on the left and framed inappropriate hues. Each image tile is from the FCN network's last convolutional layer activation. Each dot represents a feature vector in this diagram, and dots of the same hue represent feature vectors from the same data set.

Impact metrics and solution scalability

The quad (quadratic-weighted kappa) and AUC were for grade group comparison and core-level detection accuracy. On an internal test set of 425 CNB WSI, researchers observed 89.4% and 0.92, the precision of 85.3 per cent and quad of 0.96 on an external collection of 1201 pictures. On 1303 WSI from the third institution, the system had an accuracy of 83.1 per cent and a quad of 0.93. (blind evaluation). When utilized as an aid for CNB evaluation, their DL approach has the potential to increase grading consistency and accuracy, leading to better patient outcomes.

Most previous papers have only looked at algorithms that predict core-level Gleason grade groups. On the other hand, our research focuses on the high-performance aspects of a multi-task algorithm for prostate cancer interpretation, such as malignant vs benign, tumour % area, core-level grading, and Gleason scores percentage area.

Furthermore, most previous methods are limited in their applicability to data distributions that haven't been observed before during training. Our domain invariant training approach revealed higher generalizability on an unknown test set. Although there are certain limitations to this work, it motivates future improvement. In the output pixel-level overlays, misclassifications were occasionally detected, particularly in the stromal regions and tissue border margins.

Preparation artefacts that the network does not recognize the majority of tissue border misclassifications. An additional neural network detects artefact regions and deletes them as a pre-processing step. The Gleason scoring system's subjective nature is a more severe issue unrelated to our research.

For biopsies, the Gleason grading systems provide useful prognostic information. However, this study did not analyze the algorithm's predictive efficacy or directly compare it to long-term clinical results. The researchers want to look at long-term clinical outcomes from biopsy cases to improve risk stratification in the future.

AI FOR NEXT BILLION
GAMECHANGER

EzeRx Health Tech: Transforming the curative and preventive healthcare space

- **Healthcare**

EzeRx has developed a biomedical device called EzeCheck — a non-invasive, portable primary screening device that can detect hemoglobin levels. Furthermore, the device can predict the indicative range for bilirubin, creatinine, SPO2, and blood glucose levels, in less than a minute and without taking a single drop of blood from the human body.

India's healthcare industry is currently undergoing a revolution. From once being heavily reliant on government medical facilities, to embracing privatization, and now welcoming a slew of new-age startups into the ecosystem, there certainly has been slow and steady progress. Like any other field, technology has disrupted the healthcare space to make medical facilities more accessible and affordable to the masses, especially through the introduction of artificial intelligence and machine learning. While there have been several strides made over the years, its impact was rather visible during the pandemic, when there was a dire need for healthcare professionals to cater to India's ever-increasing population.

If the numbers are to go by, health tech is likely to have a promising future. As per an article by Economic Times, there exist 7,128 startups in this space today, and there's really no stopping. So, what is it that really drives the industry? Innovation, hands down. Interestingly, each startup has a novel strategy for solving all kinds of problem statements, and that's what sets them apart. A case in point is EzeRx, which prides itself in being India's most innovative and disruptive healthcare startup.

Founded in 2018 by Partha Pratim Das Mahapatra (Founder and CEO), Chaitali Roy (Co-founder and CTO), and Sudip Roy Chowdhury (Co-founder and CSO), this Bhubaneswar-based startup develops and manufactures highly advanced medical devices for the effective management of curative and preventive healthcare. The startup that envisions bridging the gap between screening and diagnosis is supported by a range of government and non-government entities like DST, DBT, Ministry of Electronics & IT (MeitY), IndianOil, and Startup Odisha, among others.

What sets EzeRx apart

In a country like India, there is an increasing burden on healthcare due to the burgeoning population that exists. This presents various challenges including delayed or even incorrect diagnosis, which causes loss of life. Research reveals that there is a delayed detection of blood sugar, kidney issues, anemia, and liver as well as lung ailments. The statistics are alarming, to say the least — nearly 2 out of every 3 women are anemic; lung-related deaths stand at 9.30% of the total deaths, while 1 out of every 10 people is living with liver-related ailments. That's not all — 17 out of every 100 people have kidney-related issues, and 1 out of every 11 persons are diabetic.

At a very young age, I witnessed people in my vicinity in West Bengal facing economic hardships, especially if they were seeking curative treatment for various diseases. Going for those treatments has led them to face extreme poverty conditions. Those who can't

> From a very young age itself, I have seen the economic hardships being faced by the people who were seeking curative treatment for various diseases being faced by them in my vicinity in West Bengal. I have seen the extreme hardships and poverty caused in those families as a result of those treatments. People who couldn't afford a square meal a day struggle to provide basic treatment to their vulnerable family members. This made me realize the dangers of falling ill especially if you are from a poor background. Even more so if you are women who bear the burden of the disease both physically and mentally. This motivated me to come up with simple yet effective solutions which can help the poor to not suffer extremely. The thought "Prevention is better than Cure" made a deep impact in my mind and I thought of devising a solution which can make preventive healthcare affordable and accessible to all.
>
> **Partha Pratim Das Mahapatra**
> Founder & CEO, EzeRx Health

afford three square meals a daily struggle to provide basic treatment to their vulnerable family members. This made me realize the dangers of falling ill, especially if you belong to a poverty-stricken family. This is far worse in the case of women. These reasons motivated me to come up with a simple yet effective solution to make preventive healthcare affordable and accessible to all," shares Mahapatra.

To arrest this issue, EzeRx has developed a biomedical device called EzeCheck — a non-invasive, portable primary screening device that can detect haemoglobin levels. Furthermore, the device can predict the indicative range for bilirubin, creatinine, SPO2, and blood glucose levels, in less than a minute and without taking a single drop of blood from the human body. All in all, it is an affordable and accessible IoT-enabled device that can serve both rural and urban healthcare needs.

AI in healthcare

As established above, mass screening can become an issue in a country like India, largely due to the need for more time and human resources, high cost, and biomedical waste. With EzeCheck, you can rest assured that all the significant health parameters will be tracked using artificial intelligence. Assisted by an easy-to-use Android app, this solution takes as little as 30 seconds to take data and generate results.

Its working is fairly simple — EzeCheck generates health parameters by sending a cool white LED light onto the skin of your finger. The light is then captured by the device and sent to the mobile application via Bluetooth. This data is then sent forward to the startup's patented artificial intelligence algorithm running on the cloud.

Based on the properties of the light that is reflected from the skin of the finger, the health parameters of the patient are determined. The data is then sent back to the application, where the user can check his/her details. In fact, this information stays on the cloud, in case the patient wants to refer to it in the future. It can be accessed both on the app as well as the EzeCheck website.

Risks and challenges

While EzeCheck is a unique and innovative solution, there have been several challenges that the startup has had to overcome, as part of its journey. For starters, people were initially not as receptive to a non-invasive way of screening, and had several concerns about its accuracy. What's more, getting ethical clearance was a huge hurdle.

For a device like this, seamless internet connectivity is also of utmost priority, but in rural centres, this was a particularly big issue. If that wasn't enough, there were also concerns about developing a data quality analysis algorithm for clinical data validation.

It doesn't end there — when it comes to AI, several models are versioned and their accuracy is tracked with respect to incoming clinical trial data. It is also based on checking the staleness and biases of AI models that are in production. Based on the accuracy comparison of the versioned models, there are models that are deployed through the CI/CD pipeline.

Assessing its impact

Over the last few years, EzeCheck has been deployed by several PHCs and CHCs across Odisha, as well as in hospitals and clinics across India. They have a Device-As-A-Service (DAAS) model, where clients pay for the kits and not the device. The device is sold with 1,000 tests at the cost of Rs. 35,000 (with an Annual Maintenance Contract of 5%, 2nd year onwards) Traditional blood test costs approximately stand at Rs 465 to detect all these parameters, while EzeCheck only charges Rs 35, which makes it an affordable solution. They also have a dedicated support team for training and solving operational problems of clients.

That's not all — they have also ensured that the major tenets of Responsible AI, such as human-centered development and monitorable performance are upheld. Each step in the development is tracked in terms of expected results, logs, and predicted failure times. Moreover, they are HIPPA-compliant, which means that they make sure that their patient's data is secure. This is done by performing predictions on the data to check that it doesn't contain any patient-related information, except age and gender.

Although EzeRx has made its mark in the healthcare space, they are still looking to improve its offerings. Currently, EzeCheck is the size of a TV remote, but they are working on making it even smaller! They are also working on eliminating their present limitations of cloud infrastructure and device production, and setting up scalable technologies like Kubernetes for handling large traffic. What's more, their aim is also to increase their pool of production engineers for large-scale production.

AI FOR NEXT BILLION
CHALLENGER

Dhiyo.ai:
AI for the blue-collar workforce

- **NLP**

The blue-collar workforce was the worst hit by the prolonged lockdowns during the COVID-19 pandemic. The sector comprises around 90% of India's workforce and 50% of its GDP. It, however, bears the brunt of high unemployment and underemployment.

Reason?

» The workforce is low-literate and finds it daunting to use the existing digital technology platforms to find gainful jobs as those are mostly English-centric and involves multiple steps, even for navigation
» The folks in this sector are overly dependent on referral networks or middlemen who charge high commission
» Their work experiences are unverified with little or no background checks
» They face a lack of salary and workplace transparency

Santhosh SS, the founder & CEO of Dhiyo.ai has experienced these challenges firsthand. He used his expertise in the area of Conversational Vernacular Voice AI technology to bring in a disruptive solution that can solve this problem.

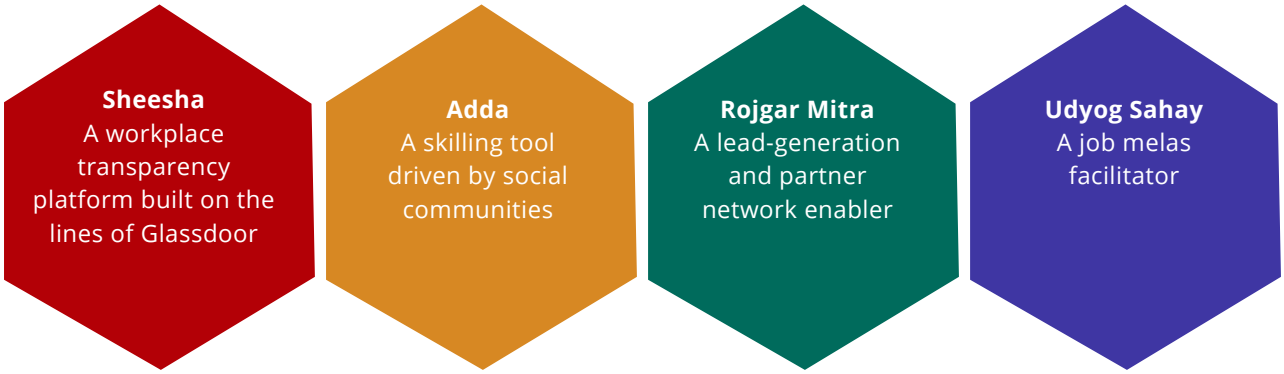
How does the solution scale?

Dhiyo is a truly voice-first conversational AI hiring platform that listens, understands, and speaks to India's rising workforce, allowing them to easily find jobs using their native language.

The solution allows blue-grey collar workers to understand and respond to natural human speech in their native tongue to create their job profile. Doing so, enables and empowers them to use the most natural of communication modes - speech, to get hired.

Dhiyo leverages state-of-the-art NLU (natural language understanding) and ML techniques to deliver an engaging conversational experience to onboard and also track the progress till one gets hired. The job profiles once created, are made available to job portals/employers by translating them into 9 different Indian languages and different formats like APIs, JSON, PDFs, etc.

The organization has also built a suite of digital transformation products powered by vernacular voice to complement its flagship hiring platform. These include:



> Dhiyo aspires to bring Digital/Social Inclusion & Job Respectability by enabling, empowering and engaging users in “Bharath”. At Dhiyo everyone counts. We employ the ignored by bridging necessity and innovation
>
> **Dhiyo representative**

How is the solution better than the existing job portals?

- Dhiyo has developed an easily accessible state-of-the-art employer portal where an employer posts a job in English and the portal translates it into other regional languages. This enables a job seeker to search and apply for the same job in his own native language.
- Easy application to a job/navigation interface to ensure higher engagement through voice
- It caters to a wide variety of professions including teachers, staff nurses, retail sales executives, drivers, customer care executives, warehouse workers, etc.

To sum up, Dhiyo is the Google Assistant and Alexa for the blue-collar workforce looking for jobs.

What’s the impact and scale of the solution?

Dhiyo is the first vernacular conversational AI that the Indian HRTech market is witnessing, especially for blue-collar workers. It thus attracts several favorable market trends. These include:

- Increased Smartphone penetration (World’s fastest-growing smartphone market year-on-year)
- Cheaper data plans (World’s cheapest data plan is in India)
- Development in the area of AI/Speech technology (Voice search in India growing at 270% year-on-year)
- 87% of India’s population are non-English speakers

In the last 2 years of operation, Dhiyo has already garnered more than 1.25 million users, 1500 job providers, and 30,000 job vacancies, and is available in 9 Indian languages. It seeks to surpass 25 million users in the coming two years.

AIOPS
GAMECHANGER

VuNet Systems Private Limited: Improving business journeys

- **Digital Transformation**

VuNet is a next-gen visibility and analytics company using full-stack AI / ML & Big Data analytics to accelerate digital transformation within an organization.

VuNet Systems is an AI & Big Data analytics company revolutionizing digital transactions. vuSmartMaps is a next-generation full-stack observability solution built using big data and machine learning in innovative ways to monitor business journeys and improve user experience.

As of today, enterprises are putting a high priority on digital transformation to deliver enhanced customer experiences. Although enterprise IT has scaled up quickly to meet this growing demand, the tools to manage IT operations have not.As a result, most teams continue to use siloed tools that are incapable of adapting and handling various data at scale.

VuNet works with the belief that the key to a successful and agile business is a modern visibility and analytics platform. One that can provide deep intelligence with unified visibility, which are prerequisites for the digital age.

Vision and mission

Their vision is to make lives simpler for Enterprise IT operations and Business users by enabling big decisions with creative insights, fostering collaboration, and driving delightful experiences for customers.

> Having built game-changing data communication products from scratch for North American OEMs, we strongly felt the need to create groundbreaking products from India and the next decade and more belongs to product and deep tech innovation coming from India. This was the strong desire to start VuNet, to create world class products from India, with deep tech differentiators. This led us to the path of creating an AI first product and leveraging its power to improve real time financial transaction user experience and accelerate the financial inclusion and digital growth in our country.
>
> **Ashwin Ramachandran**
> Co-Founder & CEO, VuNet Systems

They are currently on a path to achieve the vision through a world-class intelligent, scalable 'Visibility and Analytics' platform by innovatively integrating emerging technologies to make personalized and actionable data-driven insights easily accessible for everyone.

By providing a single unified view of the client's business, teams can now predict anomalies faster, take proactive decisions, and free up more time to go after new goals and drive profits. This effort is driven towards making a shift from silos to successes.

What does the solution entail?

vuSmartMaps is an integrated enterprise AI/ML Platform with Machine Learning Operations features built on the following tech components of data acquisition, processing, cleaning layers, scheduling layers, MLOPs modeling, dashboarding, and reporting layers.

vuSmartMaps brings together monitoring, analytics and intelligence across a customer's journey helping IT operations connect to business KPIs. Measuring and delivering to business KPIs seamlessly across IT and Business helps accelerate the digital transformation journey and enhance revenue generating potential.

It helps connect business, operations and customer experience to provide a business journey view making it easier to proactively address any issues. The platform enriched with insights such as ML-based User Experience Index and Operational Performance Index provides a statistical view of the customer's satisfaction and health of IT systems respectively, to help drive proactive operations.

Innovative data pipelines with contextifiers, semantic analysis, dynamic enrichment, correlation engines, ML algortithm helps stitch journeys through patent-pending 3T correlation. This provides visibility to customers across the business journey and empowers them to derive insights through delightful storyboards and insightful reports.

The platform also provides a single real-time business journey view, even across distributed components, APIs, and more. This helps to foster cross-team collaboration by breaking down operational technology silos in organizations across touchpoints.

Accolades and awards

Founded in 2014 and three years into the journey, VuNet Systems was selected as a part of CISCO Launchpad cohort for startups. In 2017, they emerged as one of the 50 innovative applications in AI under NASSCOM's Artificial Game Changer Awards. They have also been conferred the NASSCOM Emerge 50 award. In 2019, they were declared the winner of the Artificial Intelligence Innovation Awards by Youstory techsparks. And in 2020, they were awarded the #Time2leap award by the Ministry of Small and Medium Enterprises (Govt. of India) as the best Tech in the Payment gateway.

Impact and scale

There are a lot of AIOps products in the market; VuNet believes that there is a maturity curve to AIOps and a flexible, scalable, intelligent AIOps platform is the critical foundation. Monitoring more than 2.5 billion transactions a month across various verticals and some of the most extensive banking, financial services, and insurance enterprises, VuNet's customers have realized the benefits of a phased approach to AIOps.

Deployed at scale across BFSI/Fintech like NPCI, ICICI, etc., and other verticals to monitor over 3+ billion transactions monthly and 80K infra nodes, it is one of the most significant volumes handled in the world.

The solutions offered foster faster decision-making through end-to-end visibility across the digital landscape, provide superior customer experience, and ensure a single source of truth for business and operation.

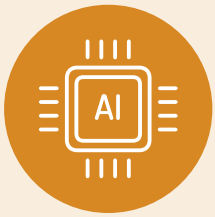
FEATURED STORIES

Exemplars

GOVERNMENT SHOWCASE

Central Electricity Regulatory Commission: Tackling data struggles with AI-powered 'REST'

- **Power Management**



CERC started building the model to have an intelligent search-based solution with Institutional Memory. The model has the capacity for automatic creation, reference and intelligent retrieval of information/ documents, process Automation and Business Intelligence.

The Government of India adopted the Common Minimum National Action Plan for Power (CMNPP), which paved the way for establishing the Central Electricity Regulatory Commission (CERC). When organizations have a vast amount of structured and unstructured data in today's scenario, AI will play a crucial role. Keeping this in view, CERC started building the solution to have an intelligent search-based solution with Institutional Memory. The model has the capacity for automatic creation, reference and intelligent retrieval of information/ documents, process Automation and Business Intelligence.

Problem area

In 2016, the commission started its regulatory portal and ecosystem. With the help of structured and unstructured data available in the CERC, they commenced incorporating AI into their activities. Thus began the story of the AI-based Regulatory Expert System Tool, commonly called REST. REST today supports CERC in seeking solutions for several of its issues. CERC's problems, which they have been trying to solve using AI, are generic. This makes their solution adaptable to any work environment.

For instance, the Tariff petitions that CERC deals with are voluminous, bulky and numerous. One petition can carry up to 1000 to 2000 pages. Multiple stages judicial process is yet another challenge. Deputation in the organization is provided to the people after three to four years of IVS, and they will continue for only a short period. Hence, building an institutional memory within the organization is necessary. The task of managing this data will be arduous to handle manually. Here is where AI steps in. It is essential to have an intelligent search-based solution that provides an easily searchable list of historical cases, citations etc., complete with a summary. With AI,

> Artificial Intelligence itself will not decide our future. The way AI is used decides the improvement in overall organizational, operational efficiency and effectiveness in the years ahead.
>
> **Vaishali Rana**
> Deputy Chief MIS, Central Electricity Regulatory Commission

the commission can index various document types, such as pdf, word etc., and provide a taxonomy and semantic-based search to find relevant documents from the existing repository. In a scenario of data overflow, the option for creation, reference and intelligent retrieval of information and documents are signed. The use of AI makes the overall function efficient and less time consuming with process automation and its business intelligence.

Overcoming the hurdles with REST

With AI and NLP, automatic document creation was enabled by extracting relevant data from various sources. Technologies such as Machine Learning and Deep Learning help train the algorithms of CERC's REST which acts as a one-stop solution for the commission. Also, the assignation of numerical "weights" concerning case facts is then computationally compared to similar cases in the expert system's knowledge base. An outcome based on the assigned values and similarities is generated using AI-enhanced input components, integration layers, and overall system output. Documentation, templates, and a document creation engine were added to the integration layer. The Core processing engine now has institutional algorithms, search engines NLP algorithms, facial recognition and a video management system. A speech to text conversion was also made possible for the system with the introduction of REST.

For the effective deployment of REST, the commission had to face several challenges. One of the primary challenges was the massive structured and unstructured data required to handle. Also, the data's exponential growth rate posed a hurdle in front of the commission. They also had to handle and transform various data schemes, including voice, video and texts, and as a solution to this, a master platform has been built that holds both ELT and ELT transformation. AI-based algorithms involving speech to text, and analyzing images and videos, are used to achieve desired results.

Integration of data is no easy task. With the increased number of data sources, they need to be integrated, brought into a single warehouse, and analyzed. At the same time, securing an enormous amount of data is yet another challenge. Also, the algorithms for data training had to be developed in the system.

Workspace after REST

Despite the hurdles, REST is now used by all the officers and staff of the commission. It now provides services for AI-based searching of the orders or automatic factsheet creation, data extraction etc. This usage has helped the organization to save time, manpower and money. There is now a reduced time consumed between filing petitions and factsheet generation. When petitions were filed manually, there were several errors in the past. Also, given the huge workload, the gap between filing a petition and factsheet generation for hearing was quite large. Factsheet generation is held within a few weeks, expediting the entire judicial process with this system. The adoption of REST has led to greater transparency as the staff and officers are now aware of the related and identical petitions.

In the future, they plan to refine and continuously innovate and enhance the solution after taking feedback from end users/stakeholders regularly. With REST, there is also improved internal monitoring and regulatory compliance. In addition, process automation makes the task undertaken by the officers more efficient with minimal manual intervention.

GOVERNMENT SHOWCASE

Telangana State Government: Revolutionizing service delivery through AI and ML

A Real-time Digital Authentication of Identity (RTDAI) has been developed that provides an easy, correct, and correct authentication of citizens' identity through a smartphone. Since authentication is the most crucial step in service delivery, it is a solution in the right direction.

The advent of new-age technologies like Artificial Intelligence (AI) and Machine Learning (ML) has truly transformed our lives in every way. Within a few clicks, one can have access to their favourite products and services, in the comfort of their homes. But what if you have to urgently renew your driving license? That thought gives you sleepless nights, doesn't it? After all, you have to take leave from work, and spend your time standing in serpentine queues until your turn arrives. Plus, there is so much uncertainty around the renewal duration. Fortunately, no more, if you are a resident of Telangana.

In July 2020, Electronics Service Delivery (ESD) and Transport Department jointly rolled out the Friendly Electronic Services in Transport Department (FEST), for presence-less and contactless service delivery anytime and anywhere, using AI, ML, and Deep Learning. A first in the country, the government of Telangana, through MeeSeva provides '500 government services' (covering 65 departments), and serves about 1,00,000 citizens, every single day.

This initiative has reinforced their commitment to providing transparent and convenient citizen-friendly services under various categories — driving license, vehicle registration, permit renewal, etc., using emerging technologies.

The problem statement

In most Indian states as well as other countries, the transport departments offer access to about 50 services (some of which are mentioned above). The delivery of services isn't as smooth and the challenges are common across geographies. These include dealing with paper-based transactions, encountering massive rush at the transport offices (since the physical presence of citizens is required), availability only during working days and certain hours, as well as facing jurisdiction-based challenges. Moreover, the presence of middlemen is another pain point.

To address the issue, there was a need for an intelligent IT application that could perform the checks done by department officials in the manual system, using smartphones at the same efficiency that can address all issues in service delivery. Finally, a solution was derived by the Telangana government that can be considered relevant for all governments worldwide.

A concrete solution

A Real-time Digital Authentication of Identity (RTDAI) has been developed that provides an easy, correct, and correct authentication of citizens' identity through a smartphone. Since authentication is the most important step in service delivery, it is a solution in the right direction.

The good news is that implementation of these services has helped ease problems — for instance, renewal of a driving license can be done easily, within the comfort of your home. With FEST, citizens can

access presence-less, contactless, jurisdiction-less service delivery, through a smartphone, 24*7*365, anywhere in the globe.

RTDAI helps authenticate a person's identity through a smartphone. These are the three technologies that are used:

01 Artificial intelligence-based liveness detection to ensure that the selfie uploaded is of a person at that instant, and not a photo of a photo.

02 ML-based demographic check to compare the input name and father's name with these names from the transport department's database.

03 Deep learning-based facial recognition to compare the selfie with the photo from the transport department's database.

The mobile app integrates the three technologies, along with the departments' database through APIs.

How does it work?

Here are the steps that are a part of the process:

1. A citizen enters key details, e.g., existing driving license number, name, and father's name. They take a selfie, using the Tapp Folio m Governance platform.
2. 3-factor authentication is done, using AI, ML, and Deep Learning.
3. After successful authentication, the citizen fills in the application and pays the requisite fees.
4. There are two types of approvals that are sought at the department end. For some services, it is auto-approval, where the approval is given instantly post submission of application, post which the certificate is sent to the smartphone as an SMS link. For some services, it is the manual verification and approval, post which the certificate is sent to the smartphone as an SMS link.
5. A physical card is dispatched to the concerned citizen by post after the department approves.

The current status

Like everything else, the journey has been ridden with challenges. Visiting an uncharted territory has not been easy; after all, it is about bringing in a behavioural change to accept that new-age technologies will work as expected, as it was in the case of manual processes. Since not too many examples existed, several pilots were conducted to ensure the desired accuracy levels.

> FEST has achieved the ultimate objective of utopian governance, which every democratic government in the world aims at; i.e., providing anytime, anywhere government services in a presence-less and contactless manner. A citizen of Telangana can renew their driving license on a Sunday (office holiday) through a smartphone from their home or from anywhere in the world. This is a government service delivery system that very few countries in the world can claim.
>
> **G.T. Venkateshwar Rao**
> Commissioner (Electronic Service Delivery)

The vision ahead for the transport department is to provide all the services to the citizens, anytime and anywhere, except for those that require a physical driving test or physical inspection. Today, the number of citizens that use FEST is 400/day, which can go up to 4,000/day.

The RTA FEST has received an overwhelming response, with ~90,000 citizens using it, ever since its launch. Telangana is perhaps one of the first governments in the world, wherein a driving license can be renewed, even on a Sunday, through a smartphone. What's more, the solution has earned accolades, including the CSI e-governance award (facilitated by Computer Society of India), 2020 and Digital Lok Sabha Award, 2021 (facilitated by Indian Express), under the Artificial Intelligence category. The project was explained to the honorable Members of Parliament (MPs), as part of the technology session organised by the Lok Sabha Secretariat in July 2021.

Information Technology Electronics & Communications Department, Government of Telangana, adding that this has opened up the possibility of several other use cases by the government, including remote e-voting through a smartphone in the General Elections.

GOVERNMENT SHOWCASE

Tamilnadu eGovernance Agency: TNeGA building a unified mobile app for Tamil Nadu farmers

- Agriculture

Weather uncertainties and crop diseases are the two most hard-hitting factors that affect the farmers. At the same time, increasing population, growing urbanization, and changing consumption habits are putting ever-increasing pressure on them. The need to increase productivity and meet the rising consumption demands is growing every minute.

What is the solution?

To solve this problem, Tamilnadu e-Governance Agency (TNeGA) has piloted a farmer-friendly, easily accessible, AI-powered system, called the Uzhavan mobile app. The app works on smartphones and uses deep learning for pattern identification from digital images. It can identify pests and diseases in crops and advise farmers to protect crops.

How does the solution scale?

In the pilot phase, the solution has been implemented for detecting three major issues in paddy and maize crops. Trained on a pre-built knowledge base to identify pests from digital images, the solution is able to detect the issues with 80% accuracy.

Over 1,50,000 farmers have been impacted by this AI-based app solution. They click the photo of crops, upload it on the app and get remedial measures from experts within 24 hours. TNeGA has also included a human loop in the process chain where every AI detection is overseen by experts who confirm the remedies on each image.

What lies ahead?

TNeGA aims to extend this solution to other crop types as well. To achieve it, it has set up a system to collect data for various crop types directly from the ground and process it for consumption by training models. This data includes GIS details, crop stage, user query, and images of infected plants and leaves.

On the technology front, the government agency is working to improve the accuracy and reporting time of the AI model. It is also implementing reinforcement learning where the AI system can learn on its own and improve. This is being done by providing more variety of data to the system. the department has also set a target to increase the app downloads from 5,00,000 to 12,00,000 in the next 18 months.

The aim is to provide all the services through the app itself so that the farmers can avail everything with a single download.

What is the impact of the solution?

With the Uzhavan mobile app, TNeGA has been able to serve around 10,000 farmer requests within a span of 3 to 4 months. The other benefit of the system is that it serves the farmers in their local language. All these requests enabled the department to build a rich dataset based on data analysis that is able to validate stressed regions and signal the onset of pests and diseases by visualizing the patterns.

> When the weather strikes or crops get affected by the disease, farmers can hardly talk about yields. Or when a global pandemic hits, all of a sudden it gets harder to manage various processes because most are not digital. At the same time, the global population is growing, and urbanization is continuing. Disposable income is rising, and consumption habits are changing. Farmers are under a lot of pressure to meet the increasing demand, and they need a way to increase productivity. Thirty years from now, there will be more people to feed. And since the amount of fertile soil is limited, there will also be a need to move beyond traditional farming.
>
> **Muthuan Chockalingam**
> Tech Lead, TNeGA

Were there any challenges on the way?

Talking of the challenges, TNeGA representative said, *"All of these are taken by the farmers (Crowd Source) using their mobile phone cameras. Due to this varied resolution of images, and different size of the images object detection become a challenge. Collected datasets must conform to the data distribution in the actual application scenario and be as unbiased as possible and without omissions. The mass data collected has no labels so annotations become complex since it requires more subject matter experts."*

"Pre-processing Standardizing images is one of the important constraints that we face during the pre-processing stage. We need to resize the images in our dataset to a unified dimension. This implies that our images must be pre-processed and scaled to have identical widths and heights before being fed to our learning algorithm", he added.

The department also employs scaling, rotations, and transformations of the existing images to enlarge the dataset and expose the neural network to a wide variety of variations in them. This would enable the model to recognize objects in whatever shape and form they appear.

FEATURED STORIES

SPECIAL MENTION

ESG

Bert Labs: Reducing energy cost and carbon footprint across industries

Bert Labs

- **IoT**

Founded in 2017, Bert Labs works at the intersection of Artificial Intelligence and Internet of Things to enable its clients to improve energy efficiency, reduce carbon footprint, and improve supply chain planning and logistics.

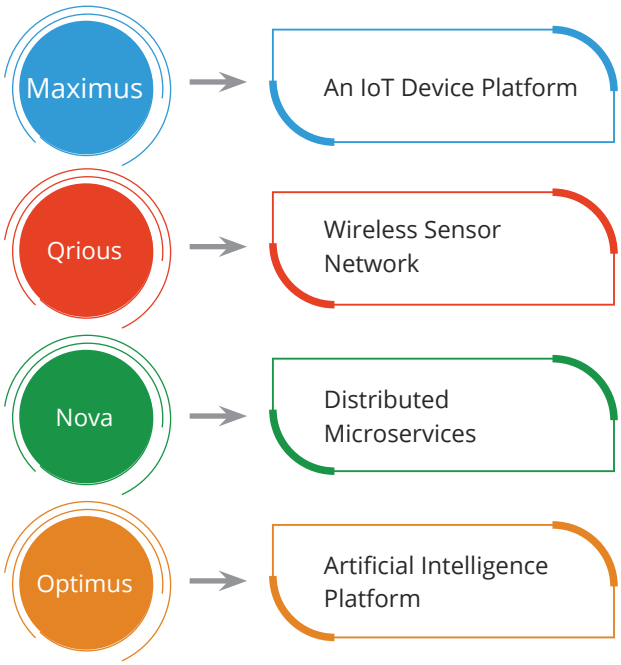
India's industrial sector is an essential contributor to its economic growth, and it is set to grow in scale as the government pushes for greater indigenous manufacturing. But while industries are a vital facet of the country's economic development, they are also highly energy-intensive. In addition, small and large-scale industries also produce a critical amount of waste that is not effectively managed.

Through innovative solutions using Artificial Intelligence and the Internet of Things, Bert Solutions aims to solve these complex issues and improve industries' production and capital efficiencies. This helps enterprises achieve their sustainability, productivity, and capital efficiency goals.

Bert Labs are solving problems that are part of Sustainable Development Goals (SDGs) adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. Bert Labs Solutions are focused on five of the seven SDGs.

AI and IoT driven product offerings

Bert Labs, through its proprietary "Bert Platform Solution," focuses on efficiency improvements in energy, production, supply chain planning & logistics, along with a reduction in carbon footprint. The Platform Solution has multiple product offerings in the form of:



The devices accurately measure the parameters related to the machine health & operations, environmental conditions, and material information. The data from various IoT & non-IoT devices are gathered at a single location to be acted upon. Deep Reinforcement Learning then follows this powered correlation identification for most optimized decision-making improving plant availability, reducing wastages, and bringing more transparency in operations.

The Bert Platform Solution was recently deployed at the Hindustan Unilever Ltd. office in Mumbai. Between Oct 2019 to Mar 2020, more than a 1000 Bert IoT devices were integrated with existing sensors spread over 1 million sq. ft. The IoT and AI/ ML-based data analytics, cloud computing, real-time analysis, and continuous HVAC controls indicated an incremental energy savings potential of 30%. The installation also showed a 20% reduction in thermal comfort complaints.

Impact and scale of the solution

The dawn of Industry 4.0 is revolutionizing how companies manufacture, improve and distribute their products. Manufacturers are now integrating new technologies, including the Internet of Things (IoT), cloud computing and analytics, and AI and machine learning, into their production facilities and operations.

Moving forward, smart factories will have no-human monitored operations, where there is real-time sensing of data points, transmission, storage, and processing of these data points leveraging AI models. The Bert Platform Solution and AI is built for exactly this and has the potential to do away with human intervention altogether.

The solution brought about 52%+ savings across all the blocks of the LEED Platinum Certified Building between Oct 2019 to Mar 2020 over the baseline defined by the latest technology of one of the world's leading technology conglomerates (HUL).

Adding more value for environmental change, Bert Labs also brought down the energy cost savings for their clients of USD 650 million with a carbon footprint reduction of 10 million tonnes.

It was also able to generate a lot of social value for the clients. The execution of Bert Platform Solution in factories was carried out with a great amount of ownership by the existing stakeholders buying into the impact of the Bert Optimus AI models on their KPIs and how it drove their public image as responsible corporate citizens.

With 200 projects across 35 clients in 7 identified industry verticals, the revenue scale-up for Bert Labs over the next 24 months is expected to be USD 400 million.

APPENDIX

ML FUNDAMENTALS
CHALLENGER

IIT Delhi:
Learning temporal point processes for efficient retrieval of continuous time event sequences

Author: Vinayak Gupta

- **AI Research**

Use case overview

» Relevance between temporal sequences is essential for a wide range of applications.
» For example, when searching for audio or music, you may want to look for sequences with different audio or music signatures.
» In social networks, retrieving trajectories of information diffusion that are relevant to a given trajectory can help with viral marketing, detecting fake news, etc.

Problem Identification

Detailed View of Opportunity

» In this paper, researchers proposed a new supervised continuous-time event sequence retrieval system called NEUROSEQRET that uses neural MTPP models.
» NeuroSeqRet learns to find and rank a relevant set of continuous-time event sequences from an extensive collection of sequences for a given query sequence.

Solution Innovation

Description of Proposed Solution

NeuroSeqRet has two main technical innovations:

» a trainable unwarping function on the query sequence, which makes it comparable to corpus sequences, especially when a relevant query-corpus pair has different attributes
» an optimization framework to learn binary sequence embeddings suitable for the locality-sensitive hashing leads to a significant speedup

Challenges and Risks

» The researchers also devised an optimization framework for learning binary sequence embeddings from relevance scores.
» This framework works well with locality-sensitive hashing and makes it much faster to get the top-K results for a given query sequence.

Impact and scale

Impact metrics and solution scalability

» Recent improvements in predictive modelling with marked temporal point processes (MTPP) have made it possible to accurately describe several real-world applications with continuous-time event sequences (CTESs).
» But the retrieval problem of such sequences hasn't been discussed much in the literature.
» Their tests with several datasets show that NEUROSEQRET is much more accurate than several baselines and that the hashing mechanism works well.

ML FUNDAMENTALS
CHALLENGER

Microsoft Research:
Adversarial Dueling Bandits

Authors: Aadirupa Saha, Tomer Koren, Yishay Mansour - Microsoft Research

- **AI Research**

Use case overview

- In Adversarial Dueling Bandits, the researchers introduce the problem of regret minimization.
- The learner must repeatedly choose a pair of objects and observe only a relative binary 'win-loss' feedback for this pair, as in conventional Dueling Bandits.
- Still, this feedback is from an arbitrary preference matrix and may be determined adversarially.
- The researchers also investigate a fixed-gap adversarial setup for dueling bandits that bridges the gap between two extreme preference feedback models for dueling bandits: stationary preferences and an arbitrary sequence of preferences.
- Furthermore, the researchers present a regret technique and a lower bound for the fixed-gap adversarial setting. Finally, the researchers use empirical evaluations to back up their theoretical findings.

Problem identification

Detailed view of the opportunity

» The researchers looked into the topic of dueling bandits with any adversarial preferences, often known as adversarial dueling bandits.
» According to the researchers, this is the first study to explore the dueling bandit problem in a completely hostile setting.

Solution innovation

Description of proposed solution

» The authors present an adversarial model for K-armed dueling bandits with binary "win-loss" preference feedback (and where regret is for Borda scores).
» The researchers describe an algorithm for the broad adversarial model, in which the sequence of preference matrices is to be completely random.
» The researchers also show how to tweak their method to provide a similar bound with high certainty.
» The researchers additionally provide a lower bound indicating that their approach is close to perfect.
» The researchers look at a more specific fixed-gap adversarial model for dueling bandits that bridges the gap between extreme preference feedback models: well-studied stationary stochastic preferences and downright adversarial preferences.

Role of AI and technical specifications

» In Adversarial Dueling Bandits, the researchers talk about the problem of making as little regret as possible.
» As in traditional Dueling Bandits, the learner has to repeatedly choose the same pair of objects and see only win-loss feedback for this pair.

Challenges and known risks

» Researchers might pursue open threads in this area, such as evaluating various broad concepts of regret performances, expanding the problem to more immense (possibly infinite) arm spaces, or even analyzing dynamic regret for adversarial preferences.
» Is it possible to show a better performance limit in the case of more structured utility-based

preferences (e.g., Plackett-Luce preference model, etc.), where the item utility scores are decided adversarially at every round?

» How does the learning rate differ for general subsets preferences in such cases? (i.e. where researchers can compare more than two items at every round and the learner receives winner feedback of the subset played).

» Another intriguing topic to pursue is understanding the link between this problem and other bandit setups, such as learning using feedback graphs or additional side information.

Impact and scale

Impact metrics and solution scalability

» The researchers show a regret technique and a lower bound for the fixed-gap adversarial setting.

» Lastly, the researchers back up their theoretical findings with real-world evaluations.

» The results demonstrate an inherent gap in the achievable regret between dueling and standard multi-armed bandits: the optimal regret in dueling bandits in the adversarial model.

» Similarly, the fixed-gap model's optimal regret for dueling bandits contrasts with the well-known regret performance for standard fixed-gap (stochastic) bandits.

» Furthermore, the Borda-winner identification problem in stochastic dueling bandits has a lower bound for sample complexity that is instance dependent.

» On the other hand, their bottom bound is identical in magnitude and applies to the regret, which is always (and often strictly) smaller than the sample complexity.

AI APPLICATION
CHALLENGER

Microsoft:
Micro-climate Prediction - Multi-Scale Encoder-decoder based Deep Learning Framework

Authors: Peeyush Kumar, Ranveer Chandra - Microsoft

- **AI Research**

Use case overview

» The researchers present a generic framework (DeepMC) that predicts various climatic parameters such as soil moisture, humidity, wind speed, radiation, and temperature based on 12 hours to 120 hours with a varying resolution of 1 hour to 6 hours.
» A deep learning strategy for a versatile Microclimate prediction framework in this study (DeepMC).
» Microclimate predictions are vital in various applications, including agriculture, forestry, energy, search and rescue, etc.

Problem Identification

Detailed View of Opportunity

» Accuracy: Due to the shortage of labelled datasets, feature heterogeneity, and non-stationarity of input characteristics, producing highly accurate findings is difficult.
» Reliability: The non-stationarity of climatic time series data makes characterizing the input-output correlations problematic.
» Each input feature has a different temporal impact on the output variable.
» The effect of precipitation on soil moisture, for example, is immediate, whereas the influence of temperature on soil moisture builds up over time.
» Replicability: Any microclimate prediction system should be able to operate over a variety of terrains.
» More sophisticated strategies are necessary to transfer models learnt in one domain to another domain with few matched labelled datasets.

Solution Innovation

Description of Proposed Solution

» Fusing weather station forecasts with the decomposition of IoT data at multiple scales to localize weather forecasts to IoT sensors, and
» A multi-scale encoder and two levels of attention mechanisms to learn a latent representation of the interaction between various resolutions of IoT sensor data and weather station forecasts.
» The researchers show a variety of real-world agricultural and energy situations, together with findings and uncertainty estimates from DeepMC's live deployment, demonstrating that DeepMC outperforms other baseline approaches and reports 90%+ accuracy with tight error bounds.

Challenges and known risks

» Micro-radiation projections for a solar farm estimate the electricity generated in commercial solar farms.
» These forecasts allow the utility company to meet its pricing and energy commitments in the energy markets.
» Seasons of high clouds or rain affect the amount of radiation received at the solar panel.
» The projections are highly accurate for the month after the monsoon in July, with MASE1 = 1.86, MAE= 65.14, and RMSE = 116.30.

Challenges and known risks

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Impact and Scale

Impact metrics and solution scalability

- On top of FarmBeats, DeepMC is in many different parts of the world.
- The researchers describe a few real-world agricultural and energy weather scenarios and their impact on operations.
- These findings are compared and demonstrated to outperform standard and baseline weather prediction models.
- The results showed a 3.11% RMSE and a 14.03% MAPE. Soil moisture levels rise quickly with heavy rains and sink slowly during long periods of drought.
- DeepMC follows these abrupt fluctuations fairly correctly, far better than weather station estimates, demonstrating the model's durability.

AI APPLICATION
CHALLENGER

IIT Madras:
Towards building ASR systems for the next billion users

Author: Tahir Javed

- **AI for Next Billion**

Use case overview

» Recent speech and language technology methods involve huge pretraining models for specific tasks.
» But the benefits of such BIG models are usually only seen in a few languages with many resources.

Problem Identification

Detailed View of Opportunity

» In this work, the researchers make several contributions to building ASR systems for low-resource languages from the Indian subcontinent.
» The researchers do this by using a curated dataset of Indic languages and a variety of ablation studies on architecture, pretraining, fine-tuning, and decoding choices.
» This approach gives the researchers the most up-to-date information about 9 Indic languages in 3 datasets.

Solution Innovation

Description of Proposed Solution

» First, the researchers collect 17,000 hours of raw speech data for 40 Indian languages from various fields, such as education, news, technology, and finance.
» Second, the researchers used this raw speech data to train different wav2vec style models for 40 Indian languages.
» Third, the researchers look at the models that have to find key features:
  » There are shared codebooks for phonemes that sound similar in different languages.
  » The language family is considered in representations across layers, and attention heads usually pay attention to small, localized areas.
» Fourth, the researchers fine-tune this model for downstream ASR for nine languages and get state-of-the-art results on three public datasets, even for languages like Sinhala and Nepali with very few resources.

Challenges and Risks

» Their work shows that multilingual pretraining is an excellent way to make ASR systems for the many different languages spoken on the Indian subcontinent.
» The public can see their code, data, and models at IndicWav2Vec and,
» The researchers hope to help ASR research for Indic languages move forward.

Impact and Scale

Impact metrics and solution scalability

» The research report shows the results of applying two new and successful ideas from English ASR to Indic ASR: wav2vec-like model architecture and unlabeled data to pretrain the model.
» While improving ASR systems for the following billion users from the subcontinent, their results show the need for more resources and benchmarks in more languages.
» The researchers hope these models will help move Indian Speech Technology to a higher level.

COMPUTER VISION
INNOVATOR

Awiros (Awidit Systems Pvt. Ltd.):
An operating system & marketplace for computer vision applications

- **ML Ops**

Use case overview

» Video intelligence analytics are being extensively used to solve multiple problems. However, video intelligence solutions are siloed and does not always communicate between systems. Also, such solutions are cost intensive, time consuming and a resource-intensive process. Awiros plugs these gaps through its operating system which is capable of running a variety of video analytics applications.

Beneficiaries: Enterprises across all sectors

Problem identification

Detailed view of the opportunity

» In a traditional video analytics system, deploying a new Video AI app is a time-consuming and cost-inefficient process.
» The system requires the use of specialized cameras and dedicated hardware for particular use cases.
» In case of new requirements, the entire hardware installation process needs to be repeated.

Solution innovation

Description of proposed solution

» Awiros OS allows deploying Video AI apps with an unmatched level of flexibility, with apps being capable of running across thousands of cameras spanning multiple locations.
» Being hardware agnostic in nature, Awiros OS allows faster execution of delivery and deployment of Video AI applications at scale.

Role of AI and technical specifications

» Awiros is functionally built as a Distributed Operating System (OS) for developing, deploying and delivering Video Intelligence "Apps."
» In 4 simple steps, anybody can launch the Awiros App on any selected camera.

Impact and scale

Impact metrics and solution scalability

Awiros has achieved

» processing 10,000 hours of video per minute
» 1.5 Mn deep learning inferences per second
» 3 Mn lines of code
» Installed in 60 diverse apps

CYBERSECURITY
INNOVATOR

Bosch Global Software Technologies Private Limited:
Bosch AIShield for Securing AI Systems

- **IoT**

Use case overview

- AIShield started as an internal initiative to secure Bosch AIoT ecosystems.
- There is also a need to secure AI across the global AI landscape.
- Bosch AIShield provides its technology leadership and bolsters digital trust in the AI and AIoT ecosystems as a neutral and unbiased organization.

Problem identification

» More than 89% of organizations did not have the right tools to secure their AI systems in 2021.
» Sixty per cent of AI providers will include a means to mitigate possible harm to their AI assets by 2024.
» The need to protect the AI systems is more critical now as increasing businesses are opting for it.
» Widespread AI Adoption has profoundly exposed AI/ML models to adversarial attacks - Model Extraction, Model Evasion, Data Poisoning, and Model Inference Attacks.
» Hackers' subversion of AI/ML models can result in substantial financial loss, reputation damage, loss of competitive advantage, and intellectual property.

Solution

» Pitching AI against AI: Bosch AIShield is an AI-based innovative solution built to secure AI systems.
» The research & training database of AIShield deals with different types of threat vectors that can harm AI/ML systems.
» Continuous learning approach : Bosch AIShield takes an AI model and sample data as input and calculates the vulnerability score of a model using the intelligent attack framework and attack database.
» The attack database is foundational and constantly updated through research and open-source intelligence.
» Near active real-time measures : The vulnerability score prioritizes the most critical vulnerabilities and creates a defence mechanism against attacks as a remediation response. Bosch AIShield generates a deployable version of the defence model and real-time attack notifications.

Challenges

» The product is to support various types of models, data, and frameworks, and therein lies the most significant complexity.
» The product must work with multiple data formats such as images, time-series, and text data, along with various model types such as classification, forecasting, and segmentation.
» The propriety query and defence engine need to also work with multiple industries recognized frameworks such as Tensorflow and Pytorch.

Impact and scale

» BGST has designed the product to work with minimal original training data (~5%). The product can accept data up to ~1GB and model files up to ~500 MB.
» Additionally, they have built connectors to accept data from multiple industry data sources such as S3, Azure Storage etc.

> Majority of AI/ML models that get shipped have zero-day vulnerabilities, and organizations are not fully aware of it
>
> **Manoj Parmar**
> CEO, Bosch AIShield

COMPUTER VISION
INNOVATOR

EdgeVerve Systems Limited (An Infosys Company):

Unparallel Accuracy Delivers Stellar Business Outcomes | USD 20 million savings & 60% productivity boost for a large US-based telecommunications company

- **Business Intelligence**

Use case overview

- The XtractEdge Contract Analysis allowed a multinational telecommunications business to save USD 20 million and increase productivity by 60%.
- Their technology enables businesses worldwide to bring their digital transformation projects to reality.
- They're developing technologies that will allow you to extract hidden business value from your procedures, records, and supply chain.

Problem identification

Detailed view of the opportunity

» Use Text Analytics and Computer Vision-based approaches to extract contract provisions more quickly and precisely.
» The surgical abstraction of numerous contractual conditions and terms also permits compliance checks and spend analytics in a subsequent phase.
» This approach Assisted in automating the contract review process by identifying, extracting, and managing data from over 650,000+ historic commercial tower lease contracts with numerous revisions, addenda, and supporting documentation.
» A data pipeline was created to categorize, auto-abstract, and validate the signature status of contracts from upstream sources.
» The contractual information was to a subsequent system.
» Enabled the sales and mobile tower negotiations team to negotiate more favourable leasing terms and optimize rent and utilization.
» The client's contract enforcement team could seek reimbursement for excess expenses and levy fines on non-compliant vendors.
» This approach was achievable by utilizing insights such as contract terms, clause variances, and beneficial provisions.

Solution innovation

Description of proposed solution

» Existing procedures involved a person manually reviewing each contract, extracting terms and conditions, and inserting the data into subsequent systems.
» Due to a lack of consistency, managing contract template variation provided a significant challenge.
» Each contract has numerous intricacies, including multiple pages, conditions, and hazards.
» During the scanning process, several required fields were omitted from legacy contract documents, harming the quality and efficiency of reading and understanding the contracts.

Challenges and known risks

» The tower leasing contracts for our client's sales and mobile tower negotiating and contract enforcement teams exceeded 650,000.

» The contract enforcement team would hand evaluate tower rental agreements and identify and record pertinent information, such as clauses suitable for capital refunds from tower and real estate businesses.

Impact and scale

Impact metrics and solution scalability

» The sales and mobile tower negotiations team lacked complete visibility into their existing contracts, including their location-specific applicability, the availability of multi-party lease terms, and any potential for cost savings.

» The manual examination of these contracts impacts the team's efficiency and the correctness of the information.

BUSINESS INTELLIGENCE
INNOVATOR

Click2Cloud:
Automated historical, real-time and predictive analytics in healthcare and agriculture

- **Agriculture**

Use case overview

Click2Cloud provides automated solutions using AI and ML-based trademarked products. In addition, they have developed a comprehensive business and technology platform named farmer's engagement solution under Agri Cloud Industry vertical. That is revolutionizing the entire ecosystem with a personalized experience and proactive and predictive maintenance to increase the throughput of the Agri industry.

Beneficiaries: Farmers

Problem identification

» The traditional method of disengaged agriculture ecosystem affects the entire cycle of the food chain.
» Ultimately that affects the country's economy, and in the end, consumers and government face the burden of price hikes and inflation.

Solution innovation

Description of the proposed solution

» The solution is a mobile-based Microsoft PowerApp to reach remote areas and cover maximum outreach
» Real-time analysis and reporting
» Reduces time and resource consumption
» Reduce manual labor and research costs

Role of AI and technical specifications

» AI is used in:
» Identifying crops (object detection)
» Grouping crops by similar properties (clustering),
» Quality check (classification)
» And yield prediction (regression and forecasting).

Challenges and risks

» Data availability
» Onboarding farmers who are the end-users

Impact and scale

» This product is accepted in Maharashtra and Telangana region.
» Responsible AI has been addressed in matters of data privacy where blockchain was implemented.
» The dilution is self-explainable that collects insights from Satellite, Drone images, Sensors, Open 5G
» This solution is callable to millions of users based on cloud technology, NLP, which supports language interoperability.

NETWORK SCIENCE
INNOVATOR

EasyGov:
Identifying errors of inclusion/exclusion in social protection

- **Governance**

Use case overview

EasyGov has designed a human-in-loop, auditable Artificial Intelligence model to compute an individual's 'need score'; the model also helps identify possible errors of inclusion/exclusion.

Beneficiary: Government of Karnataka

Problem identification

» With the total welfare budget of India at approximately 15 lac crore rupees, the errors of inclusion/exclusion are almost 30-40%. Combined with the adversities brought forth by the pandemic, it becomes crucial for the Government to effectively deliver social protection without putting additional burdens on the budget.

» To achieve the same, the Government needs insight into the errors of inclusion/exclusion. The error of inclusion is the inclusion of 'less needy' beneficiaries due to policy design issues. The error of exclusion refers to a situation in which the 'needy beneficiaries' cannot avail of benefits for various reasons.

Solution

Description of the proposed solution

» The AI-powered solution helps the Government identify inclusion and exclusion errors at scale and with a quick turnaround.

» The platform solves the problem related to beneficiary identification, prioritization, and errors of inclusion/exclusion for any social welfare program.

» The AI-powered solution helps the Government identify inclusion and exclusion errors at scale and with a quick turnaround.

Role of AI and technical specifications

» The solution requires three different types of scores to get the view at the individual/family/program/scheme/education intent level.

» Creation of a master graph to compute the socio-economic need score that acts as an indicator for the success/failure of a scholarship scheme.

» Computation of 'welfare-type need score' catering to housing, health, education, food, and livelihood, almost all building blocks of social protection and socio-economic dimensions.

» Provision of including expert inputs and assumptions based on macro-level socio-economic indicators in case of non-availability of data. The algorithm is designed to learn on its own after achieving a high level of verified available data sets.

Challenges and known risk

» Consolidating data from multiple sources

» Collecting meaningful data

» Availability and quality of data collected

Impact and scale

» The Government was able to identify more than 20,000 students who did not avail scholarships though they were eligible and had high 'need scores'. Such students included disabled girls and other vulnerable groups as well.

» Errors of inclusion/exclusion account for 30-40% of the total welfare budget. The welfare budget is of the order of fifteen lac crores rupees

BFSI
CHALLENGER

EXL:
Automated data extraction and entry for certificate of insurance

- **Data Extraction**

Use case overview

» The process involved in getting the certificate of Insurance is time-consuming and complex.
» EXL uses cross-industry expertise and multiple technologies such as Cloud, AI, ML, NLP, etc.,
» To create and customize solutions for specific objectives in obtaining a certificate of Insurance.
» EXL's cloud-native AI drives end-to-end solutions directly through customer journeys.

Problem identified

» Commercially insured clients would require a Certificate of Insurance (COI) as a legal document as part of their contractual requirements.
» Certificate of Insurance depicts the coverage, geography, and locations.
» Unstructured Requests: requests involve severe human efforts to understand the context and nature of the request.
» Response time: COI carries an SLA of ~24-48 hours, with rush requests having an SLA of less than ~7 hours.
» Thus, making it a time-consuming task for manual research and data entry.

People and Process Challenges

» Non-standard request intake: EML, Excel Files, PDF, Word documents, JPEG, PNG, TIFF, etc. are present in the email attachment with no standard request format.
» A manual intensive process of checking each attachment and extracting 16-18 critical fields from those multiple sets of documents along with the email body for generating a Certificate of Insurance.
» It's time-consuming as it takes around 40-45 minutes to complete each request interacting with multiple platforms and toggling between 130+ screens.

Solution

» EXL has built a strong working relationship with clients' IT teams basis comprehensive application deployment capabilities
» It has changed the tide through solid project governance, excellent stakeholder management, and domain expertise

Impact and scale

» It is now seen as an Enterprise Solution and will allow EXL to deliver subsequent EXL XTRAKTO. AITM use-cases with more incredible speed, effectiveness, and significant business outcomes
» It has developed new capabilities and approaches around QA and model monitoring and learning strategies for AI applications

> Our objective is to transform how our clients think about, manage and leverage data. We are automating traditionally manual, time-consuming, and linear operational processes that are inefficient and significantly impact customer experience. These solutions will fundamentally change the way organizations deal with huge volumes of customer communication and contact centre data.

Rupesh Malik
EXL

BFSI
INNOVATOR

EXL:
Improving the economics of debt collection by leveraging AI and data

- **Customer Engagement**

Use case overview

A leading South African bank was facing high number of delinquencies every month which could not be addressed due to the traditional techniques of collection deployed by the collection team for collecting overdue from customers. EXL's AI-backed solution helped the bank reach all the required customers through all digital channels.

Beneficiaries: Banks

Problem identification

Detailed View of Opportunity

- Bank was facing a high number of delinquencies every month (~100K customers were overdue each month)
- The bank's collection team, responsible for collecting the overdue amount from customers, used traditional techniques of collection, leading to lower collection efficiency and high cost to collect.
- Only SMS with no two-way capability was being used to contact customers digitally.
- Limited visibility for business stakeholders on collection operations.
- Limited content personalization due to sub-optimal usage of analytics which was leading to low customer engagement.

Solution innovation

Description of Proposed Solution

- Develop an AI-based solution that can reach 100% of the delinquent customers, engage them through personalized messaging, do automatic follow-ups, ask for the reason for non-payment and offer payment plans.
- EXL Paymentor leverages AI to reach 100% of customers without deteriorating customer experience.

Role of AI and technical specifications

- An AI-based self-learning algorithm was required to do continuous experimentation to learn the optimal strategy, thereby improving the collected amount without bombarding the customers with multiple communications.
- Determine customer persona via multiple behavioral data points such as the ability to pay, willingness to pay, payment discipline, outstanding amount, and tenure.

Challenges and risks

- Data availability, security, accessibility and integration with banks.
- Inadequate model training due to lack of granular level data.

Impact and scale

Impact metrics and solution scalability

- Revenue Optimization: EXL PaymentorSM recorded a 600 bps higher payment rate than traditional processes leading to annual credit loss savings of USD 3 million.
- Cost Optimization: The dialing reduced from 5 to 2.5 calls per customer per month, leading to annual savings of USD million.
- Operational Efficiency: Able to collect money 10-20% faster compared to BAU.
- Customer Experience: Solution resulted in 2-3X higher engagement which translates to a 55% open email rate (national average at 25%) and 15% customer interaction over 2-way SMS (national average at 4%).

RETAIL & CPG
INNOVATOR

Fractal Analytics:
Next gen revenue management

- **BFSI**

Use case overview

» The four chief aspects of Revenue Growth Management comprise pricing, promotions, assortments, and trade investments.
» Revenue growth management is about capturing the value companies deliver to their consumers in realizing business growth.
» Ensure profit by using analytics to sell the right product to customers at the right price to maximize your revenue growth.

Problem Identification

» With new emerging channels, desire for personalized shopping experiences, and aspirations for a healthier lifestyle, consumer behaviour has changed over the years.
» As a result, revenue Growth Management has been a challenge for several companies.
» To Uncover Value Continuously
» Enable End Users on Better Pricing / Promotion Decisions.
» Keep Pace with Marketplace Changes, e.g., COVID-19 and high inflation.
» Connect the Value Chain from Pricing to Promotions to Trade terms
» Think Beyond Brick and Mortar to Omnichannel, eCommerce. Think beyond SRM.

Solution

» RGM has a user-centric design-enabled platform compared to non-intuitive standard platform play.
» RGM solution is 'always on' compared to discrete ad-hoc RGM available in the market.

Challenges

» It is a white box AI-enabled solution compared to a black-box analytic solution.
» It features GLocal solutions by market archetype compared to companies that offer global standard solutions or Local non-scalable solutions.

Impact and scale

» RGM has end-to-end RGM (Strategy and Execution) compared to consulting.
» Researchers will activate the solution with capabilities in 5 areas:
» AI for Smart Pricing
» AI for Trade promotion optimization
» AI for Shopper marketing & Consumer promotion optimization
» AI for SKU rationalization & mix
» Trade architecture & profit pool with customers/retailers

> Fractal Team has helped deliver over USD 40 million profitability enablement across various related workstreams.
>
> **Praneet Aneja**
> Vice President, Fractal Analytics

HEALTHCARE & LIFESCIENCES
INNOVATOR

Genpro Research:
Voody - Automating scientific literature generation using NLP

- **NLP**

Use case overview

» Prohibitive amounts of time are required to read through a large set of documents to derive meaningful insights and create draft literature/publications.
» To that end, Voody is a machine-assisted data extraction and authoring platform that help medical writers reduce their cognitive overload and produce quality reports easily and quickly. With an intuitive workflow and AI-assisted writing, our end-to-end platform is designed to support a variety of scientific documentation and use cases.

Beneficiary: Pfizer and J&J

Problem identification

Current data sources include at least 33 million+ citations through Pubmed, Medline®, and Google Scholar, coverage of 100 million+ scholarly articles. Further, the company integrates additional sources (pre-published archives, RWD, registries, genomic data, EMR etc.) based on market needs and evolving landscape. As 80% of the medical data is unstructured, it takes a lot of time for medical writers to produce quality reports.

Solution innovation

Description of Proposed Solution

» Voody contains continuously validated AI-enabled modules within a workflow, allowing familiar methods to be employed in a turbo-charged framework where much of the tedium and time-consuming background work is automated.

Role of AI and technical specifications

» AI is used for Document Ingestion & Layout Detection; Document Recommendation Models; NLP Highlighters; Knowledge Graphs; Natural Language Generation; Summarization; Semantic Search.
» Ontology Integration; Transfer Learning for Cross Collaboration; Visualization Engine.

Challenges and known risk

The team considers transparency and empathy as two of the significant challenges that need to be addressed in this domain.

Impact and scale

Impact metrics and solution scalability

» The accuracy of the AI model ranges from 90 to 97%.
» The technology enhances the speed of scientific writing and evidence generation in any domain by at least 25% through machine-assisted literature generation and quality checks.
» The technology aims to provide ROI in less than six months.

Persistent Systems Ltd.

Advancing healthcare models by combining Federated Learning and Semi-supervised Learning

- **Federated Learning**

Use case overview

Developing AI models over decentralized medical imaging data is extremely challenging due to lack of adequate labelling. To add to this is the lack of skilled medical personnel for annotating data as the task if tedious and time consuming. This is where AI-backed solutions can be effective by generating pseudo labels for unlabelled data and provide insights to boost performance of the model.

Beneficiaries: Hospitals, Diagnostic centres

Problem Identification

Detailed View of Opportunity

» Lack of skilled medical expertise, especially radiologists in tier 2 and tier 3 cities.
» Current diagnostic AI models in medical imaging are developed in silos by healthcare research organizations along with select hospital chains.
» Due to the sensitive nature of patient data as well as the unavailability of expert time, diagnostic AI models are still in their elementary stage.

Solution Innovation

Description of Proposed Solution

» Diagnostic AI solutions can be used as extensions to medical imaging hardware to facilitate early diagnosis.
» A Federated Learning platform that puts together data science, machine learning, engineering, DevOps, data management and security technologies and makes it transferable across environments

Role of AI and technical specifications

» Develop a collaborative platform which uses federated learning for building medical imaging models
» Develop a custom federated learning algorithm which allows hospitals to participate in improving models

Challenges and Risks

» Different resolutions of images had to be standardized for model development
» Unlabeled images across classes from multiple hospitals

Impact and scale

Impact metrics and solution scalability

» With a federated learning algorithm, hospitals can collaborate with other healthcare research organizations to improve models with only a fraction of annotated data.
» Successfully demonstrated improvement of endoscopy image classification model on an academic dataset.

MANUFACTURING
INNOVATOR

Knowledge Lens:
Digital twin based AI model to predict and maximize process yield and optimize asset efficiency

- **Digital Twin**

Use case overview

Production of specialty chemicals is a complex process that involves multiple real time process parameters and numerous reactions happening at any given time. As a result, fluctuating yields are observed across multiple shifts resulting in huge losses. Knowledge Lens's solution not only helped in increasing the yield of a specific specialty product, but also optimize the efficiency of associated equipment involved in the yield improvement process.

Beneficiaries: Any industry that has continuous manufacturing process involved for example, Chemicals, Biopharma

Problem identification

» Production of speciality chemicals is a highly complex process which often results in fluctuating yields across multiple shifts leading to huge losses.
» A yield improvement results in optimization of energy involved in the production process and significant savings.

Solution Innovation

Description of Proposed Solution

» Knowledge Lens's UnifyTwin iLens Industrial Platform and Edge Gateway provided the foundation to transform data and make it AI-model-development ready.

Role of AI and technical specifications

» Deep Learning Model that combed through the historical data and narrowed down the list of critical parameters that impacted the yield.
» An ensemble-based Machine Learning pipeline that provided real-time predictions for the process parameters and then optimized operating ranges for the controllable parameters.
» An intuitive recommendation web app that provides real-time recommendations to operators.

Challenges and Risks

» Absence of a structured dataset that could be used for modelling and profiling
» Data security
» Lack of a scalable infrastructure for data processing

Impact and scale

Impact metrics and solution scalability

» Revenue optimization: Approx. Rs.15 crores per year per plant.
» Operational efficiency: Approx. Rs. 1 crore per year per plant.
» Customer experience: Simple 1-page operator console with recommendation screen that simplifies underlying complexity for the plant operator.

AI FOR NEXT BILLION
INNOVATOR

AarogyaAI Innovations:
Precision diagnosis for drug-resistant tuberculosis

- **Healthcare**

Use case overview

- AarogyaAI gives precise diagnostics to tackle antibiotic resistance using a mix of genetics and artificial intelligence/machine learning (AI/ML) (AMR).
- The AarogyaAI drug susceptibility test for drug-resistant tuberculosis is a hybrid machine learning (ML)-based diagnostic pipeline.
- It is to identify AMR in Mycobacterium tuberculosis whole genome sequences (WGS).

Problem identification

Detailed view of the opportunity

» The advent of medication resistance exacerbates tuberculosis, and India bears one-third of the worldwide load.
» Although efforts are to diagnose drug-resistant tuberculosis using existing technology, these methods are ineffectual due to their limitations.

Solution innovation

Description of proposed solution

» The solution's front end features a simple and intuitive drag-and-drop interface where clinicians may drop sequencing files to generate a patient report.
» The algorithm is on AWS, and the front end can utilize the computational capacity to generate results quickly for the end-user.
» The end-user receives a quality report for the sequenced sample, a drug sensitivity report, mutations contributing to drug resistance, and the sample's ancestry as part of the report.
» In addition, clinicians can modify the pipeline to provide additional information regarding co-infections, sample microbial diversity, heteroresistance, etc.

Challenges and known risks

» The AI program not only evaluates drug susceptibility based on the data provided but also searches for new targets that contribute to treatment resistance.
» AI can track and forecast developing drug resistance as the algorithm evolves with the growing quantity of samples.

Impact and scale

Impact metrics and solution scalability

» The algorithm's back-end utilizes a proprietary bioinformatics pipeline and machine learning techniques to decode next-generation sequencing data.
» Data security is a significant obstacle, as is processing.
» The files produced by sequencing equipment are too large to be quickly submitted for processing.
» This approach necessitates that a portion of the processing is on the user's computer before submitting the resulting files for analysis and execution against the AarogyaAI model.

AI FOR NEXT BILLION
INNOVATOR

L&T Technology:
Chest-rAi: AI-based radiologist assist solution

- **Healthcare**

Use case overview

India has a dearth of trained radiologists and a skewed doctor-to-patient ratio. The role of a radiologist is critical when it comes to proper reading of MRI scans to treat any illness. With time, imaging equipment has become sophisticated whereby radiologists need to spend more time on its understanding and subsequent interpretation. L&T's Chest-rAi, an AI-based chest X-ray analysis solution, is enabling radiologists increase speed and accuracy of diagnosis.

» India has only 10K fully trained radiologists which hampers on-time diagnosis of any illness
» MRI scans and X-ray interpretations are not standardized and often inaccurate

Beneficiaries: Hospitals, Doctors

Solution innovation

Description of Proposed Solution

» An AI-backed solution/imaging system that can produce faster, accurate and standardized reports
» Reduce turnaround time on chest x-ray with no significant abnormalities
» Hierarchical classifiers to mimic tele-radiologist infrastructure

Role of AI and technical specifications

» The current accuracy of the solution is ~92.3% for ten prominent symptoms.
» The solution is available in a hosted cloud model for radiologists and can be accessed through the web and mobile.
» An in-built ASK-AI button that helps analyze the chest x-ray and produces the AI-based findings along with localization of tags
» Report generation that can be accessed on the web and mobile and shared across sharing platform

Challenges and Risks

» Data availability is limited for medical images on open source
» Data security
» The complex nature of hierarchical structure makes productionizing the solution a challenge
» Regulations regarding AI usage in healthcare are still at an elementary stage

Impact and scale

Impact metrics and solution scalability

» By deploying Chest-rAi, a radiology interpretation platform is generating over 10K+ chest x-ray reports per day.
» Chest-rAi has improved efficiency of radiologists
» The reports from the imaging are hosted on the cloud and can be accessed by the patients from anywhere, anytime.
» Chest-rAi solution will help train future radiologists on symptom identification, localizing area of interest & standard report generation.

AI FOR NEXT BILLION
INNOVATOR

Logy.AI:
Oral health screening application for population health triaging and timely treatment

- **Healthcare**

Use case overview

In India, more than 60% of the population has poor oral health. These include dental caries, periodontal diseases, etc., which they are unaware of. The team developed an AI-enabled solution powered by WhatsApp to help users become aware of their oral health from home and then connect with clinics and dentists for further treatment.

Beneficiary: Apollo Dental and Colgate

Problem Identification

- Dental caries affects nearly 530 million children every year, as per WHO. Severe periodontal disease affects 10% of the global population to have tooth loss.
- 60% of the Indian population has oral health problems like caries, periodontal diseases, etc., which they are unaware of. In villages, 70% of the population does not have access to proper dental care or advice. Hence, a lack of early health intervention from home.
- Healthcare providers like clinics are unable to get customers with dental problems in their clinics at the right time.

Solution Innovation

Description of Proposed Solution

- The user interacts with the AI health screening WhatsApp chatbot and clicks a few images of their mouth using their smartphone, and an AI-generated oral health screening report is created immediately. The patented AI models are 95%+ accurate based on the Kantar Trials report).
- Once the user becomes aware of their oral health, they can decide to get an advanced treatment plan from dentists online and then visit the clinic for necessary treatment.

Role of AI and technical specifications

- AI is used to create a comprehensive AI-generated oral health report from oral images taken from a smartphone.
- Computer vision models trained on 10,000+ users' oral health data to identify the presence of stains, calculus and caries in a user's mouth and create an immediate AI-based oral health report.
- AI is used to identify the patterns in the mouth images and give an immediate screening for the presence of caries/ decay or gum diseases in the mouth and how likely the person may have tooth sensitivity, bleeding gums and other oral health issues in the near future.

Challenges and Risks

- The AI solution is being developed on free-hand oral images taken from the smartphone. Since such a dataset was not available, the entire training dataset had to be created from scratch.
- The system works well with low-bandwidth internet connectivity. However, in places with no internet connectivity, the system faces some challenges. We are currently planning an offline version to overcome this limitation.

Impact and scale

Impact metrics and solution scalability

- The Oral health Screening solution is currently being used by Global enterprises like Apollo Dental and Colgate in India and Africa, respectively. Since the launch of this application in December 2021, the system has been rolled out to more than 100+ clinics in India and has screened more than 10,000+ patients in various urban and rural areas.
- The solution shall, in future, be extended to give early signs of the presence of oral cancer as well from the smartphone images of the mouth.

AIOPS
CHALLENGER

Affine:
AI driven automated operational data warehouse (ODW) server monitoring

- **Data Centre Management**

Use case overview

As ODW servers have a limit to memory & CPU usage, inefficient & expensive queries may impact server performance & its health, resulting in unscheduled downtime of servers and thereby causing downtime for the Enterprise system and opportunity cost to the client. Affine's AWS Based AI Solution to Automate the Overall Process of ODW Server Health Monitoring by enabling the system to deal with issues proactively without any manual intervention.

Beneficiaries: Industries
Problem identification

» As per IDC, approx. USD 5K Can Be Attributed as Lost Opportunity & Operational Delay Cost for every 1 min of unscheduled downtime of enterprise servers
» On average, the client faced up to 3 hrs of unplanned downtime owing to crashes over six months. Considering the dollar value impact for every six months to be ~900K - 1 M$, over two years, it's an operational impact of nearly USD 4M.
» Hence, automated monitoring of the servers needs to be used to check the impact of queries, syncing & replication on the system health.

Solution innovation

Description of proposed solution

» Affine developed a sophisticated AWS-Based AI Solution using ML Algorithms and cloud-based deployment for the AIOps Solution.
» The solution requires no manual intervention.

Role of AI and technical specifications

AI is used in:
» Query and User profiling
» AI decision engine
» Deployment

Challenges and risks

» Availability of historical data, which was orchestrated into the AIOps pipeline.
» The live data had to be processed, and decisions had to be taken in real-time, considering the criticality of the impact. The findings on the live queries were post-processed to avoid repeated decision making on terminated questions. The decisions, along with the query metadata, had to be informed to the respective stakeholders at specific intervals.

Impact and scale

» For each Enterprise level server, the deployed solution provided the client with USD 1.8-2M worth of annual cost savings.
» The deployed solution reduced unplanned downtime by ~80%, significantly boosting operational efficiency.
» Responsible AI has been addressed in data privacy, data security and explainability.

AIOPS
INNOVATOR

GAVS Technologies:
AI enabled solution for digital transformation

- **Digital Transformation**

Use case overview

Lack of visibility in hybrid IT and issue of high MTTR (Mean Time to Repair), lead to challenges in delivering required business service level agreements (SLAs) for critical SAP business processes. Manual correlation is tedious, time consuming, incomplete and often gets outdated. Automated correlation is required between business, application, and infrastructure. Operational data is siloed, existing in disparate domains of the SAP ERP stack.

Beneficiaries - Enterprises looking for a robust, high performing IT ecosystem to support their digital transformation journey.

Problem Identification

Detailed view of the opportunity

» Client with contrasting IT Infra systems with a variety of tools and technologies where many tasks are done manually.
» It makes analysis and managing IT enterprise quite difficult, thus delay in service and high operational costs.
» Client lacks adequate 360-degree visibility into the IT environment, thus faces challenges in delivering SLAs.

Solution Innovation

Description of proposed solution

» Auto-discover an application and understand the dependencies between the various components.
» End-to-end monitor all the devices, infrastructure components and applications.
» Baseline the acceptable performance behaviour of these components and alert any potential abnormal patterns, through machine learning.

Role of AI and technical specifications

» Topology mapping provides granular relationships between physical, virtual, and logical compute, storage, and network entities.
» Supervised and unsupervised ML algorithms draw crucial insights from data in real-time.
» A HIPAA compliant platform and leverages the power of AI led automation to optimize costs, automate workflows and bring in an overall productivity efficiency.

Challenges and known risks

» Lack of complete awareness
» Misconceptions around AI adoption
» Cultural inertia and skepticism to AI tools

Impact and Scale

Impact metrics and solution scalability

» Real time discovery of assets and relationships helps in faster resolution by 60%
» Increased services availability by 99+% by proactively detecting business services impact and providing Observability as a key outcome
» Reduce MTTR on incidents by a minimum of 60%
» Single pane of action, Noise suppression, Correlation, Root Cause Analysis, Predictions, and self-healing through BOTS
» Deploy bots to reduce defects to zero and increase productivity by a minimum 60%
» Intelligent triaging and automation, Self Service BOTs

TRANSPORT & LOGISTICS
INNOVATOR

Maersk Technology Centre:
Free time extension revenue optimizer

- **Predictive Analysis**

Use case overview

Maersk customers get a standard free time in terms of number of days in returning empty/filled container. In case of delay, they are liable to pay a penalty. Maersk also has a product named free time extension that provide customers an option to buy additional free time in returning the containers. The extension period has a cost which is much lower than the penalty rates. Hence, there is a trade-off between the revenue earned from the penalty rate and the extension rate. In the absence of any tool, Maersk was unable to understand the impact of free time extension pricing change on the revenue trade-off.

Beneficiaries: Offer to Agreement (OtA) platform

Problem Identification

Detailed View of Opportunity

» MAERSK customers get a standard free time (# of days) for returning the empty/filled container
» In case of delay in return, customers need to pay a penalty charge called Demurrage & Detention (D&D) charges.
» Maersk's Free time extension is a new product which provides the customer with an option to buy additional free time (# of days) for returning the containers. Free time extension rates are lower by 70-90% when compared with penalty rates. Revenue generated from this is called free time extension revenue.
» Both revenues (i.e., free time extension and D&D) have a trade-off and pricing managers manually implement the prices and evaluate to ascertain if the adoption rate increases/decreases.
» Absence of any tool to understand the impact of free time extension pricing change on free time extension revenue and the corresponding D&D revenue

Solution Innovation

Description of Proposed Solution

» Learn proportions of free time extension bought by users, delays, turnaround time, etc., from the data based on filters applied by a user
» Compute values for slabs and their corresponding rates based on historical data
» Predict the increase/decrease in customers' sensitivity to any price change
» Run simulations on the data after considering the inputs derived from the above steps
» Derive the optimal pricing point which optimizes the trade-off

Role of AI and technical specifications

» Machine learning (regression) was used to predict the customer sensitivity toward a change in price. The use of machine learning and operations research techniques was important to achieve higher accuracy, explainability and adoption of the solution.
» Traditional analytics-based solutions failed to meet the high accuracy level.

Challenges and Risks

» Cloud deployment of solutions as supporting ports were not configured in cloud resources.
» Maersk had to make the corresponding configurations to enable cloud deployment.
» Absence of any existing solution to the problem necessitates training another anomaly detection model in the future.

Impact and scale

Impact metrics and solution scalability

» 8X increase in the decision-making process, which can be fully reproduced.
» Optimization of revenue by 24%.
» Increase in customer adoption by 13%.

TRANSPORT & LOGISTICS
INNOVATOR

WNS:
Freight automation platform

- **Shipping**

Use case overview

The shipping and logistics industry is a highly manual-driven process that involves high-level of documentation and email handling. The industry has a high operational cost due to inefficiencies caused by high turnaround time and people dependency. WNS aims to automate freight movement through their solution MALKOM.

Beneficiaries: Transportation and logistics service providers

Problem Identification

Detailed View of Opportunity

» Transport and logistics movement involves a high volume of documentation which are available in multiple formats; the conventional process of email handling leads to low visibility of KPIs and inefficiencies driven by high turnaround time, which results in high operational costs.
» Processing of documents involves adherence to complex business rules and a stringent TAT.
» This sector is in need of a solution that can extract shipping information from various formats of documents and at the same time comply with all business rules and adhere to strict timelines.

Solution Innovation

Description of Proposed Solution

» WNS's MALKOM solution helps in
» data extraction and contextualization
» digitization of workflow, which helps auditors
» create common data model APIs which can be used for Transport ERP

Role of AI and technical specifications

» AI is used in extracting shipping information from different documents
» Cloud-Native Serverless architecture is leveraged to provide seamless scalability

Challenges and Risks

» Complexity of data sets
» Multiple formats of documents
» Lack of standardization in the industry

Impact and Scale

Impact metrics and solution scalability

» Extraction of data with 90% accuracy
» Minimize manual processing by automating more than 60% of shipping processing
» Improvement in TAT by > 90%

DL ALGORITHMS & ARCHITECTURE
GAMECHANGER

IIT Hyderabad, Google Research: Towards open-world object detection, incremental object detection via meta-learning

Authors: K J Joseph, Salman Khan, Fahad Shahbaz Khan, and Vineeth N Balasubramanian

- **Computer Vision**

Numerous vision-related tasks, including object detection, have been significantly enhanced by deep learning. The majority of existing detection models assume that examples of all object types are accessible throughout the training phase. Due to the changing character of the real world, it is possible to discover new classes of interest when travelling. The current approaches are fragile in an incremental learning environment since they tend to forget old information when taught a new task.

In this study, the researchers examine the challenge of class-incremental object detection. While learning to recognize new object categories, an intelligent learner must not forget previously acquired classes. As a result, knowledge distillation has become the de facto solution. While learning a new set of classes, distillation-based approaches ensure that the classification logits and regression targets of the previously learned classes are not from their initial condition.

Use case overview

Humans have an innate instinct to recognize examples of unknown objects in their environments. Curiosity regarding these unknown cases facilitates learning about them when the relevant information becomes accessible.

Object detectors can continuously encounter instances of new object classes in a real-world environment. When the existing object detector's performance on older classes drastically degrades. A few initiatives have to circumvent this issue; they all employ knowledge distillation versions to prevent catastrophic forgetting.

Although distillation aids in the retention of prior learning, it hinders the rapid adaptation to new activities, which is an essential condition for incremental learning, according to the researchers.

Problem Identification

Detailed View of Opportunity

The researchers propose a novel computer vision problem titled 'Open World Object Detection', in which a model is to:

1) identify objects that have not been introduced to it as 'unknown', without explicit supervision, and
2) incrementally learn these identified unknown categories without forgetting previously learned classes, as the corresponding labels are progressively received.

Solution Innovation

Description of Proposed Solution

The researchers frame the challenge, propose a rigorous evaluation process, and offer a novel solution based on contrastive clustering and energy-based identification of unknown objects.

Role of AI and technical specifications

The researchers suggest a meta-learning strategy that learns to restructure model gradients so that knowledge is across incremental tasks. A meta-learned gradient preconditioning that minimizes forgetting and maximizes knowledge transfer enables a seamless information transfer.

Challenges and known risks

Compared to existing meta-learning methods, their methodology is task-agnostic. It enables the incremental addition of new classes and scales to high-capacity models for object identification and permits the gradual addition of new classes and hierarchies.

Impact and Scale

Impact metrics and solution scalability

The researchers analyze their method using various incremental learning settings based on PASCAL-VOC and MS COCO datasets, where it outperforms state-of-the-art techniques.

Existing incremental object detection methods rely on knowledge distillation, which aids in retaining prior information at the expense of adaptation to new challenges.

In this research, the authors present a meta-learning technique to object detection that learns to preload gradient changes so that information is across incremental tasks. This process allows the model to remember past data and adapt to new jobs with agility.

The meta-learned incremental object detector on two benchmark datasets surpasses the current best approaches. In addition, the thorough ablation experiments highlight the contributions of each technique component. Extending their methods to single-stage detectors and incremental versions of related problem settings, such as action identification, object counting, and instance segmentation, is a fascinating and crucial research topic.

DL ALGORITHMS & ARCHITECTURE
CHALLENGER

IIT Hyderabad:
Grad-CAM++: Generalized Gradient-Based Visual Explanations for Deep Convolutional

Author: Vineeth Balasubramaniam

Use case overview

- Convolutional Neural Network (CNN) models have successfully tackled complicated vision issues, yet they are notorious for being "black box" solutions.
- A generalized strategy is necessary for improved visual explanations of CNN model predictions compared to the state-of-the-art.
- For example, the model should examine the tumour and categorize the image as malignant or any other background object.

Problem Identification

Detailed View of Opportunity

- Most of the existing ways to show how CNN model predictions look are based on model gradients.
- When gradients on all pixels in a given convolutional layer are the same weight, corresponding saliency maps, this process means that saliency maps don't focus on the object entirely, especially when there are multiple objects of different sizes and occlusions.
- To suggest a generalized method called Grad-CAM++ that can give better visual explanations of what CNN model predictions mean compared to the current state of the art.

Solution Innovation

Description of Proposed Solution

- To improve the accuracy of saliency maps by making the computation of gradients better.
- Ensure that the final method for all tasks CNNs are for (image classification, video classification, image caption generation, etc.)
- Extensive experiments and evaluations, both subjective and objective, show that Grad-CAM++ provides good human-interpretable visual explanations for a given CNN architecture across multiple tasks, such as classification, image caption generation, and 3D action recognition.

Role of AI and technical specifications

- CNNs are now an essential part of AI, especially in deep neural network models used in many computer vision applications.
- The contribution or solution is at the heart of how CNN models work and how researchers can calculate gradients.
- resources.

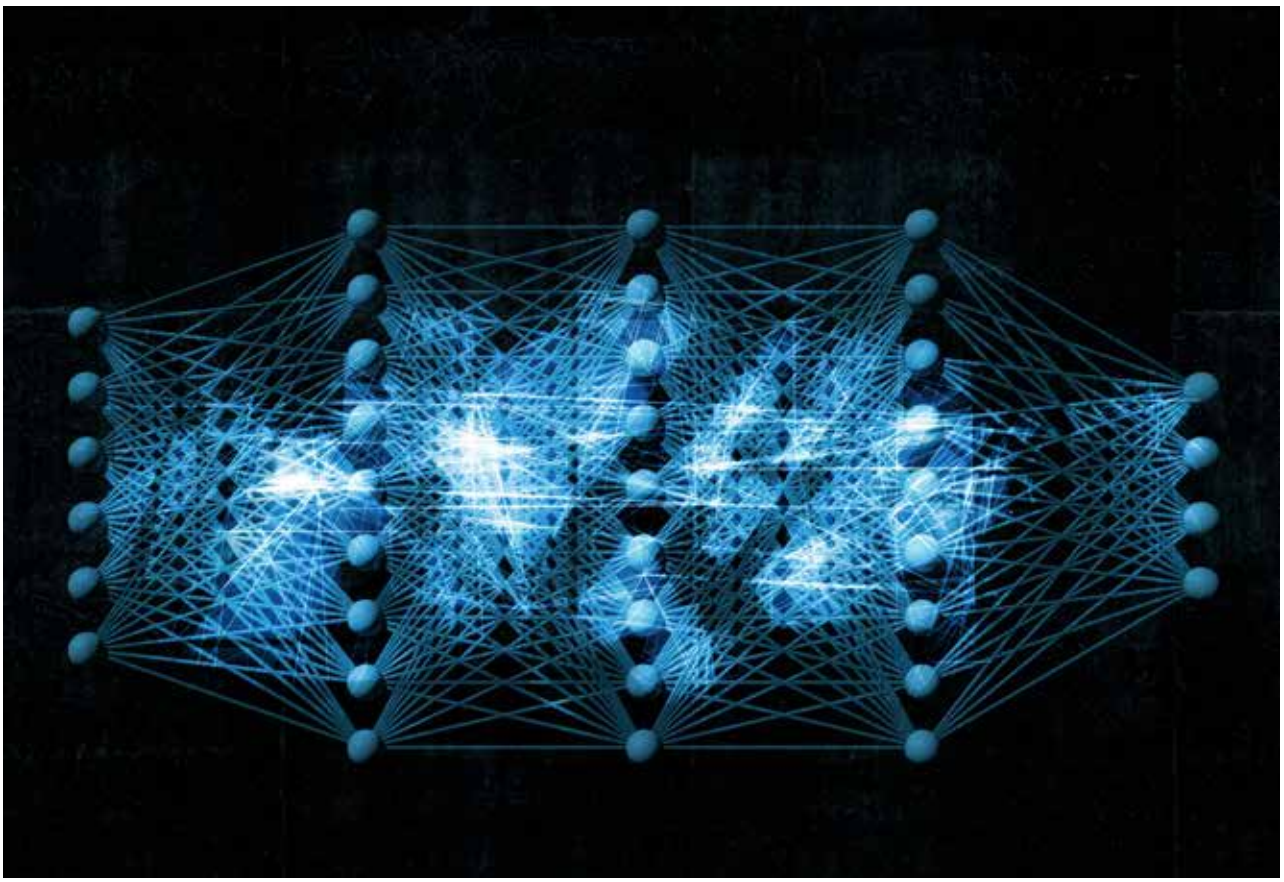
Challenges and Risks

- It is challenging to make Grad-CAM++ work well because of bigger maps.
- Getting visualizations to look better.
- Make visualizations less dense to draw attention to fewer essential pixels.
- To be made sparse with the help of regularizers.
- Gradients can be sensitive to small changes on their own.
- To use more stable gradients, like IntegratedGradient.
- The models only learned correlations. To learn causal saliency maps.

Impact and Scale

Impact metrics and solution scalability

- Grad-CAM++ is a generalized method for visual descriptions of CNN-based architectures provided by the authors of this study.
- The researchers derived that it is a simple yet successful generalization of earlier gradient-based visual explanation systems.
- Their solution solves the deficiencies of Grad-CAM, particularly the many instances of a class in an image and the inadequate object localization.
- Using typical, well-known CNN models and datasets, they objectively (fidelity to the model) and subjectively (invoking human trust) validated the success of their strategy (ImageNet and Pascal VOC).



DL ALGORITHMS & ARCHITECTURE
INNOVATOR

Paypal:
DeepGRASS: Graph, Sequence and Scaled Embeddings on large scale transactions data

Author: Mahesh

- **BFSI**

Use case overview

Lack of a fair credit underwriting system often eliminates customers who have the intention pay back but falls in the marginal category on creditworthiness. This results in revenue losses as good customers gets rejected. PayPal's solution model take a multidimensional view of the customer to make a holistic decision rather than simply relying on behavioural aspects.

Beneficiaries: Banks and financial institutions offering credit

Problem Identification

Detailed View of Opportunity

» Credit underwriting involves two challenges.
» Declining customers who are very good but borderline on creditworthiness.
» Lack of sufficient data for the process of credit underwriting for new markets.
» Absence of a fair credit underwriting system whereby many people fail to avail credit for personal needs because of their profile characteristics that sound average.

Solution Innovation

Description of Proposed Solution

» Develop a good and fair credit underwriting model that will mine patterns that indicate the customer's intention to pay back, affordability to pay back rather than the profile worthiness of the customer.
» The model should have a multidimensional view of the customer to make a holistic decision. It should rely more on behavioural cues of the customer rather than demographic characteristics.
» The solution, DeepGRASS, is a graph and sequence-based embedding educated from large-scale transaction data that capture multiple cross-sectional and temporal aspects of a customer.

Role of AI and technical specifications

» The Graph embeddings are calculated based on the transaction graph based on the last five transactions of the customer.
» The Sequential embeddings are calculated based on the last transactions at the individual level of the customer using features created from the product description of the transactions.

Challenges and known risks

» Predicting scores for 330+ million customers on a daily basis.
» Creating graphs from large-scale transaction data on a daily basis.
» Operating in very strict latency as customers can't wait long for real-time approvals.

Impact and Scale

Impact metrics and solution scalability

» Improvement in approval base for credit targeting by an additional 5%.
» Increase in TPV by Credit instrument by 6% resulting in an increase in revenue by 10 million.

EDUCATION
INNOVATOR

PrepAI:
AI powered question answer generator tool

- **NLP**

Use case overview

Many coaching institutes and EdTech companies are facing the challenge of creating dynamic question banks to test a student's learning capacity. At present, these institutes are using the services of freelance content writers to create questions which prove to be expensive and time consuming. DatatoBiz's solution PrepAI is helping these companies overcome these challenges.

Beneficiaries: Teachers, Students, EdTech Professionals

Problem Identification

Detailed View of Opportunity

» EdTech companies and coaching institutes are facing a lot of shortages of dynamic question banks to test their students' learning.
» They spend between Rs 100-500 per question to be created by freelancers/content writers, which leads to a lot of time investment, coordination challenges and human dependency.
» Absence of personalized learning and testing capability

Solution Innovation

Description of Proposed Solution

» The solution PrepAI has the ability to customize the difficulty level of the questions generated and personalize it as per the students.
» PrepAI algorithm has been trained on various custom datasets using state-of-the-art NLP algorithms to match how humans think about a context and act accordingly.
» PrepAI is an advanced AI-powered question-answer generator tool that has high accuracy when it comes to processing different input sources like Video, PDF, Docx and Audio.

Role of AI and technical specifications

» Uses AI to create a solution that emulates the human mind, understands the context in a given text document and proceeds accordingly to create question-answer pairs

Challenges and Risks

» Data availability to train models as per desired output
» Data training infrastructure
» Deployment solution that required heavy, heavy GPU processing and a huge recurring cost

Impact and Scale

Impact metrics and solution scalability

» PrepAI has been able to save USD 10K in the last two months of usage.
» PrepAI has also been able to consistently generate the question paper in 10 minutes as against the previous record of 2 hours.

BFSI
INNOVATOR

Researchfin.ai:
Research insights for trading

- **Stock Trading**

Use case overview

» AI-powered application-based research and technical analysis for trading financial assets.
» The simple solution offers the traders an easy and better analysis of the markets for better decision-making.

Problem Identification

» Combine technical and fundamental analysis to pick and exit stocks at the right time, helping you make profits and minimize loss.
» Money is lost while trading in stock markets due to a lack of in-depth research analysis and the strategies to manoeuvre through the high-intensity stock markets, which are unpredictable.
» Moreover, the research analysis demands knowledge and data and consumes enormous time.
» Retail traders fail to meet these demands without full-time professionals or intermediaries.
» It is challenging for them to analyze high-dimensional, voluminous information compared to institutional traders.

Solution

» As the stock data has a meagre signal-to-noise ratio (SNR), It's incredibly challenging to spot opportunities in stock markets.
» Researchfin.ai's solution provides ML algorithms well suited to weed out most of the noise to help the user find functional mappings better than random.
» Researchfin.ai's domain coverage for optimal solution/speed of decision making provides the ML algorithms.
» AI/ML algorithms allow users to model the relationships between intrinsic and extrinsic factors.
» Researchfin.ai makes objective and not emotional decisions as significant difficulty in trading comes from emotions as trading stirs up powerful feelings.
» In contrast, AI/ML algorithms help the user make more objective decisions.

Challenges

» Retail traders could not express their problems succinctly.
» To build a wide range of solutions to cater to maximum retail traders and a few institutions.
» Researchfin.ai's UX is far simpler than its competition in India and the United States.
» Scanner rules in competitor applications need machine language.
» Researchfin.ai app automates chart pattern recognition enabling anyone to make a TA-based trading decision without the knowledge of a TA.

Impact and scale

» The app has significantly improved their productivity overall, saving them time for other things in life while enormously streamlining their trades.
» Backtesting chart patterns and combining fundamental and technical analysis have attracted expert traders, for whom Researchfin.ai are launching the web version by the 24th of April '22.
» Researchfin.ai has created a domain-centric AI for Finance. The solution highlights the Dollar impact wherever possible.
» With its mobile and web version combined with additional features like a trading journal, backtesting, etc., the application will touch lives across generations, both expert and novice traders, and students to professionals.

> "As a trader/investor in financial assets, it was difficult to be consistent. The institutional traders have excess cutting-edge technologies that elude the retail traders, making investing not a level playing field. We've solved various problems in the past with the use of Big data and AI/ML. The pursuit with Researchfin is also to combine AI's computational power to analyze high-dimensional, voluminous information with the human art of understanding soft information for higher accuracy in trading,".
>
> **Sujt Barua**
> VP, Revenue - Researchfin.ai

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About NASSCOM

NASSCOM, a not-for-profit industry association, is the apex body for the 194 billion dollar IT BPM industry in India, an industry that had made a phenomenal contribution to India's GDP, exports, employment, infrastructure and global visibility. In India, this industry provides the highest employment in the private sector.

Established in 1988 and ever since, NASSCOM's relentless pursuit has been to constantly support the IT BPM industry, in the latter's continued journey towards seeking trust and respect from varied stakeholders, even as it reorients itself time and again to remain innovative,without ever losing its humane and friendly touch.

NASSCOM is focused on building the architecture integral to the development of the IT BPM sector through policy advocacy, and help in setting up the strategic direction for the sector to unleash its potential and dominate newer frontiers.

NASSCOM's members, 3000+, constitute 90% of the industry's revenue and have enabled the association to spearhead initiatives at local, national and global levels. In turn, the IT BPM industry has gained recognition as a global powerhouse.

About Microsoft

Founded in 1975, Microsoft (Nasdaq "MSFT" @microsoft) is the leading platform and productivity company for the mobile-first, cloud-first world, and its mission is to empower every person and every organization on the planet to achieve more. Microsoft set up its India operations in 1990. Today, Microsoft entities in India have over 11,000 employees, engaged in sales and marketing, research, development and customer services and support, across 11 Indian cities – Ahmedabad, Bengaluru, Chennai, New Delhi, Gurugram, Noida, Hyderabad, Kochi, Kolkata, Mumbai and Pune. Microsoft offers its global cloud services from local data centers to accelerate digital transformation across Indian startups, businesses, and government organizations.

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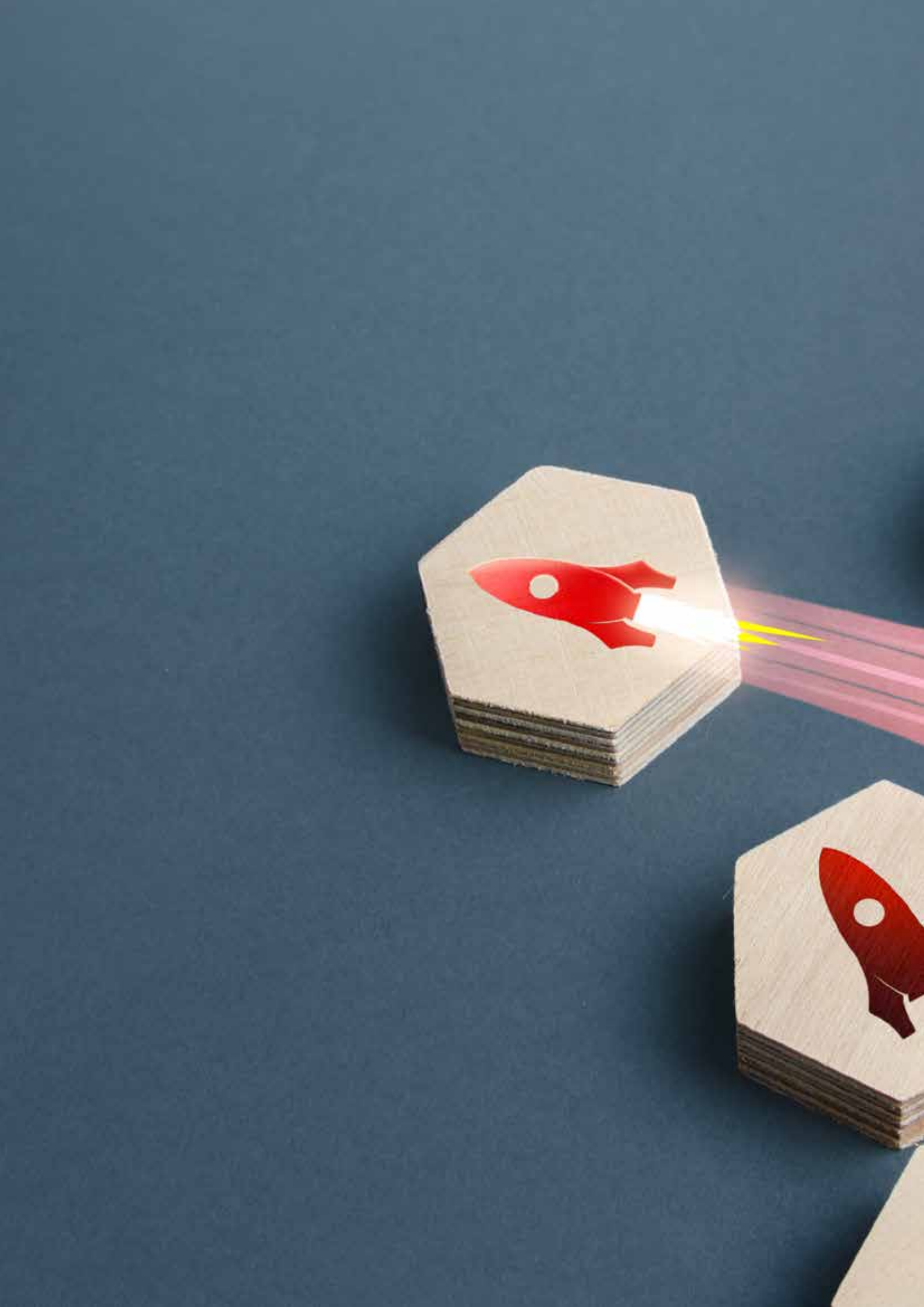

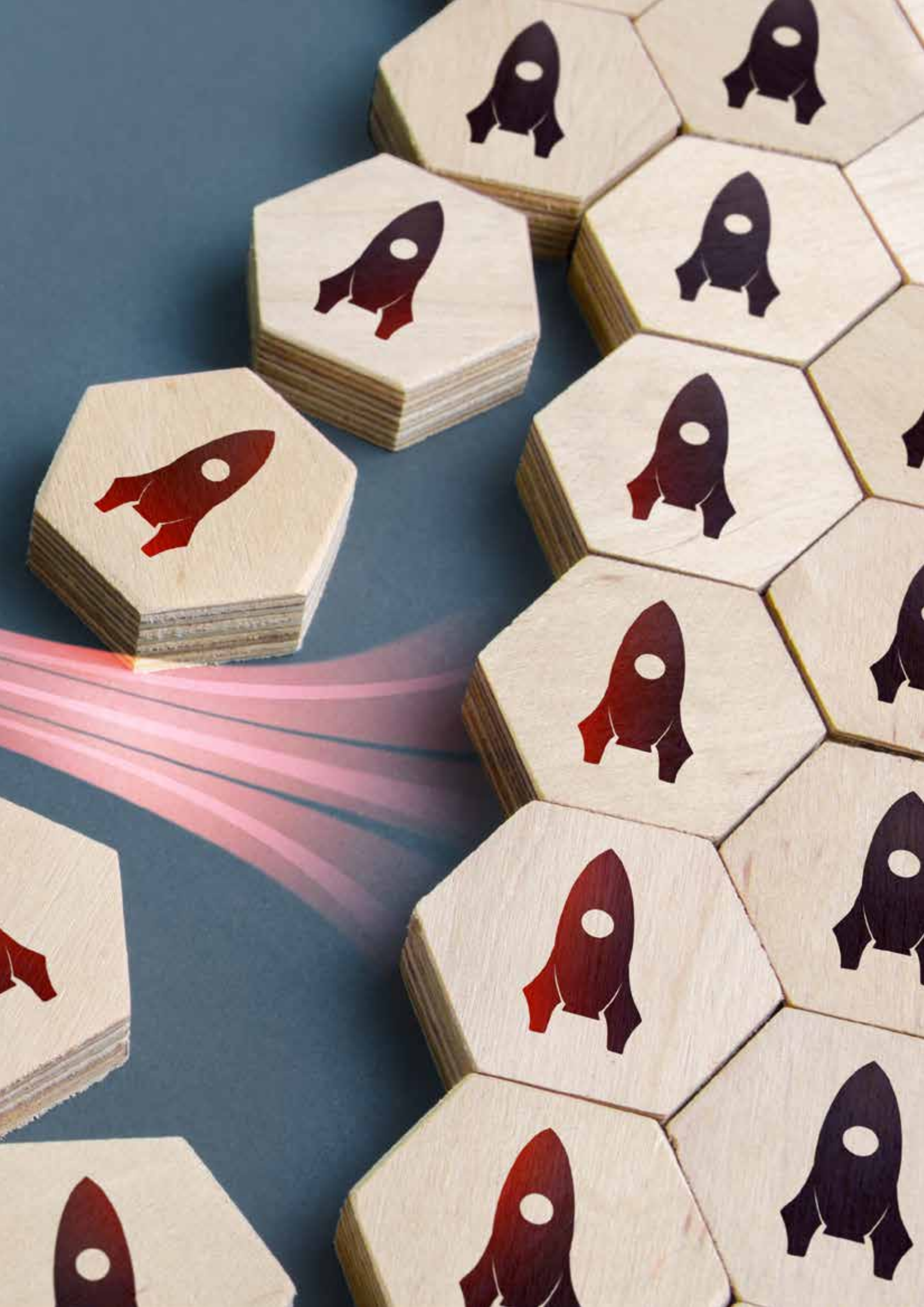

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