

July 2018

Centre of Excellence in
Data Science & Artificial
Intelligence

Catalyzing Innovation in Data Sciences
and Artificial Intelligence



ARTIFICIAL INTELLIGENCE Primer

NASSCOM

Foreword



The NASSCOM Research report titled “**Artificial Intelligence Primer 2018**” is published on NASSCOM’s annual Big Data & Analytics Summit, 2018. The report aims to highlight and analyze latest innovations in Artificial Intelligence across industries and categories of companies. The case studies submitted as part of **NASSCOM AI Game Changer Awards 2018** form the basis of this report together with secondary research and discussion with key leaders. The report also tries to showcase the latest AI trends and key use cases and impact of AI across industries. Hope you enjoy reading the insights.

Debjani Ghosh
President, NASSCOM

Acknowledgement



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This report has been developed by NASSCOM through a comprehensive study to understand the latest innovation in Artificial Intelligence and how the market is shaping up in the near future.

The preparation of this report has been possible with the various information sources and analysing case studies received from different firms working in AI as part of **NASSCOM AI Game Changer Awards - 2018**. We wish to sincerely thank all of them for their valuable contributions without which this report would not have been possible.

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Developing an understanding about Artificial Intelligence

Study latest Technologies and key AI Tools and Techniques

Global and India AI Industry Scenario

Key Incubators, Accelerators and Investors driving AI in India

Analyzing AI Game Changer Award case studies and deducing strategic insights

Prominent AI Game Changer Award case studies



Research Methodology

NASSCOM AI Game Changer Awards process

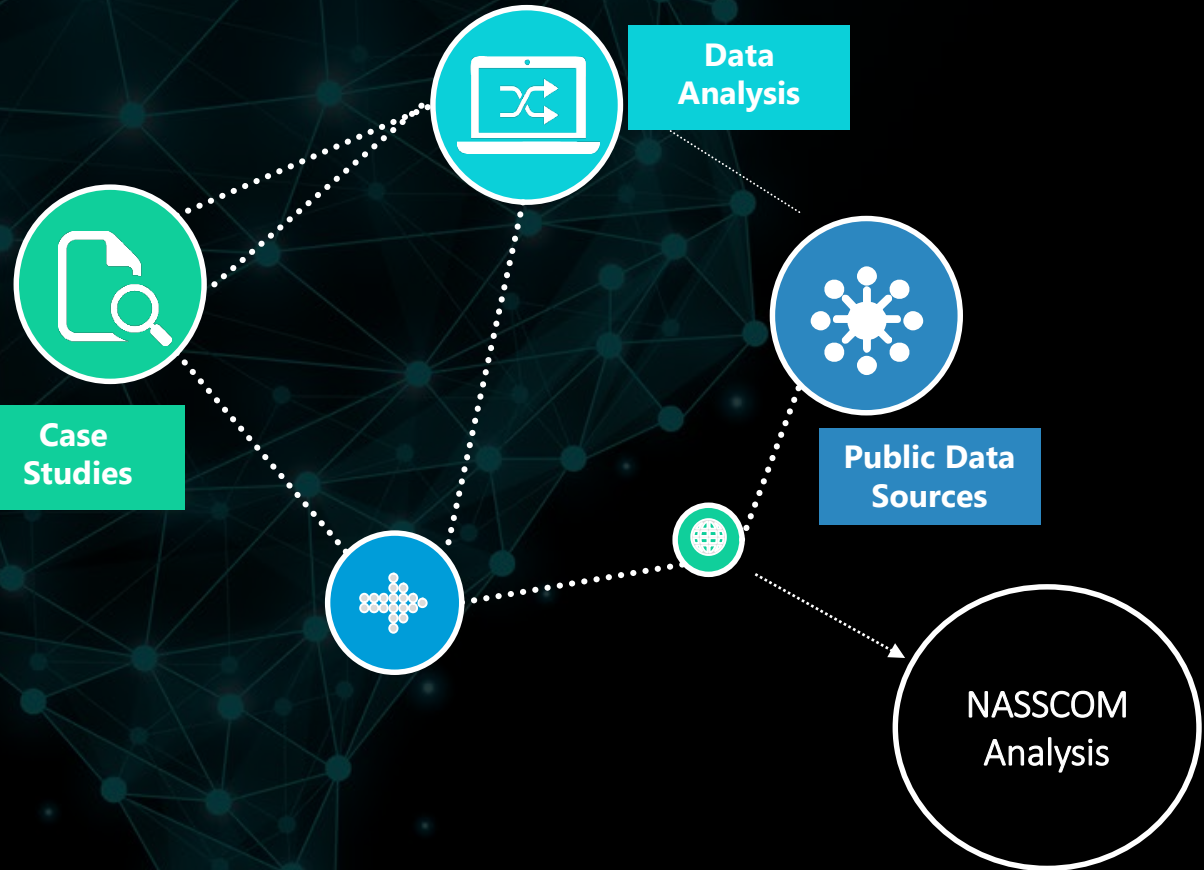
Key Inputs to NASSCOM AI Primer 2018

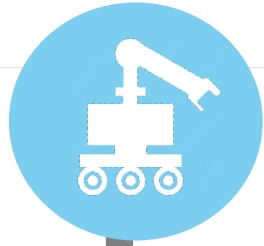
Submission of Case Studies — 273 — 15th May 2018

Shortlisting of Case Studies — 100 — 31th May 2018

Review by External Jury — 50 — 15th June 2018

Announcing the Winners — 10 — 11th July 2018





About Artificial Intelligence

Advanced Analytics, Natural Language Processing, Computer Vision, Robotic Process Automation and Speech Recognition are the key business categories of companies working in AI



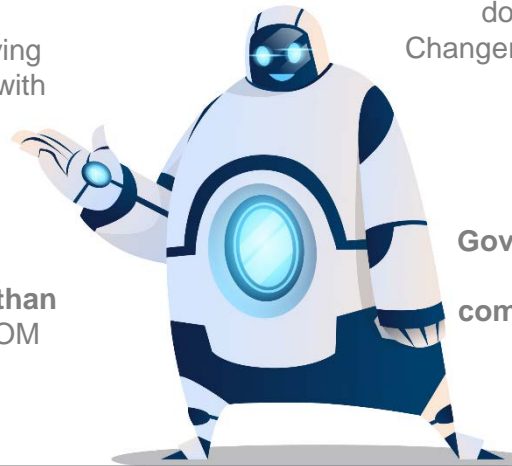
Sector Maturity

While overall funding increased from \$44 mn in 2016 to \$73 mn in 2017, new start-ups incorporated dropped from 146 to 81 implying Investor focus shift to more mature start-ups with increased investments.



Major AI Techniques

Advanced Analytics and Computer Vision techniques are the interest areas of more than 50% of firms that participated in the NASSCOM AI Game Changer Awards 2018



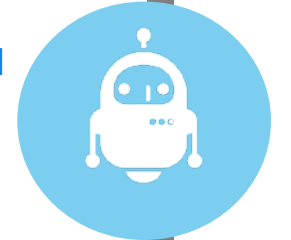
High interest of Investors and Large Companies

Companies like TCS, Infosys, Wipro, HCL, IBM, Capgemini are advancing in AI and have created AI based platforms like Ignio, NIA, Holmes,, etc. Similarly large fund managers are continuously in the process of investing in AI ventures.



Key Industry verticals focused on AI

Banking, Financial Services and Insurance (BFSI) dominate most of the AI innovations under AI Game Changer Awards attracting 26% of the firms followed by Retail, Healthcare and Manufacturing.



Supporting Incubators

Government of India has allocated USD 477 Mn for emerging technologies and set up expert committees. Large companies also provide nurturing environments in the form of incubators by offering mentoring, technology platforms, funding, etc.



Recommendations

- Collaborate with countries leading in Artificial Intelligence market
- Increase financial support for emerging AI ideas
- Re-skill the work force according to meet the technology needs
- Make AI technology cost effective and secure for faster integration in businesses



AI: The Basics

What is Artificial Intelligence (AI)?

Artificial Intelligence

Ability of machines to perform functions similar to that of human mind like perceiving, learning, and problem solving

Machine Learning

Machine learning refers to ability of computer systems to improve their performance by exposure to data without the need to follow explicitly programmed instructions

Deep Learning

A type of machine learning which sets up basic parameters about the data and trains the computer to learn on its own by recognizing patterns using multiple layers of processing

Supervised Learning

In Supervised Learning, the machine is trained on data which is labeled and tagged. The learning algorithm can also compare its output with the correct, intended output and find errors in order to modify the model accordingly. Ex: Regression Analysis

Unsupervised Learning

In Unsupervised Learning, data used by machine is neither classified nor labeled allowing the algorithm to act on that information without guidance. The system doesn't figure out the right output, but it explores the data and can draw inferences from datasets to describe hidden structures from unlabeled data. Ex: Clustering Analysis

Reinforcement Learning

Reinforcement learning is more of an experience based learning in which decisions are made sequentially. In this, the learning method interacts with its environment by producing actions and discovers errors or rewards.

Why AI?

AI is the need of the hour for efficient and effective industrial, economic and social growth



AI promotes innovation which is must for the growth in today's era



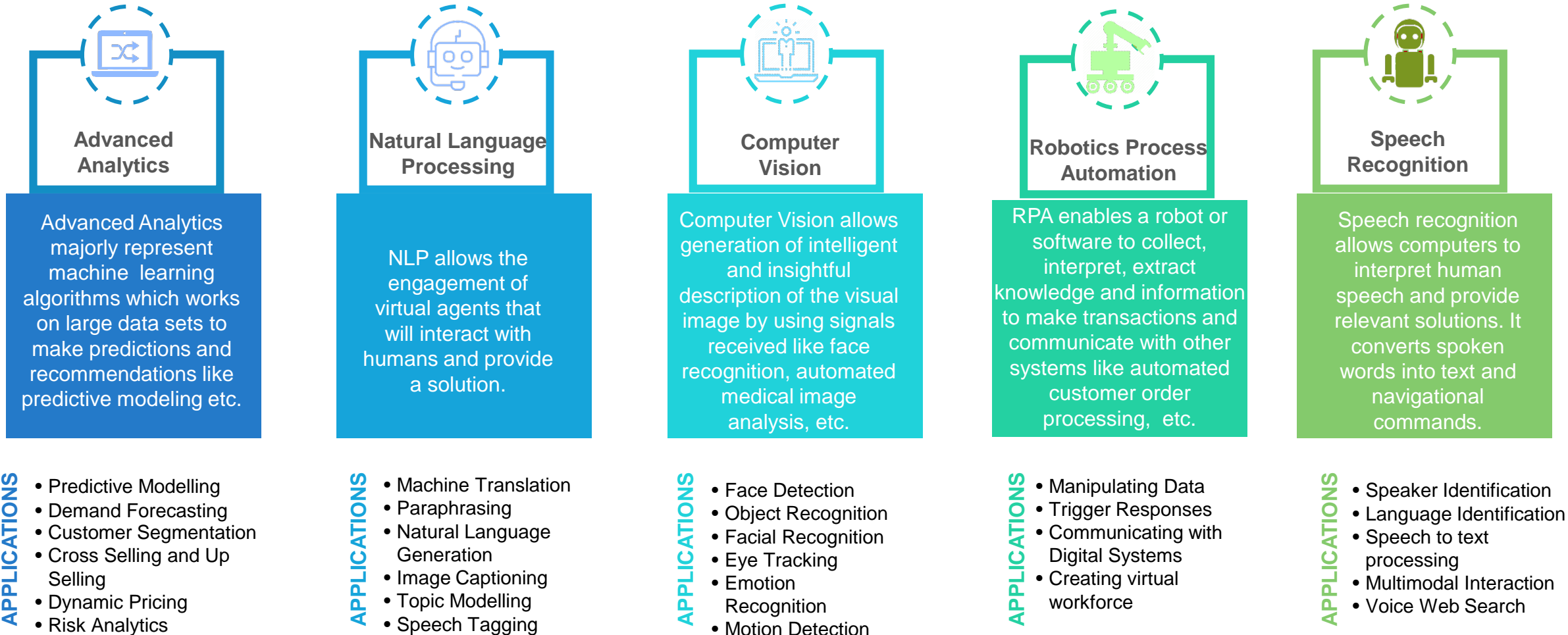
AI enhances workforce skills and abilities making them to be more powerful



AI helps automating complex solutions intelligently for better efficiency

AI is the ability of machines to perform functions similar to that of a human mind like perceiving, learning, problem solving, etc.

AI Business Categories



Machine Learning is most important AI technique to handle large and complex data

Machine Learning

	Algorithm	Use Case Example	Outcome
<p>Supervised Learning</p> <p>Used when we know the classification of data and what to predict</p>	<p>Liner Regression</p> <p>Logistics Regression</p> <p>Linear / Quadratic Discriminant Analysis</p> <p>Decision Tree</p> <p>Naïve Bayes</p> <p>Support Vector Machine</p> <p>Random Forest</p> <p>AdaBoost</p>	<p>Estimating product price elasticity</p> <p>Classify customers on likeliness to repay a loan</p> <p>Classify customer on likeliness to repay a loan</p> <p>Find attributes in a product that make it likely for purchase</p> <p>Analyze sentiments to assess product perception</p> <p>Analyze sentiments to assess product perception</p> <p>Predict power usage in a distribution grid</p> <p>Detect fraudulent activity in a credit card</p>	<p>Descriptive</p> <p>What Happened?</p>
<p>Unsupervised Learning</p> <p>Used when we don't know the classification of data and want the algorithm to classify data</p>	<p>K Means Clustering</p> <p>Gaussian Mixture Model</p> <p>Hierarchical clustering</p> <p>Recommender System</p>	<p>Segment customers into groups by characteristics</p> <p>Segment customers based on less distinctive characteristics</p> <p>Inform product usage by grouping customers</p> <p>Recommend news article to a readers based on what they are currently reading</p>	<p>Predictive</p> <p>What Will Happen?</p>
<p>Reinforcement Learning</p> <p>Used when we don't have training data and only way to learn about the environment is to learn with it</p>	<p>Balance the load on electricity grids in varying demand cycles</p> <p>Optimize the driving behavior of self-driving cars</p> <p>Finding real time pricing during a product auction</p>		<p>Prescriptive</p> <p>What To Do?</p>

Machine Learning today is extensively used and has well defined Algorithms, Tools and Technology while other AI technologies are confined to vendor provided solutions...

Natural Language Processing	
Vendor	Product
Google	Google Cloud Natural Language
Apple	Natural Language Framework
HP	HPE IDOL
IBM	Watson
Microsoft Corp.	Linguistic Analysis API & Text Analytics API
3M	360 Encompass System

Computer Vision	
Vendor	Product
Cognex	Vision Sensors, 3D Laser Profilers, VisionPro
Omron	Vision System, Smart Camera, Lighting System
Keyence	Vision Sensors
Basler	Cameras, Vison Kit
National Instruments	Platform Modules, Computer Based Devices
Sony	CameraLink

Robotic Process Automation	
Vendor	Product
UI Path	Studio, Front Office Robot, Orchestrator
Blue Prism	Enterprise Platform
Thoughtonomy	Virtual Workforce
Automation Anywhere	IQ Bot, Bot Inside
NICE	NICE Robotics Automation
Kofax	Kofax Kapow

Machine Learning

Technology



- Python
- Hadoop
- Java
- R
- MATLAB
- ELM
- Scala

Algorithm



- Regression
- Decision Tree
- Naïve Bayes
- Support Vector Machine
- Random Forest
- AdaBoost
- Gradient-boosting trees

Tools



- Scikit learn
- Shogun
- Apache Mahout
- H2O
- Cloudera Oryx
- GoLearn
- Weka

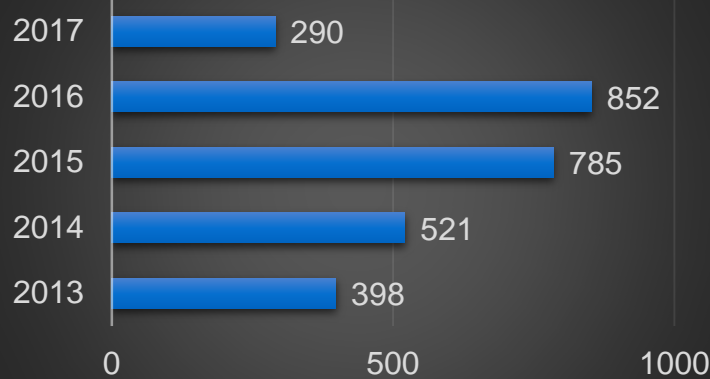


AI Landscape

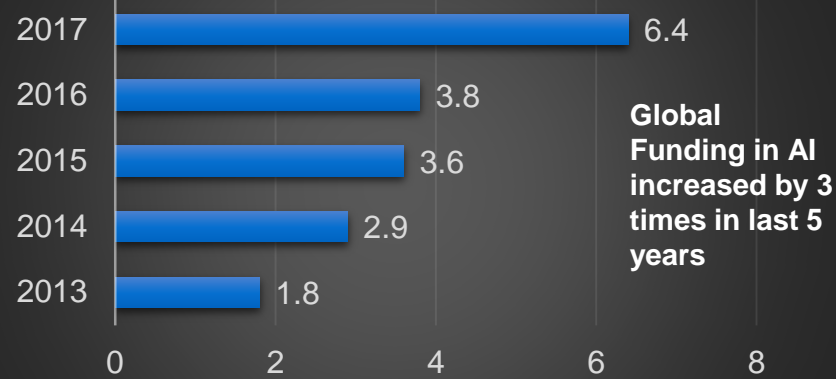
Global AI Scenario

Globally, 2017 saw fewer new AI Start-ups but almost 70% more funding...

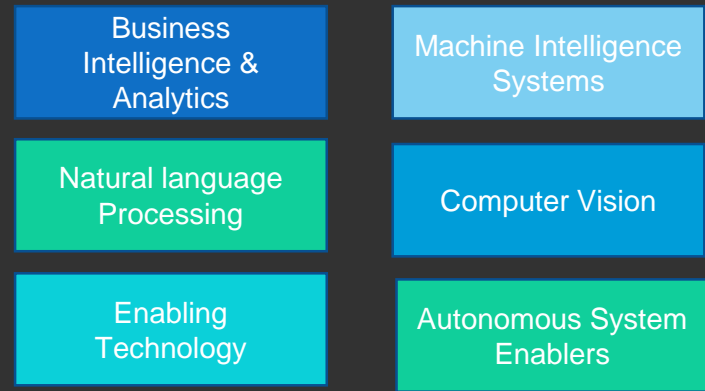
No. of Start-ups



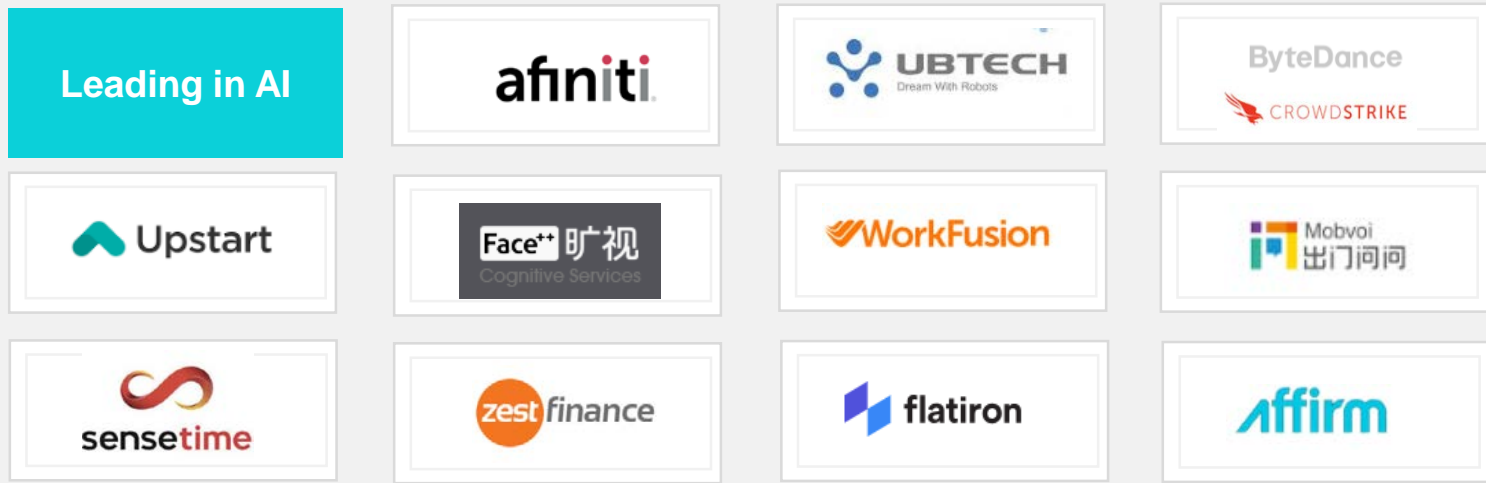
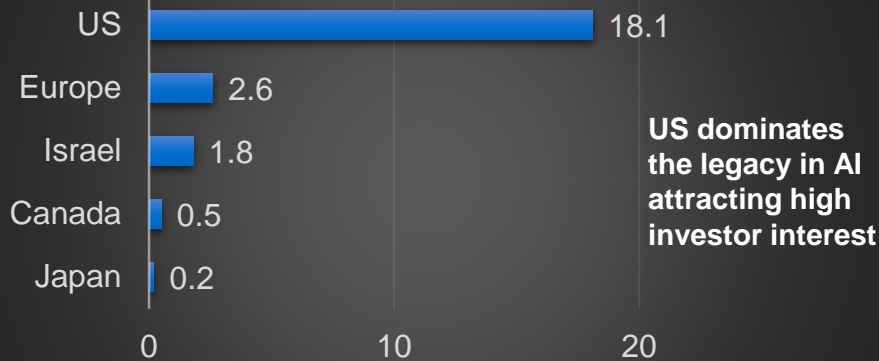
Global Funding (in USD Bn)



Major Investment Targets



Top Geographies

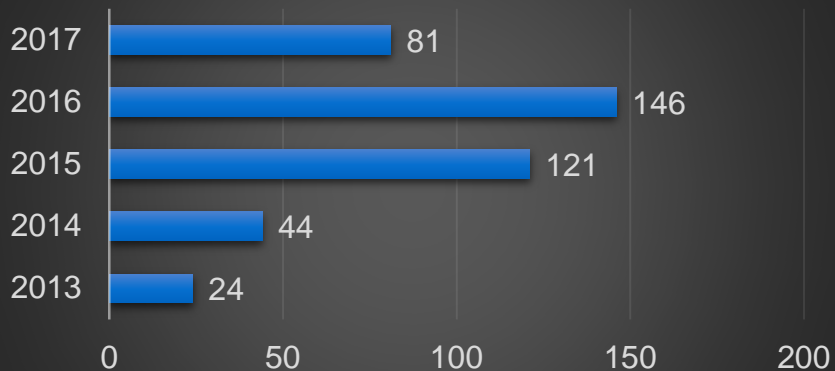


Illustrative

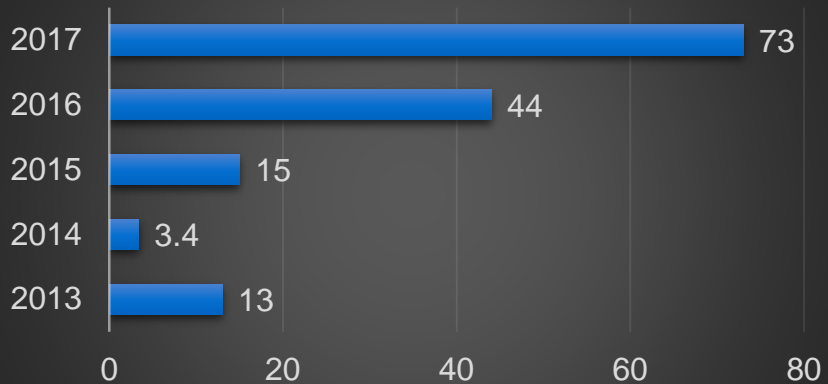
India AI Scenario

400+ AI Start-ups and ~150 USD Mn invested in last 5 years

No. of Start-ups



India Funding (in USD Mn)



Top 10 Recent AI Investments

Company	Funding (in USD Mn)	Investors
SigTuple	19	Accel Partners; IDG Ventures India; Endiya Partners; Pi Ventures; Axilor Ventures
Active Intelligence	8	Vertex Ventures; Dream Incubator; Kalaari Capital; CreditEase; IDG Ventures India
Observe	8	Undisclosed
Uniphore	7	India Infoline; IDG Ventures
CreditVidya	5	Matrix Partners; Kalaari Capital
Edge Network	5	Kalaari Capital; Ventureast
Acellere	3	Capnamic Ventures
Emotix	2	YourNest; IDG Ventures
Playment	2	Y Combinator; Sparkland Capital
ParallelDots	1	Multipoint Capital

Investor focus shift to more mature Start-ups with increased investments but fewer new Start-ups being incorporated

Companies have built AI Platforms to industrialize offerings...

Illustrative



Enterprise cognitive automation for IT Operations

Ignio binds together disparate yet interconnected business applications and their underlying infrastructures to perform actions autonomously and drive smart decision-making.



Artificial Intelligence Platform

NIA collects and aggregates organizational data from people, processes and legacy systems into a self-learning knowledge base and then automates repetitive business and IT processes.



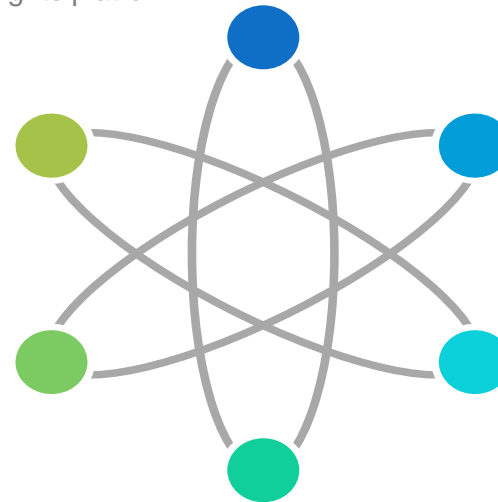
Artificial Intelligence Platform

Watson lets you learn more with less data. It allow to integrate AI into your most important business processes, informed by IBM's rich industry expertise.



Travel-as-a- Service (TaaS) platform

WNS TaaS Enables travel providers improve their workflow, automate travel bookings and acts like a personal travel concierge using chatbots and travel dashboards for an end-to-end booking and data insights platform.



Artificial Intelligence Platform

A modular platform that learns over time, finding new ways to get results. Built by operations and domain experts, Genpact Cora delivers an industry first—AI for the real world.



Artificial Intelligence Platform

Wipro HOLMES accelerates the digital journey of enterprises and enhances their operational efficiency, effectiveness and user experience across applications, infrastructure management and key business processes.



AI-powered Products & Platforms

DRyICE empowers IT delivery to match up to the dynamic requirements of business. By reducing application development, testing and deployment cycle-times, it enables the developers to focus more on value creation activities Benefits include enhanced user experience, improved productivity, faster GTM, cost reduction etc.



Machine Learning Platform

It streamlines processing of the plethora of information that flows into organizations every day from customers, suppliers and employees by post, paper, fax, email, attachments, social media and other electronic data streams.

Key Investors in AI

Illustrative



Prominent AI Incubators & Accelerators

Illustrative



8 week program delivering analytics value and roadmap



Acceleration program for startups in AI, AR/VR, Computer Vision, Robotics, NLP and Other deep tech technologies:

- Focus on research based startups
- 25 Lakh seed money in convertible notes
- Customized 6 months program



India Supported By



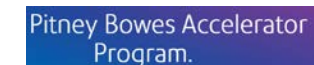
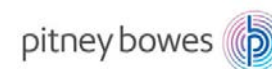
- Networking Opportunities
- Peer-to-Peer Meeting Sessions
- Funding
- Mentorship & Business Development
- Counselling
- Access to Talent
- Marketing and Promotional Opportunities
- Access to Cloud Credits
- Work Space



Startup accelerator backed by Reliance Industries that advise and mentor exceptional founders for launching their startup in the Jio ecosystem



Z Nation Lab works closely with corporate innovation teams to bring new technology, products, and services to life through startup partnerships and collaborative industry accelerators



- Infrastructure support – from office to cloud credits
- Pitney Bowes Location, Ecommerce, Machine Learning, Analytics and Data tools
- Technical & Business mentorship. Product Management, Branding, Marketing, Legal support
- Investor Connect & Exclusive Showcase Opportunity



The Hive, a venture fund & co-creation studio that builds and fosters startups focused on AI-powered applications announced the closing of its third fund with \$26.5M in capital commitments to co-create more than 7 startups in the next 3 years

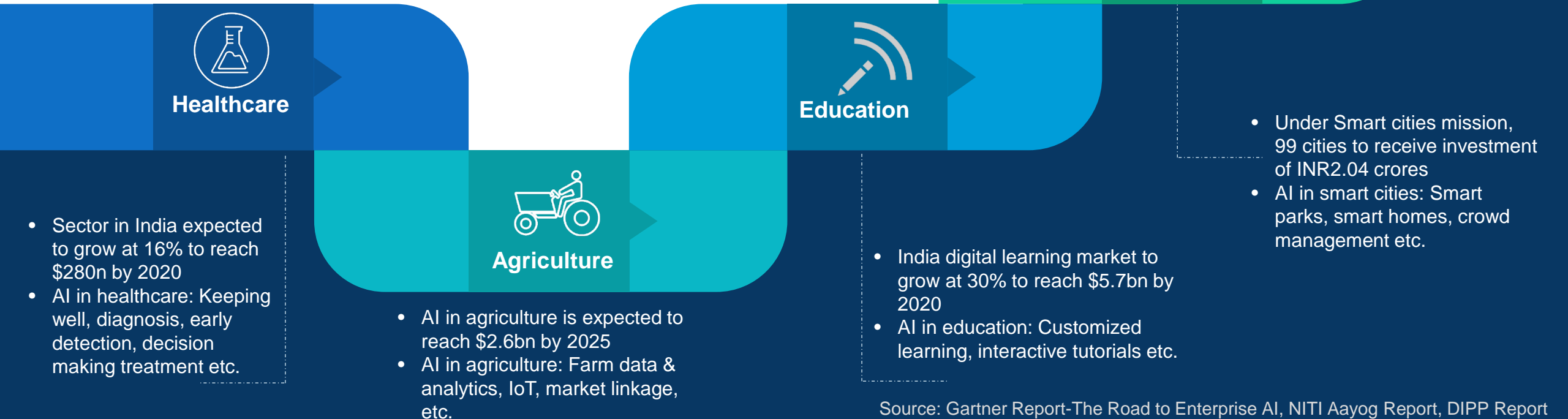
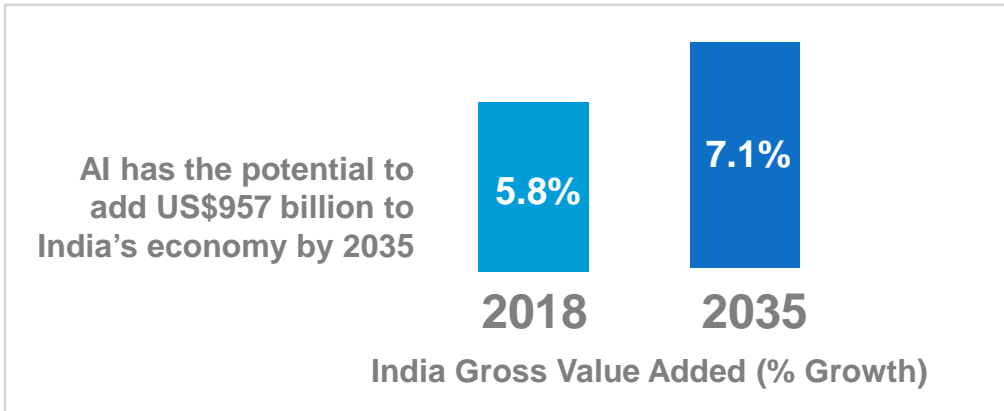


- Microsoft Reactor:** Providing physical spaces
- Microsoft ScaleUp:** Global program for co-marketing and co-selling opportunities
- Microsoft Ventures:** Venture capital investment team for investing between Series A and Series D



Launched accelerator programme "Catalyst" for disruptive startups

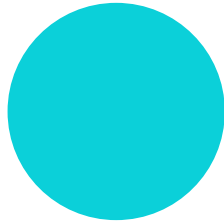
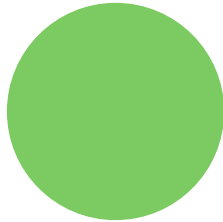
Focused push across a few sectors could lead to substantial growth of AI in India...



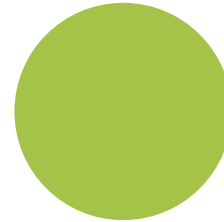
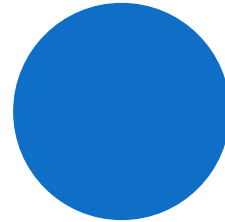
AI journey in India just got a booster for its growth...



Key Promoters



Expert Committees



Budget Allocation

\$477 Million

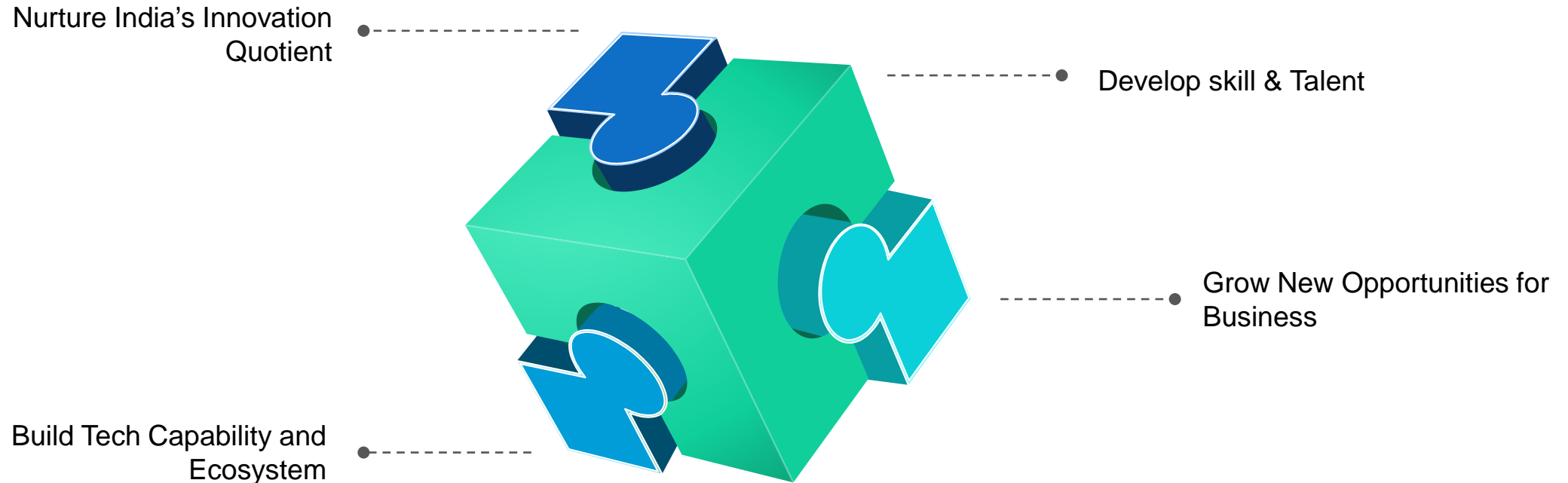
Budget of Emerging Technologies (2018)



- Committee on Leveraging AI for identifying National Mission in key sectors
- Committee on Platforms and Data for AI
- Committee on Mapping Technological Capabilities, key policy enablers required across sectors
- Committee of Cyber Security, Safety, Legal and Ethical Issues

NASSCOM Centre of Excellence in Data Science & Artificial Intelligence (CoE - DSAI)

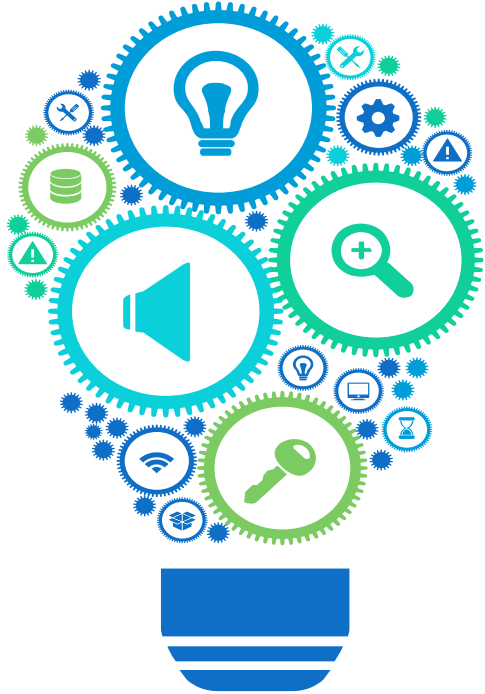
To Catalyze Industry Transformation and Growth



Vision

To accelerate the Data Science & Artificial Intelligence ecosystem and establish Karnataka as a Global hub for Data Science & Artificial Intelligence

Exponential Growth in AI demands skillful talent and companies are just getting ready for it...



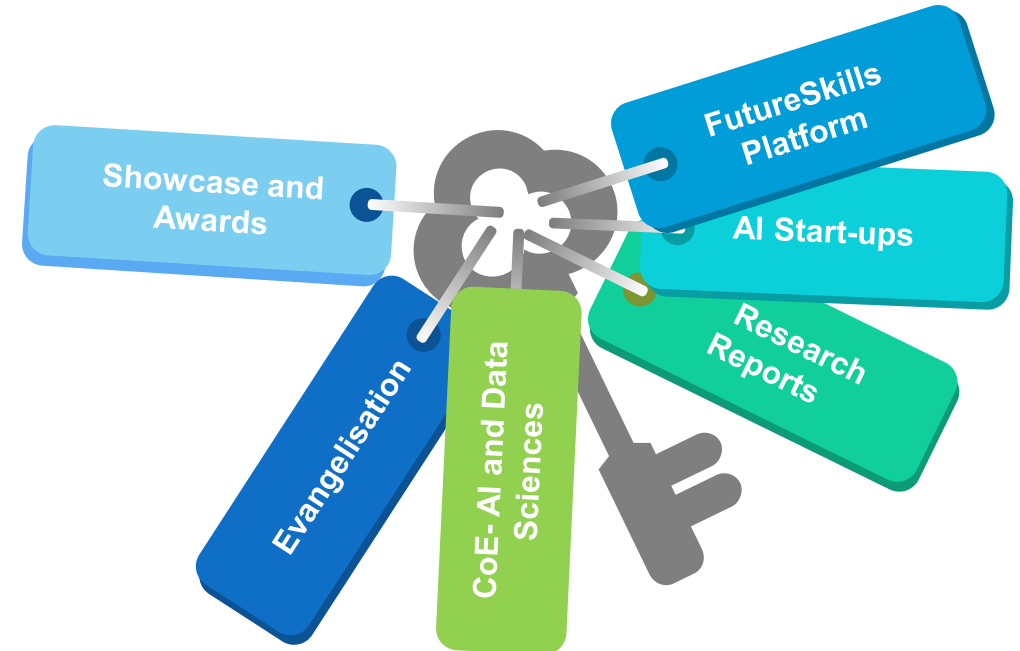
Global Highlights

- Demand for workers with AI talent has more than doubled over the past three years
- AI-related job postings as a share of all **job postings up about 119 percent**
- New jobs largely in two AI-related roles: **Machine Learning Engineers** and **Computer Vision Engineers**.
- **Only 10,000 people in the world can tackle serious AI research**
- **India is at 10th place** in terms of countries with most number of AI researchers trailing by US, UK, Canada, France, Australia, Germany, Spain, Switzerland and China.

India Initiatives

- Google partnered with nanodegree training providers Udacity and Pluralsight
- **Google to give out 1.3 lakh scholarships** in emerging technologies, including ML, to Indian developers
- Microsoft started extending training tools for its developers in the enterprise space to help them build AI and ML applications
- **Intel offers 60 courses** under 'AI Developer Education Program' to train 15,000 Indian engineers, scientists, developers and students
- **Indian Government is drafting a skilling programme in AI** – much like AICTE-driven cyber security courses
- Infosys “**Catch Them Young**” programme to nurture future talent

NASSCOM Initiatives



Future AI Applications...

Home and Service Robots

Specific robots for house hold work like package delivery, cleaning, security etc.

Artificial Intelligence Doctor

Knowing individual vulnerabilities to particular diseases and call for help even if the human faints

AI based News and Stories

News and stories are expected to be written by software robots and tailored according to personal preferences

Search

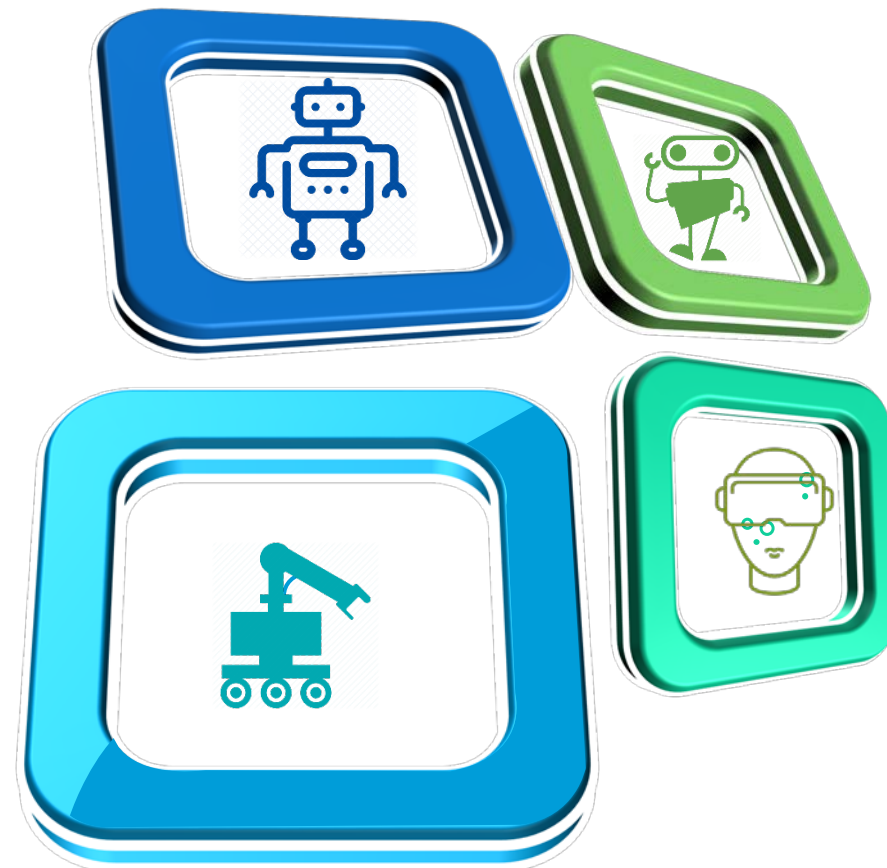
Search to become dialog based rather than client server interaction

Autonomous Trains and Planes

Trains and planes carrying cargo will get autonomous

Robotic Food Delivery

Food to be raised by robotic vehicles





Key Highlights

Key Highlights...

273

Artificial Intelligence Case Studies Analyzed

163

Companies Participated

- 27 No. of Large Companies
- 66 No. of Case Studies
- 72 No. of Small / Medium Companies
- 107 No. of Case Studies



- 21 No. of GCCs
- 34 No. of Case Studies
- 43 No. of Start-ups
- 66 No. of Case Studies

26%
BFSI

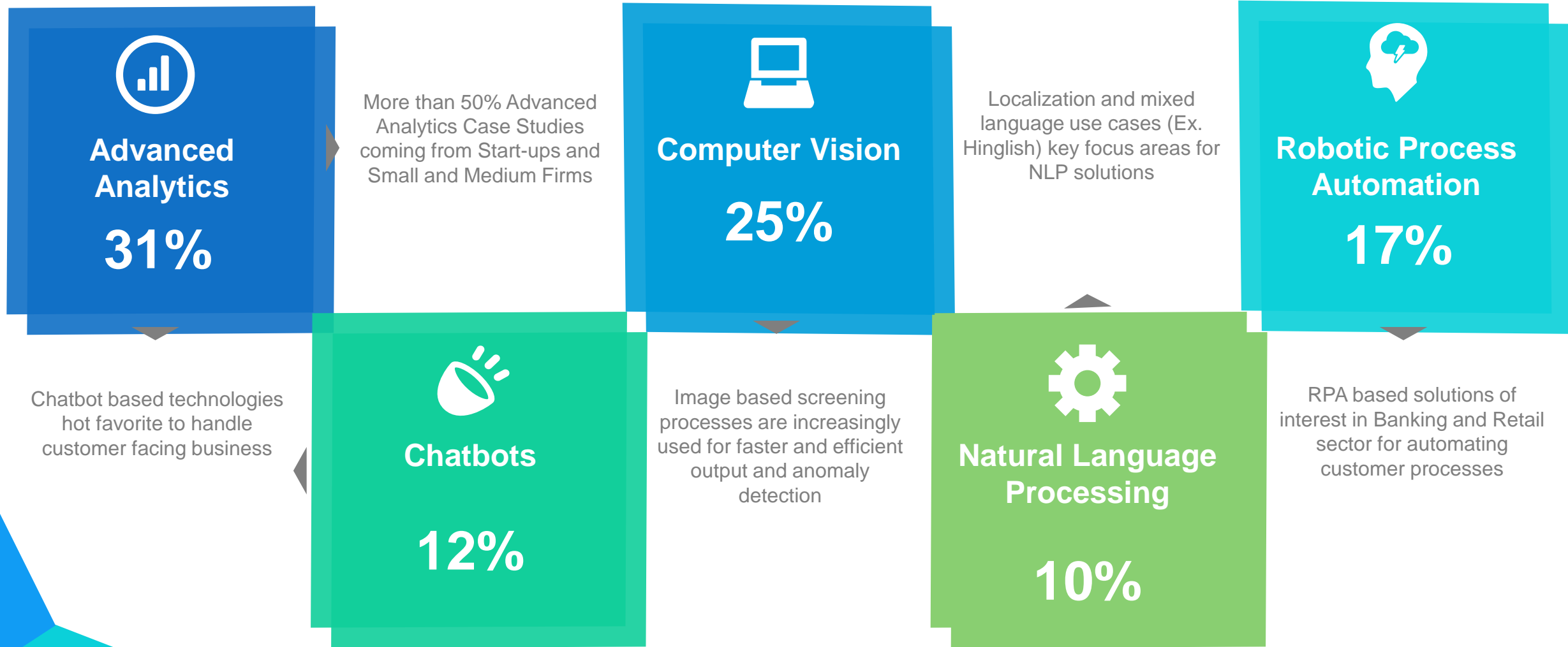
18%
CROSS INDUSTRY

17%
RETAIL

8%
HEALTHCARE

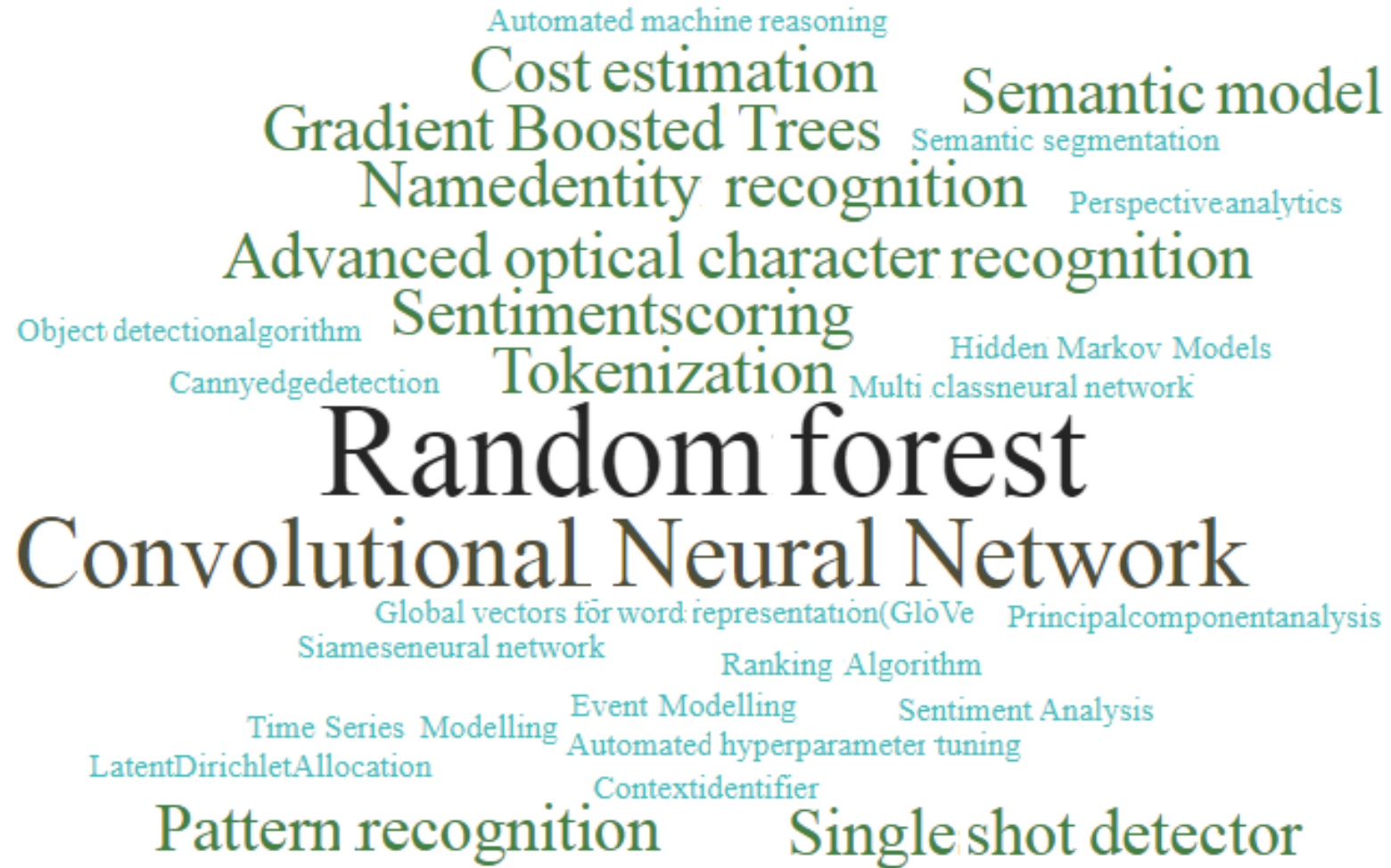
8%
MANUFACTURING

More than 50% of the firms are working on Advanced Analytics and Computer Vision based AI technologies



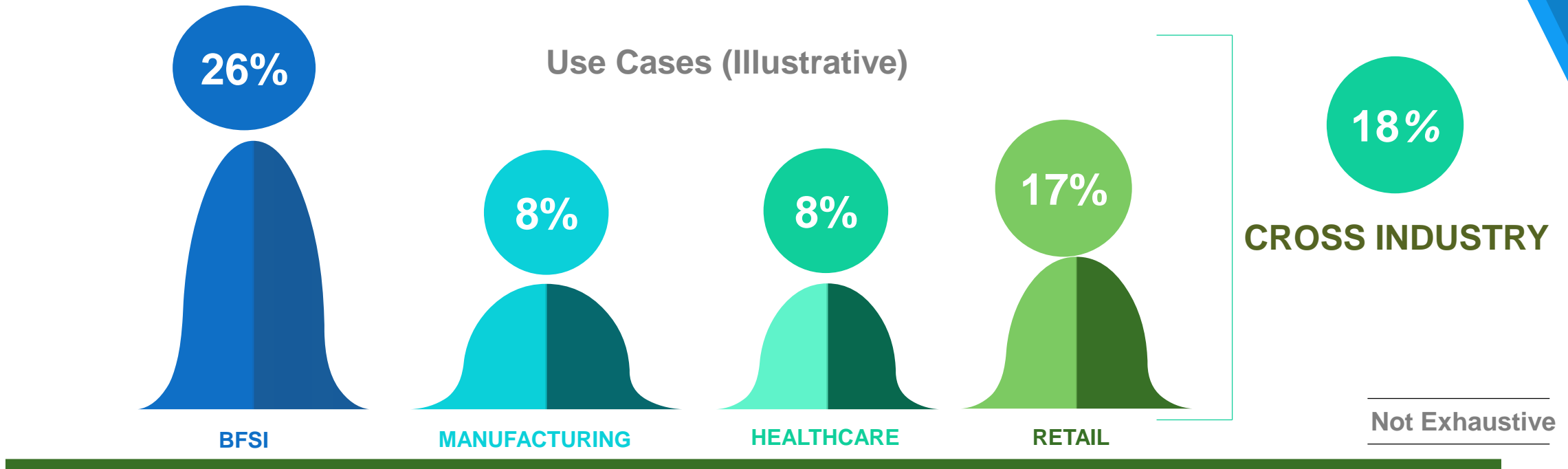
A wide variety of algorithms used in Machine Learning projects...

Illustrative



Machine Learning and Machine Vision based algorithms are of highest interest

AI is getting adopted across industries but consumer facing sectors faster in the race...



BFSI

- Advanced Analytics for fraud detection, loan monitoring, automating analysis, data extraction, etc.
- Robotic Process Automation (RPA) for automating KYC reviews, reducing errors, and improving efficiency
- Image analysis to expedite claim settlement, optimize response time for analysis of risky profiles, etc.

MANUFACTURING

- Computer Vision for real time quality monitoring and product
- Addressing inaccurate demand forecasting by capturing seasonality, trends, etc.

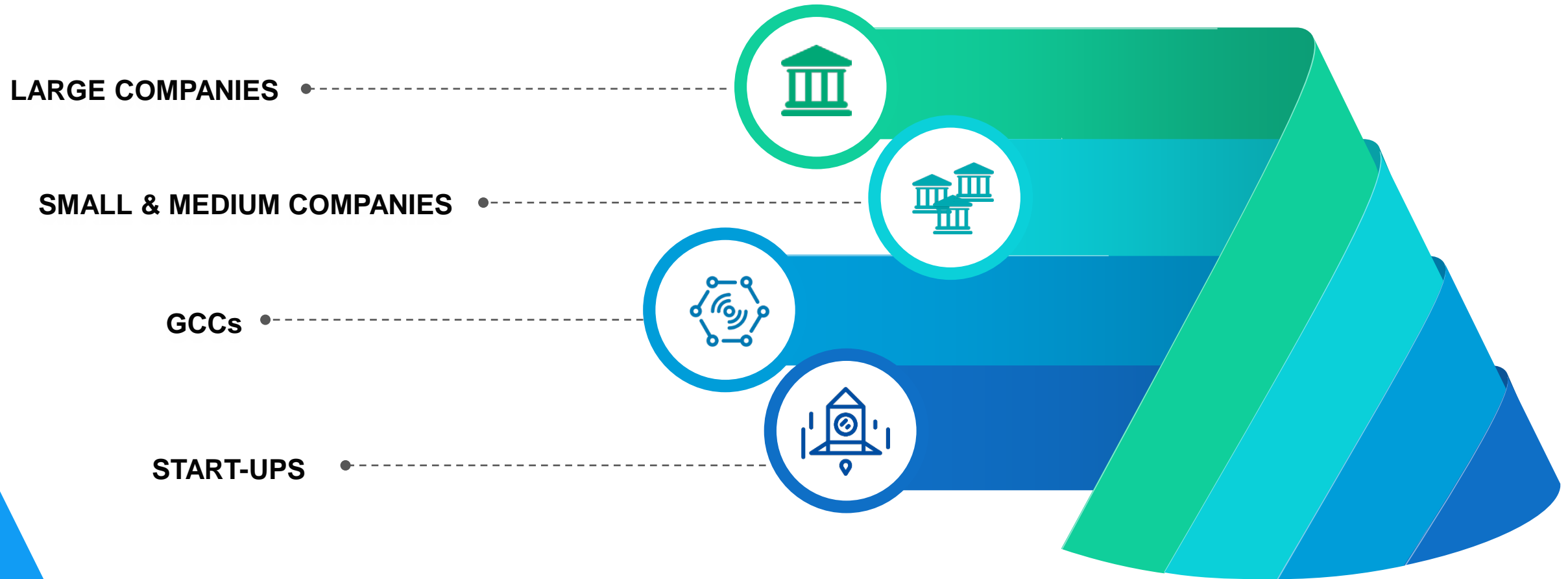
HEALTHCARE

- Machine Vision for timely detection of cancer using neural networks, automated scans, and more accurate & quicker diagnosis

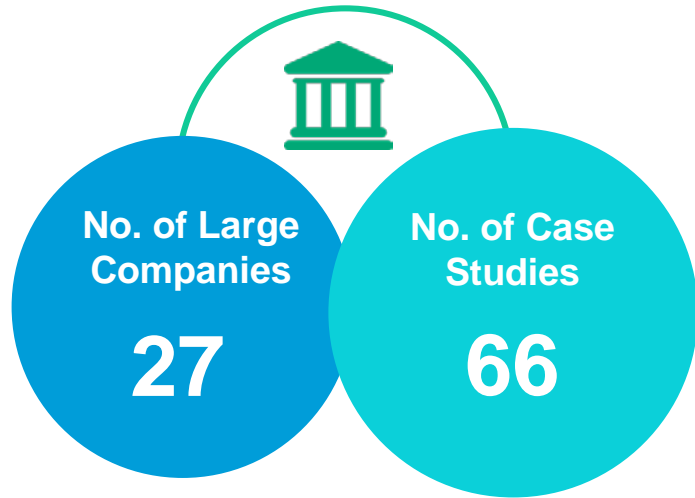
RETAIL

- Advanced Analytics for purchasing trend, replenishment assistance, dynamic pricing model, and reducing transaction failure
- Computer vision for reducing pilferage, smart vending machines, and intelligent product discovery

AI Game Changer Awards analyzed across 4 categories of companies...



Key AI initiatives at Large Firms focused on Customer Experience and use of Advanced Analytics for Segment-of-one Marketing...



Sector Focus				
Manufacturing	Banking	Cross Industry	Healthcare	Others*
11%	35%	21%	8%	25%

* Retail, Media, Corporate Functions, Automobile, Supply Chain, Agriculture, Telecom, Hospitality, Government

Technology Focus Area					
Advanced Analytics	Robotic Process Automation	Computer Vision	Chatbots	Natural Language Processing	Speech Recognition
37%	20%	20%	12%	7%	4%

Illustrative

Advanced Analytics	Robotic Process Automation	Computer Vision	Chatbots
<p>Use Cases</p> <ul style="list-style-type: none"> Customer content analysis for better service delivery Scoring mechanism for credit worthiness in Telecom Productivity enhancement of financial advisors in the banks 	<p>Use Cases</p> <ul style="list-style-type: none"> Automatic client onboarding process in Healthcare Automatic fetching of fares from Global Distribution System for reducing processing time in Travel & Tourism 	<p>Use Cases</p> <ul style="list-style-type: none"> Correct identification of appeal document in Health Insurance Image capture using drones and assessing the validity of claims in Insurance Handwritten and typed fax based document identification 	<p>Use Cases</p> <ul style="list-style-type: none"> Bot directly retrieving information from microsites for customers Bot handling IT helpdesk request leading to reduced IT helpdesk request flow

Small and Medium Companies focused more on Computer Vision & RPA but Advanced Analytics use cases still dominate...



Sector Focus					
Government	BFSI	Retail	Cross Industry	Manufacturing	Other*
7%	24%	17%	20%	6%	26%

* Corporate Functions, Education, Government, Media, Agriculture, Healthcare, Hospitality

Technology Focus Area					
Advanced Analytics	Robotic Process Automation	Natural Language Processing	Computer Vision	Chatbots	Speech Recognition
36%	17%	9%	24%	9%	5%



Illustrative

Advanced Analytics

Robotic Process Automation

Computer Vision

Natural Language Processing

Use Cases

- Culture analytics platform for recruitment
- Identify and target users for personalized communication
- Railroad maintenance and fault detection
- Analyze skill mix in human resource management

Use Cases

- Reduce turnaround time for queries with voiceover features
- Automate RFP processing leading to efficiency gains
- Automated sales trigger alert for customer awareness
- Robot parsing emails and taking appropriate action

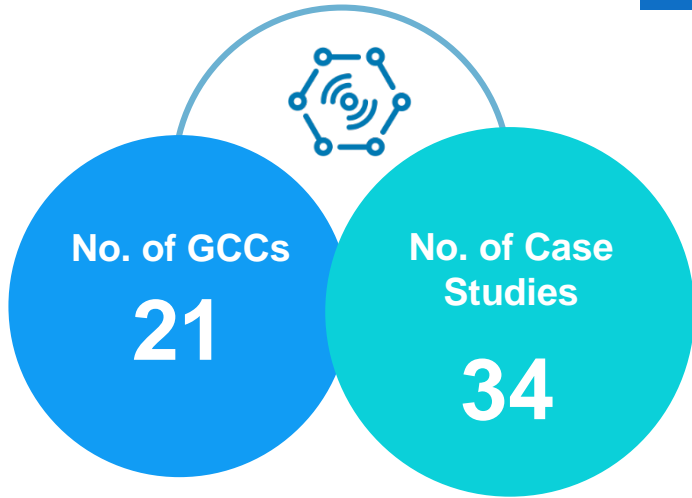
Use Cases

- Using image to assess damage in Insurance
- Automate tax preparation process in Financial Services
- Identify and understand in-store Customer in Retail
- Smart machines that understand and respond based on customer behavior

Use Cases

- Monitor incidents from social media for urban planning
- Localize agricultural content in different languages
- Monitor citizen feedback from social media for Government use
- Assess medical impairments and suggest level of coverage in Insurance

Early adopters include Banks and Manufacturing GCCs; Balanced focus between RPA, NLP and Computer Vision...



Sector Focus					
Manufacturing	BFSI	Retail	Cross Industry	Healthcare	Others*
15%	29%	12%	12%	9%	23%

* Automobile, Education, Supply China, Telecom, Government

Technology Focus Area					
Advanced Analytics	Robotic Process Automation	Computer Vision	Natural Language Processing	Chatbots	Speech Recognition
44%	16%	17%	14%	6%	3%



Illustrative

Advanced Analytics

Use Cases

- Predict flight delays based on weather forecast
- Categorize transactions out of millions of transactions in Banks
- Create Online Adaptive learning platform for students

Robotic Process Automation

Use Cases

- Comprehend conversational language and reply to users immediately
- Automate various banking process like keystrokes, copy-pasting data between software systems, movement between screens, etc.

Computer Vision

Use Cases

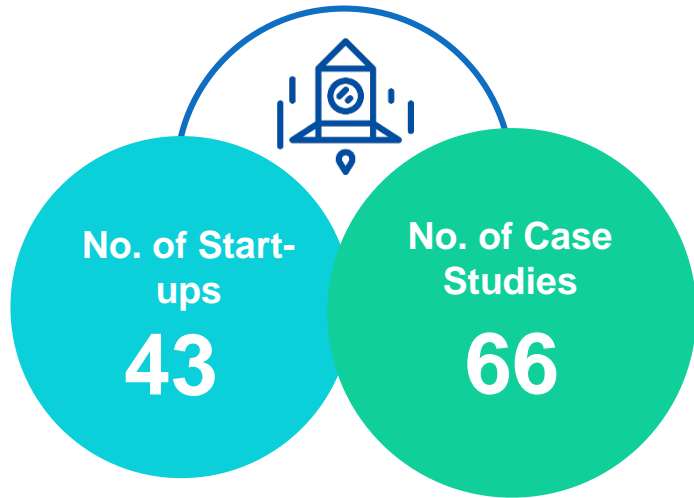
- Diagnose Lung cancer accurately using computer aided detection of CT scans
- Automate KYC remediation and reviews in Banks

Chatbots

Use Cases

- Real time query response regarding order, inventory and shipment details
- Automate service desk requests received from employees

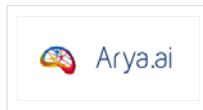
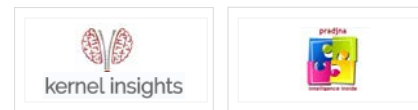
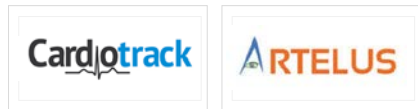
Computer Vision and Retail key focus areas of Indian AI Start-ups



Sector Focus				
Healthcare	BFSI	Retail	Cross Industry	Others*
12%	18%	30%	14%	26%

* Corporate Functions, Manufacturing, Education, Government, Media, Agriculture

Technology Focus Area				
Advanced Analytics	Robotic Process Automation	Computer Vision	Chatbots	Natural Language Processing
23%	20%	35%	12%	10%



Illustrative

Advanced Analytics

Use Cases

- ECG waveforms interpretation in Healthcare
- Replenishment assistance in Retail
- Loan Monitoring in BFSI
- Forecasting viewership trends in Media & Entertainment
- Improving website visibility

Robotic Process Automation

Use Cases

- High speed and accurate search of documents
- Resume screening for hiring automation
- Help candidates on courses, training centers, jobs based on information provided

Computer Vision

Use Cases

- Timely detection of cervical cancer
- Computer Vision based self-driving systems
- Accurate detection of Lung Nodules
- Automated head CT scan screening
- Crime prevention and detection

Chatbots

Use Cases

- Virtual agent for sales and support
- Chat and buy with bots
- Predict factors for sales improvement
- Automate citizen services and citizen query resolution



Top 10 Winning Case Studies

In Alphabetical Order

Reliable Industrial Intelligence



Industry

Industrial Adhesives - Specialty Chemical Manufacturing

Approach/Solution



- Enabled a dynamic operating procedure using IoT Analytics where the quality of the finished goods can be controlled during the process which was not possible with the standard operation procedure
- Cerebra Quality solution implemented through three step AI Apps.
 1. **Quality pulse:** Performance Benchmarking
 2. **Quality Diagnostics:** Causal Factor Analysis
 3. **Quality Prognostics:** Quality Prediction

Problem

The adhesives for critical mission usage comes with stringent quality requirements from customers and the standard operating procedures were not giving room for real-time interventions and quality control. This lead to over- production, rejects and customer complaints.

Tools/Technology

- Cerebra Visualization Studio
- Python
- MongoDB
- Cerebra Asset Platform

Key Impact/Outcome

- Achieved 95% accuracy in prediction of quality of finished goods
- Annual Cost Saving of 15-20 million USD across 10+ plants.
- 12% reduction in customer complaints
- 60% reduction in Root Cause Analysis Time
- 10% Off-spec reduction

Key Innovations

- Cerebra Quality solution implemented to the manufacturing plant has high predictive accuracy and scale across different products and plants in a rapid manner to enable dynamic operating procedure

Awards & Recognitions



AI/ML Powered Intelligent Virtual Assistant “EVA”



Industry

Banking & Financial Industry

Approach/Solution



We created EVA as automated customer engagement online chat platform which runs on AI and NLP capabilities to answer routine customer queries in conversational manner.

The target was to make EVA the first point of contact for all query that the customer has from the content available on website.

Problem

For any product related query / information, customer has to navigate through multiple pages on the website for their answers or call Phone Banking or contact through Email channel.

Huge cost was incurred in servicing such routine queries

Tools/Technology

- Mainly Java and python based
- Engine is wrapped into a J2EE compliant web application which can be deployed in a cluster and scaled infinitely

Key Impact/Outcome

- Currently, EVA is answering 0.5 million queries on an average monthly with an accuracy level of close to 89%
- Reduction of generic queries on other channels
- Better User Experience
- Customer delight

Key Innovations

- AI & NLP was used for the first time within the bank
- Different patterns of queries were identified as to how customers interacts with the customer service agent
- EVA skills were extended to Amazon Alexa, Google Assistant, Humanoid Robot

Awards & Recognitions

GLOBAL

- Online Banking initiative of the year - Asian Banking & Finance - Retail Banking Awards, Singapore
- Most Innovative Digital Cost Saving Initiative Finalist - Gartner – Eye for Innovation Awards, Australia

INDIAN

- Innovative Products / Services - FinTec India Conference & Awards

High user engagement using high-utility AI-powered bots



Industry

Technology and Enterprise Products

Approach/Solution



An SDK that contains multiple chatbots that can be instantly embedded into any app or web client with a memory footprint under 1 MB.

A chatbot with great utility: Our entire roster of chatbots includes over 40+ bots that offer everything from reminders to flight/cab bookings to bill payments to jokes.

Problem

Our clients, who are major players from various industries wanted a way to stand out from the clutter with an engaging product that provided utility in a conversational format.

Tools/Technology

Tool: bot builder, data analytics, agent chat interface

Technology: python, machine learning, data lake

Key Impact/Outcome

- 60% higher retention
- Increase in impressions is higher by 35.4%.
- increase in engagement is higher by 31.6%
- Using our technology, chatbots can go from 50% to 95% and higher automation in terms of chat response.

Key Innovations

- A Hybrid Model
- Chatbot NER

Awards & Recognitions

2018: MIT Innovators under 35- Conversation AI
2017: Amazon Web Services Mobility Award - Deep Tech in Mobility

Driving Insights on Automotive Shop Floor



Industry

Automotive Manufacturing

Approach/Solution



- ✓ The end to end solution includes the key data sources – Programmable logic Controllers (PLCs), operational data from robot's, maintenance and Cycle time of robots.
- ✓ Solution encompassed the following:-
 - ✓ Spark as a distributed platform with pyspark used for data curation and Open Source deep learning algorithms along with other ML algorithms for analytics.
 - ✓ For an end user, there was two personas created in Dashboard for Plant Manager and Maintenance engineer.
 - ✓ For the client, the value is being driven all the way from gathering of the data through IBM's IoT Platform, visualising of the patterns and providing insights through advance analytics capabilities

Problem

- Automotive OEM faced below issues on manufacturing line:
- Performance, Quality & availability of the high end robots used in welding, painting, assembly and other operations.
- Impacting the production, raw material wastage, production delays and revenue.

Tools/Technology

- Following AI techniques was employed –
- Deep learning
 - Advanced Machine learning algorithms
 - Statistics algorithm for quality issues
 - Optimization for Maintenance scheduling

Key Impact/Outcome

- Significant reduction in operational cost.
- Informed decision making on maintenance and reduction in robots down time.
- Predict and pinpoint potential OEE Losses at machine level and prescribe optimised recommendations

Key Innovations

- Spark as the computing resource to address large scale application
- Ready to use and customizable dashboards for quick roll out of predictive applications.
- ISA 95 Information model to support automotive domain.
- Differentiating end to end story from IOT to analytics to Cognitive Journey

Key Contact

- Shefali Bansal (Program Director, IBM India Software Labs)
- Email: shbansal@in.ibm.com

Infosys Nia Contracts Analysis, applied to Revenue Assurance Group



Approach/Solution



- **Infosys Nia Contracts Analysis** uses a Machine Learning architecture at its core, enabling it to read contractual documents the way humans would i.e. keeping its context and semantics intact.
- The system converts natural language into a computable format to maintain semantics and context.
- Pre-trained models help expedite its usage to real-life scenarios.

Problem

- Revenue Assurance Group needs to verify high volume of contracts (25,000+).
- Expected turn around time ~3-4 days.
- Ensure exhaustiveness and zero tolerance to any inaccuracy

Tools/Technology

- Sequence-to-sequence neural network models for intent mining
- Pre-processing of docs by Object detectors and classifiers not just OCR
- Semantic models and text classification

Key Impact/Outcome

- Automatic extraction of contractual information saving over 30,000 person hours a year.
- Contract interpretations are standardized and helps in early identification of risks.

Key Innovations

- Parallel neural pathways with text and vision based learning to enhance model prediction
- Models which learn with data and get better with time without compromise to system dependability
- Auditability, traceability and explainability of the underlying machine learning predictions.

Awards & Recognitions

Finalist: **Best Innovation in Deep Learning category** – The Alconics awards, London 2018



Smart Insights – An Analytics Platform for Connected Vehicles



latentview

Actionable Insights • Accurate Decision

Industry

Automotive Manufacturing

Approach/Solution



- **SMART INSIGHTS**, a scalable and self-service code-free platform for analytics on connected vehicles.
- Platform empowers SMEs/ Business users to Identify & characterize different driving Styles, test product hypothesis & correlate them with Warranty Claims
- Built on IoT Sensor Data from cars, Warranty Claims & Other Vehicle Information.
- Powered by Advanced Machine Learning Algorithms, Interactive simplified User Interface & a powerful parallel computing scalable infrastructure.

Problem

- Costs incurred due to warranty claims had a high negative impact on the bottom-line.
- The client was looking to **minimize warranty claims** by correlating vehicle usage/driving styles with expensive and severe claims using IoT data from Vehicles.
- Major Challenge was to derive relevant and actionable insights by merging enormous amount of complex data across different dimensions.

Tools/Technology

- ML Techniques – Neural Networks, Random Forests, Clustering
- ML Libraries – Apache Spark, H2O, Tensor Flow
- Distributed Processing - Apache Spark
- Platforms – Play Framework, ReactJS
- Programming Languages – Scala, Javascript

Key Impact/Outcome

- Significant reduction of warranty claims due to
1. Proactive drive-right messaging
 2. Providing Preventive maintenance.
- Representative Insights**
- 20% of the total car universe exhibited a Short Trip & Long Pause driving behavior and such cars are at a 40% higher risk of engine related defects.
 - Vehicles that spend 100% more on Pedal position are at a 250% risk of engine related defects.

Key Innovations

- Automated Machine Learning model Optimization
- On-demand Machine Learning
- Significant Reduction in Processing time from hours to minutes.
- Highly Responsive User Interface
- Infinitely Scalable

Awards & Recognitions

- Awarded the **SPiRiT OF LATENTVIEW**, an award given to the most advanced AI Projects within the Organization.

qER: Prioritizing Head CT Scans by Detecting Emergency Findings

qure.ai

Industry
Healthcare

Approach/Solution



- Deep Learning to detect scans with emergency findings
- Streamlining the radiologist workflow by prioritizing these scans

Problem

- Head CT scans of patients with brain hemorrhage need to be evaluated immediately
- But radiologists evaluate Head CT scans on first-come-first-serve basis

Tools/Technology

Key Impact/Outcome

- Time to diagnosis decreased significantly
- Better volumetric measurement of lesions
- Second opinion in case of trainee radiologists

Key Innovations

Awards & Recognitions



InstaBP : Cuff-less Blood Pressure Monitoring using Smartphone

SAMSUNG

Industry

Consumer Electronics



Approach/Solution

- Data acquisition from HRM sensor
- Pre-processing of raw signals
- Feature extraction : Physiologically relevant to cardiac cycle having information about systolic and diastolic BP
- Multiple BP predictions using a machine learning approach (ANN/DNN).
- Robust outlier elimination method.
- Deployed in Google Play store as an Android application named InstaBP
- Compatible with smartphones having HRM sensor

Problem

Continuous monitoring of BP can result in prevention of fatal cardiac events however, this is often not possible using a cuff based BP equipment. As the **focus shifts from hospital-centric healthcare approach towards patient-centric one**, smartphone based (HRM sensor) BP estimation approach will be highly useful.

Tools/Technology

- Photoplethysmography (PPG) sensor
- Linear & Non-linear Feature extraction from time & frequency domain
- Stat. Analysis: Check feature relevance
- Ensemble of ANN and CNN models using a feedback mechanism

Key Impact/Outcome

Non-invasive monitoring of BP is a much-needed requirement today for efficient management of cardiac health.

- **Uses existing HRM sensor in smartphones**
- **On-demand measurement of BP**
- **Easy tracking of BP trends over a long period of time**

Key Innovations

- **Single PPG sensor based approach**
- **Physiologically relevant novel features**
- **Demography based partitioning**
- **Combination of different ANNs**
- **Feedback mechanism from Diastolic BP to Systolic BP**

Awards & Recognitions

- Work was converted to 1 patent filed in US and 1 IEEE publication in EMBS.
- <https://patents.google.com/patent/WO2017142240A1/en>
 - <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7590775>
 - Demo in Samsung MDC, Korea
 - Downloads: ~ 1600



Industry

Homeland Security

Approach/Solution



- Staqu adopted technologically an un-conventional approach to process these real-world datasets by decoupling them to their constituent elements like text, speech and images
- Further, performing selective amalgamation of these data points to feed into advanced hybrid deep neural networks models.
- Enabling extraction of information impossible to achieve with the single domain (image or speech or text) neural network models.
- For the end user, the solution is in the form of a web-panel and a mobile application.

Problem

Security Agencies and Police forces face several challenges on ground zero level such as identifying the suspects in real time while routine checking, examining CCTV footage as there is no unified technology platform to connect unstructured and heterogenous data points of criminals, making policing reactive rather than proactive

Tools/Technology

- Artificial Intelligence
- Deep Learning

Key Impact/Outcome

- 400+ gangsters apprehended
- 21 foreign handlers identified
- 8 terrorist modules busted

Key Innovations

- Hybrid deep neural network model to analyze multiple data categories simultaneously
- Replaced traditional practices of tackling each dataset in silos; thereby extracting larger information compared to other entities

Awards & Recognitions

Winner- Tech Rocketship Awards, 2018
Winner- IBM GEP Award, 2016
Winner- IBM GEP Award, 2015

World's Best Speaker
Identification on Vox Celeb- Inter Speech Conference, 2018

VideoKen: Transforming the way your videos are watched



Industry

Approach/Solution



VideoKen's AI-based platform makes informational videos much richer and more consumable. It uses AI techniques to automatically index videos, creating table-of-contents (ToC) and phrase cloud, which nicely summarize key topics in a video. VideoKen's embedded video player provides unique navigational capabilities to jump within a video to points of interest to the viewer. VideoKen further provides insights on which topics within a video received more views, and where the viewers left the video.

Problem

Videos represent a powerful medium of communication. Enterprises produce marketing & product training videos for customers/partners, learning & internal communication videos for employees. However, these videos are highly underutilized, as viewers are unable to peer inside videos and most viewers rarely watch past the first few minutes.

Tools/Technology

- Deep Learning: Visual Classification, Object Detection, Text Summarization, Domain Classification, Automated Speech Recognition
- Tensorflow, PyTorch, Keras, OpenCV, Docker, Python, C++

Key Impact/Outcome

- Richer video watching experience by topic discovery and search within videos
- >2.5x higher user engagement for informational videos
- Rollout video-based learning programs 3x faster than before

Key Innovations

- Automatically index videos by creating table-of-contents (ToC) and phrase cloud. No other platform provides such rich indexing currently.
- 4 granted US patents and more pending patent applications.

Awards & Recognitions

- Selected among top 100 most innovative startups by Govt. of Karnataka at Elevate 100
- Selected & graduated from Microsoft Accelerator (one of 14 startups among over 1500 applicants)
- Featured among 10 AI startups to watch out for in 2018 by Your Story



Other Noteworthy Case Studies

A Snapshot View



Robotic Process Automation (RPA)



Arya.ai

Created an Convolution Neural Network & Recurrent Neural Network based AI technique to handle large claim process which are the biggest expense in the General Insurance Sector, reducing claim processing time from 48 hours to less than 0.4 seconds.



Marlabs

In this large financial market, determining the right investment is pretty challenging hence Marlabs built a research analytics solution that analyzes multitude of data sources (financial reports, databases, PDF reports, external equity analyses, etc.) to determine the likelihood of delivering high returns. This solution reduces the analyst time to build an investment case by 40%.



Capgemini

Used a sophisticated and fully integrated Artificial Intelligence solution which predicts incidents based on pattern analysis of past data to handle high customer dissatisfaction due to unresolved customer service requests. It leads to reduction in incident cycle time by almost 60%.



Infosys

To manage large contract documents which requires time and are tedious to analyze, Infosys created a bio-inspired design which uses a Deep Learning architecture at a fundamental level enabling it to read contracts the way humans would.



Advanced Analytics



Axis Bank

Used unstructured data pre processing and similarity analysis based AI techniques for checking transaction of customers and filling suspicious transaction for fraud detection. It resulted in 50% increment of trigger reviews with critical nature.



Deloitte Consulting

To reduce recall and quality issues in the automobile manufacturing process, Deloitte created AI / ML based solution for the quality investigation team which gets an alert based on risk profile leading to high quality product and \$8mn annualized benefits observed in the first year.



CardioTrack

To reduce the time between diagnosis and intervention and increasing effectiveness, artificial intelligence and machine learning concept was used by allowing the technology to simply mimic what a cardiologist does after looking at an ECG scan. It resulted in improved detection of abnormal, moderate and severe ECG scans.



Flutura

Manufacturing plant incurring high loss due to customer rejection of low quality products. Flutura created an analytics based dynamic operating procedure to control product quality. The product achieved 95% accuracy in prediction of quality of finished goods during the manufacturing process.



IBM

Facing the issue of performance and quality in the operations of an automobile manufacturing facility, IBM provided a deep learning and AI product which detects quality issues in advance and also predicts major faults. Based on few assumptions this AI technique can lead to overtime cost saving of \$5-6 Mn per year.



McAfee

To provide best protection from increasing breaches in cyber security area, McAfee created state-of-the-art machine learning techniques to identify malicious code based on both an in-depth assessment of its static and dynamic behavioral analysis without signatures. This solution Improved detection rates up to 30% from legacy based DAT/signatures.



Latentview Analytics

To reduce warranty claims, automobile production has to better understand vehicle usage patterns and test various product related hypotheses based on real-time data. Latentview Analytics created a scalable and self-service platform for analytics on connected vehicles. This solution leads to 35% cost savings in warranty claims.



Nokia

To predict ways to address network issues and help operations team make faster decisions, Nokia created predictive operation analytics solution that analyses network KPIs, Counters, Alarms, Special Events, Site Category, etc. to find patterns of KPI degradation/non-degradation which enables the system to predict degradation. It lead to increase in network availability by 10%.

Advanced Analytics Case Studies (3/3)



Swiss Re

Increasing flight delays causes various unclear insurance coverage whose claims are difficult to settle. Swiss Re developed a machine learning model using the flight and weather data to forecast with the highest accuracy the propensity of delays of any flight in the future. This solution is today providing delay predictions of close to 20,000 routes.



Tiger Analytics

In freight railroads networks, railroad maintenance is a regular and manual task. Tiger Analytics developed an AI based solution that analyzes videos of tracks to detect faults in joint bars, missing bolts, sleeper fractures, wheel burns, etc. This solution lead to \$12 mn per year of direct savings.



Tech Mahindra

In todays E-governance system, understanding citizen concerns and providing a smart solution is a big challenge. Tech Mahindra created a Social media management product that collect grievances in a single platform from various channels and processes it. This solution resulted in 20-30% improvement in citizen response times.



TCS

In the retail sector, seasonality is a big issue and its causes downtime during peak season. TCS created a module that uses historic performance data from monitoring tools for providing recommendations for server configurations and normal behavior profiling for dynamic threshold. It leads to measurable reduction in bottle necks observed during peak season.



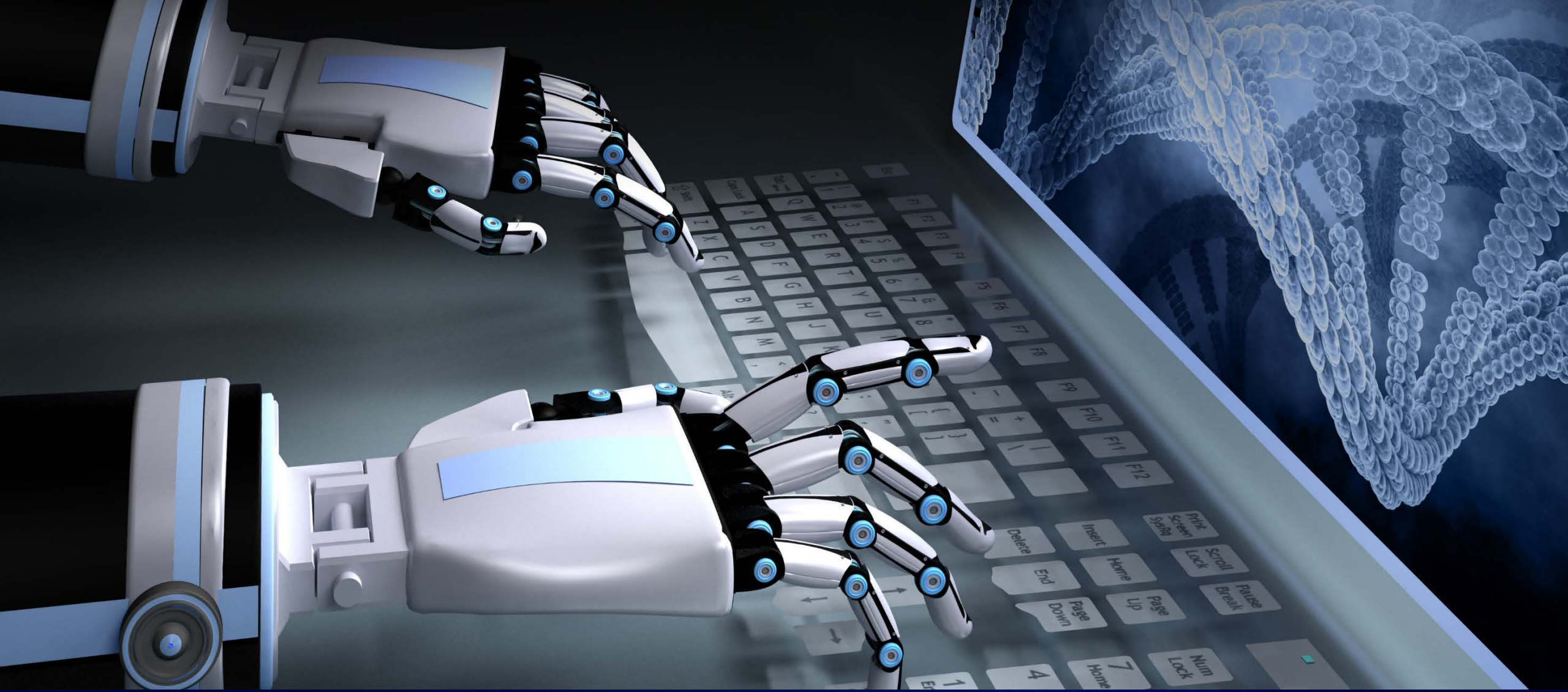
Rivigo

To make trucking experience easy for the customers, Rivigo created a price discovery model that predict the prices for all possible Origin-Destination-Vehicle Type with highest accuracy in real time. Using this model, system fulfilment has increased from ~10% to ~45% resulting in Rivigo Vyom crossing \$100+ mn annualized freight platform in just 12 months.



VuNet Systems

In the BFSI sector, Aadhar enabled payment systems due to complex architecture used to have frequent transaction failures. VuNet developed a multi vector analytics platform that uses unsupervised ML techniques for anomaly detection, with correlation based on temporal, topology, transaction id and meta data tagging. It leads to 33% improvement in productivity.



Computer Vision



Asquared IOT

Real time quality monitoring is a big issue and current models have several limitations. Asquared IoT created machine learning (including Deep Learning) algorithms for sound analytics that use industrial sounds as the inputs, and a microphone as the sensor.

Constems AI



To remove the subjectivity of physical quality standard check process for selecting the right product for the customers, AI based inspection system was used for automated and strategic output. It lead to easy inspection process and reduced man power involvement during the manufacturing process.



BRIDGEi2i Analytics Solutions

In the casualty insurance sector, manual inspection of rooftops to assess damages for insurance claims are cost-prohibitive. Bridgei2i provided an automated identification of defect type, damage counts and severity using drone images. The algorithm implemented achieved an accuracy measure higher than 95%.

Drive Analytics



Used computer vision technique for taking broadcast feed of sporting events and running video analytics on brand presence and mining various statistics to arrive at Media Exposure Value. This technique lead to reduction in the sponsor's spend on generating return on investment report.



Dataweave

To identify counterfeit products, Dataweave developed an AI Convolutional Neural Network (CNN) based model which detects possible counterfeits by capturing minute discrepancies and differences in the catalog images and text. It lead to identifying up to 45% counterfeit products.

HCL



To handle the challenge of extracting language based objects, HCL created an AI/ML based information extraction tool designed specifically for classifying and reading handwritten and typed fax/image based documents whether captured by standard scanner or mobile device. The tool generated a conservative saving of \$1.5M by reduction of human efforts.



Fractal Analytics

To analyze image data to quantify the damage on vehicles from images of damaged vehicles, a Convolutional Neural Networks based Image classification, segmentation technique is created that provides accurate damage estimates.

Intelligence Node



Since text information is not sufficient to segment and analyze product catalogs, Intelligence Node created a Convolution Neural Network based solution to handle the problem. This solution saw an improvement in operational efficiencies by 20%.



Intello Labs

Manual inspection of food commodities is subjective and leads to various issues. Intello Labs and KCPMC worked together to digitize the current process using Images and AI. The manual inspection as well as sorting is replaced by a simple image based classification. The accuracy level of the solution is 90% as compared to 70% accuracy of manual results.



L&T Technology Services

Oil & Gas sector has large amount of legacy data in the form of millions of hard copies which needs digitization. L&T created a cognitive solution which extracts the data from scanned documents and converts unstructured data into structured format. Customer could now use legacy data for making better informed decisions.



Kernel Insights Technology

In the online shopping industry, apparel product price comparison and discovery sites are not available like booking.com etc. Kernel Insights provided a solution that involves aggregating data across multiple data sources from ecommerce sites. Using the product, company saw a 270% increase in click-through rate for their apparel matches.



Netradyne

To reduce road accident fatalities due to driver inattention, Netradyne created deep learning based Computer Vision algorithm to identify at-risk driving . One of the partners using this technology observed significant improvement in driver behavior (50 percent reduction in hard-braking alerts).



Praktice.ai

In the healthcare sector, converting leads to patients visiting the website is a task and requires high operational cost for call centers. Praktice.ai created a solution that was able to interact, book/cancel/reschedule appointments, deliver care instructions post the consultation, redirect to proper specialists, etc. It led to large saving of operational cost for the hospital.



Qure.ai

To handle busy trauma care processes and automate initial patient screening, Qure.ai created a software that identifies critical abnormalities, quantifies the volume and localizes them to aid diagnosis of the critical findings to prioritize scans that need immediate attention. It led to reduction in median time to diagnose from 512 to 19 min.

Staqu



In the security domain, identifying suspect is challenging due to lack of unified technology platform to connect unstructured data. Staqu created a Deep Neural Network model that amalgamates data points like text, speech and images. Data collected is processed to create criminal's unique profile. This solution resulted in busting of 8 terrorist modules.



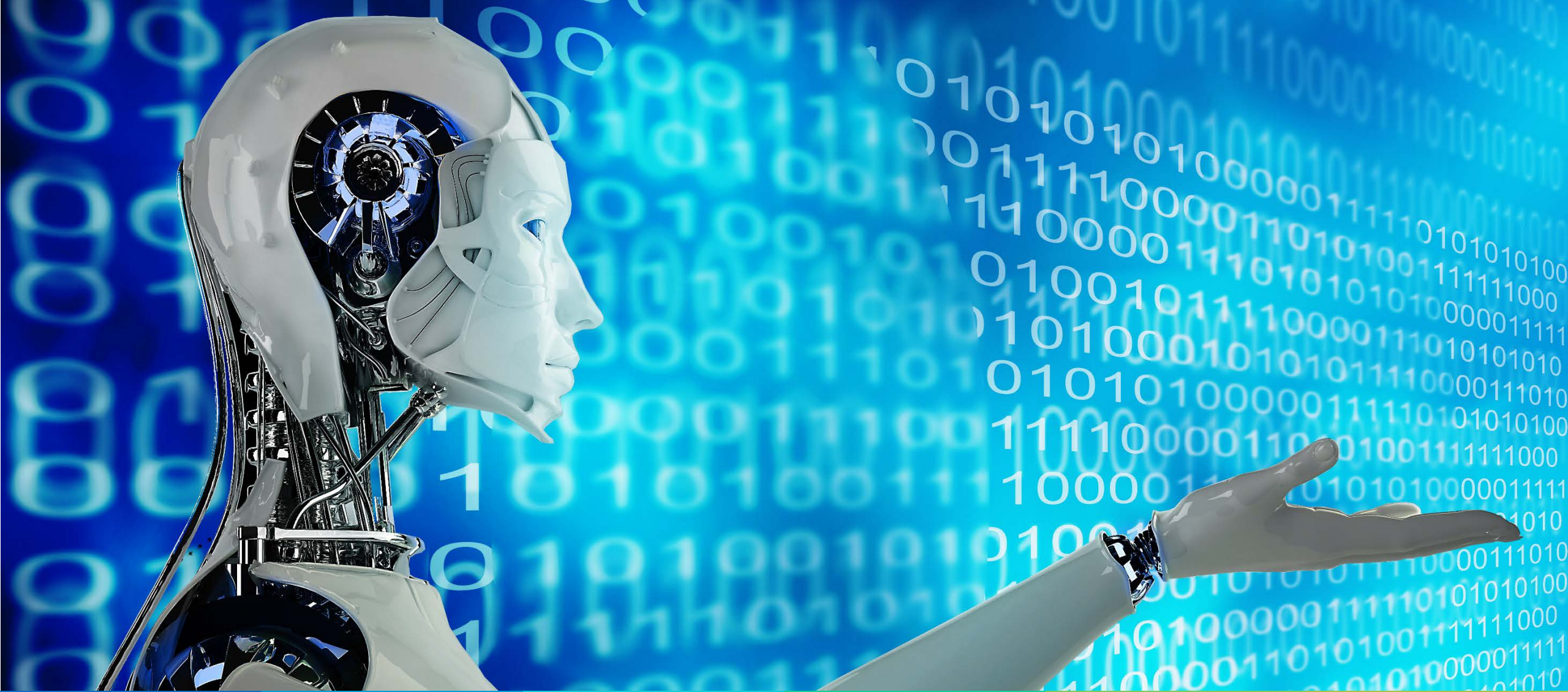
Uncanny Vision

Non standardization of number plates creates issues like traffic management, vehicle analytics & security. Uncanny vision created automatic number plate solution that sends the number plate info over a secure network interface to the Toll Management Software. It leads to faster flow of traffic, expected to cut toll plaza time by 50%



WNS

In the insurance sector, Claims processing of rooftop damages caused by hailstorms and other weather-related incidents is a challenging task. WNS designed an AI solution with the help of images captured through drones to reduce the effort in assessing the validity of claims, identify risk factors and automate claims estimation reporting. It resulted in prediction accuracy of 95% leading to elimination of manual effort.



Natural Language Processing

Natural Language Processing Case Studies



Fidelity

To manage the increasing corporate governance issues, Fidelity implemented Natural Language Processing (NLP) to automate manual effort of processing large information about investible companies and professionals. This led to handling large amount of data which was not possible earlier.



Locus

Manual shipment processing has high error rate, processing time and cost. Locus created a NLP based Geocoding technique to code addresses corresponding to route number. High route mapping with accuracy of 95%-97% was observed under in this process.



Light Information Systems

For sales growth, effective data driven sales pitches requires large team of analysts which is not scalable. So light Information systems created a NLP based system that generates report and product heatmap on any company under a minute.



GE Digital

Thousands of engineering (ER) cases per month are raised in power generation capacity which has high turnaround time and causing lot of prolonged down time of plant equipment. Its led to ~ 95% reduction in turnaround time of engineering cases resolutions for the repetitive cases.



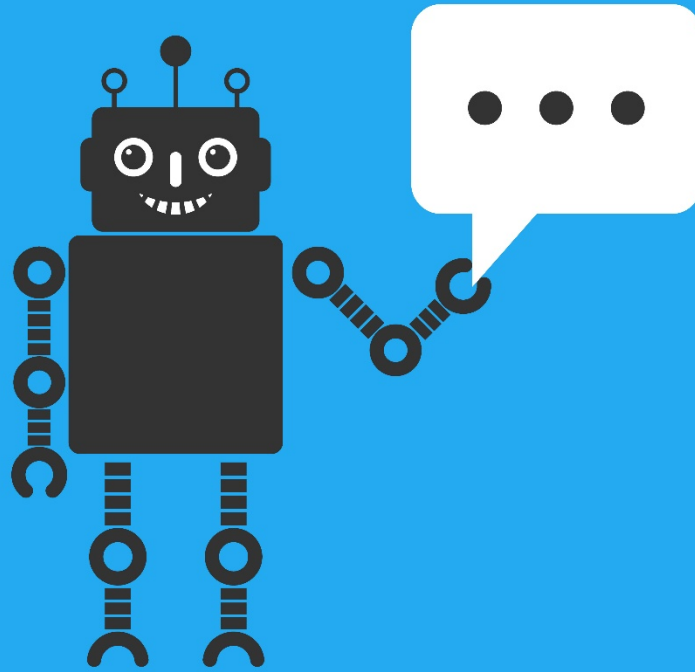
SetuServ Informatics

In the sports arena, decision making in selection of players based on scout reports and psychographic segments of each player is a complex process. SetuServ created an AI solution that returns the attributes/aspects mentioned in the scout report and the player performance. It led to the reduction of time taken to analyze scout reports from 1 month to near real-time.



Societe Generale

Banking sector needs a solution that provides customer a more natural way (read, natural to human actors) of interacting with information systems. To handle this Societe Generale created an NLP based conversational agent based solution.



Chatbots / Speech Recognition

Chatbots/Speech Recognition Case Studies (1/2)



Cognizant

Cognizant

Using claim chatbots, high end customer queries were handled for insurance claims. Maintaining the customer responses and positivity is of high importance while interacting with them. It lead to handling more than 5000 monthly enquiries with high customer satisfaction.



Haptik

Customer engagement in a digital era is a big task and customer growth and retention needs some standout strategy. Haptik created a hybrid neural conversational model that assists user in scheduling reminders through chat conversation. It resulted in an average increase of engagement by 31.6%.



HDFC Bank

To reduce customer heavy dependence on call center to resolve queries, HDFC created an AI based automated customer engagement online chat platform that determines the correct taxonomy of the user's input; pairing this with cognitive learning capabilities that extract, understand, and act upon user queries. Around 20,000 questions are getting answered every day using HDFC Bank's Virtual Agent.



Kotak Mahindra Bank

To reduce customer's time spent on the IVR, voice bot is made to use automatic speech recognition, natural language understanding and text-to-speech technology. Self-service on the IVR saw an improvement by 10% over 2 months.



Senseforth

In growing banking industry, scaling customers is a big task and requires automation. Senseforth built a chatbot that was trained to handle customer queries about products and services based on large amount of domain and bank specific data. This chatbot has already processed over 6 million customer queries in 9 months.



Uniphore

To analyze vast quantities of speech data from banking, hospitality and health care, Uniphore created an ASR engine for language processing. It lead to significant improvement in overall customer experience and brand loyalty for the enterprises.



Videoken

Videos contains large amount of information and are under utilized. VideoKen created an AI based video processing pipeline which inputs video content as an input and analyzes it to produce several deep indexes such as table of content (ToC), key concepts (or phrase cloud), visual summarization, etc.





Others

SAMSUNG

Samsung

To measure an individual's blood pressure from their photoplethysmography (PPG) signal, Samsung used heart rate PPG sensors present on smartphones, making it highly convenient for users to measure their blood pressure regularly and on the go.



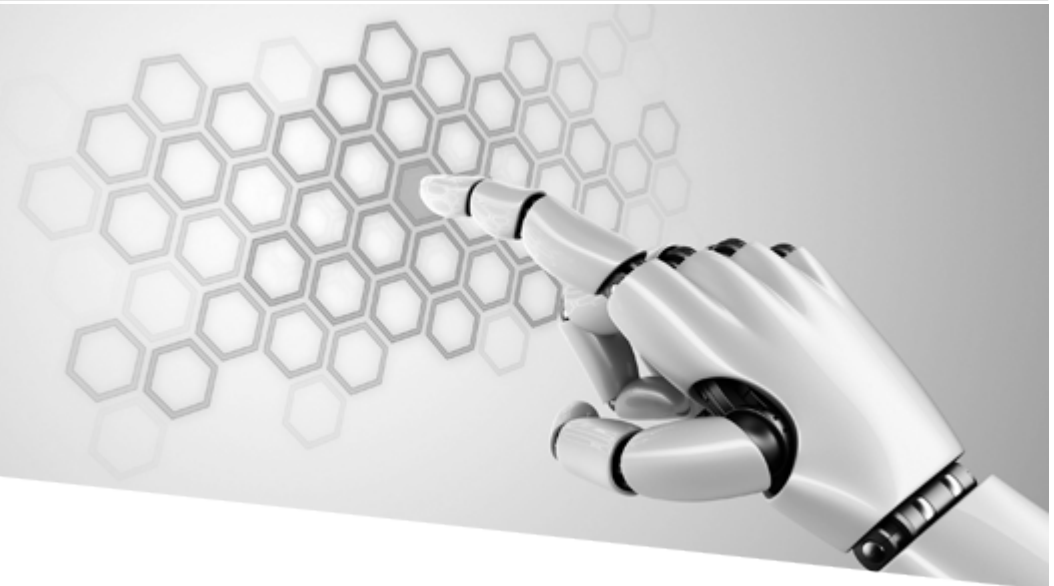
Tata Elxsi

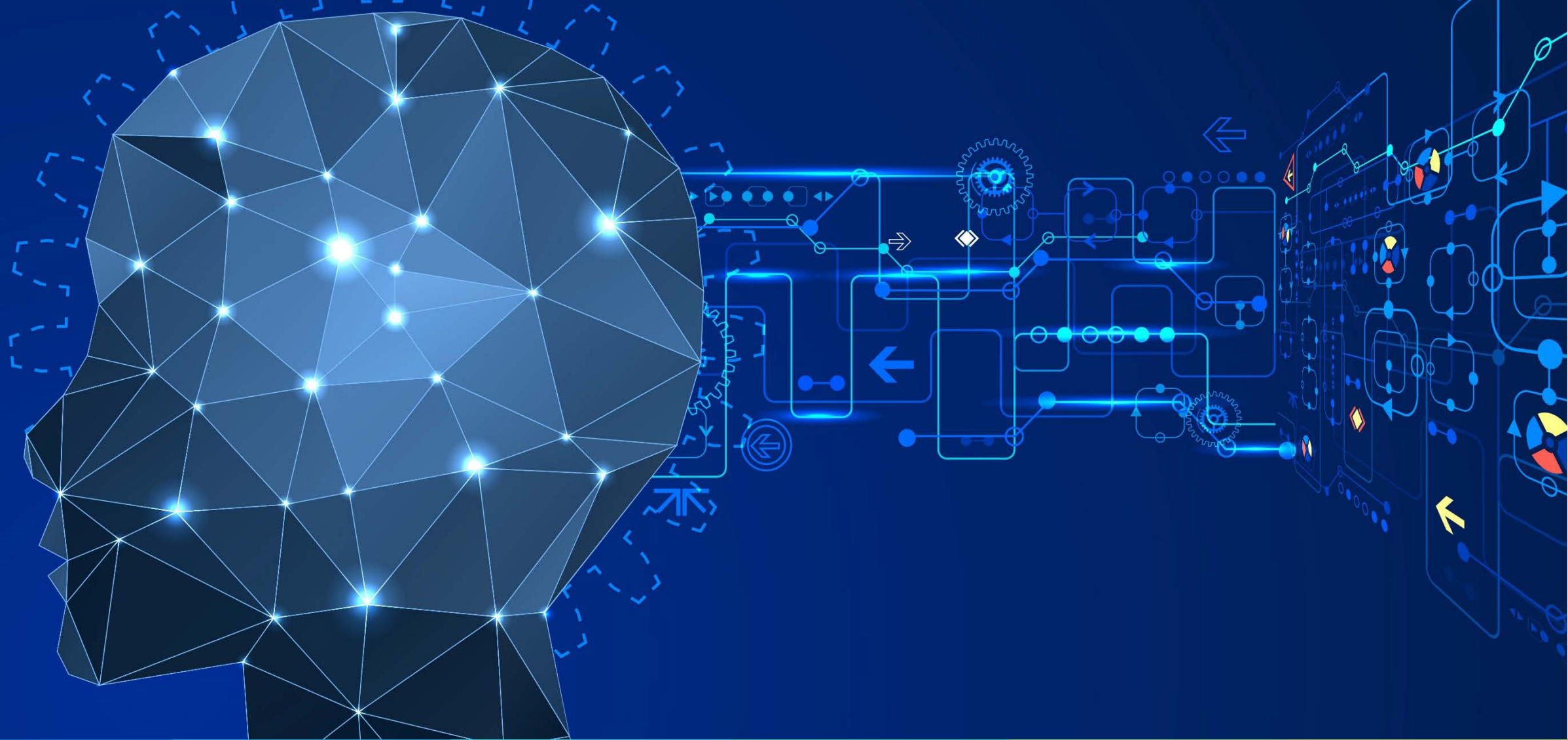
In the semi conductor industry, accommodating high computational Artificial Intelligence capabilities on smaller form factor devices is a challenge. To tackle this company created a way to convert Deep Neural Network model into a light weight platform. It lead to increased revenues for the firm.



Tricog Health

Reading Electrocardiograms (ECGs) required skills and experience which is an issue in developing countries. Tricog Health created a solution which connected Tricog IoT connector to the web enabled ECG machine which transmits the ECG data to the Tricog ECG Cloud, where proprietary algorithms interpret the data and return the ECG analysis. Since 2015, Tricog has analyzed ECGs for close to a million patients.





Appendix

Key Contributors

Aindra Systems	Dataweave	HCL Technologies	Lowe's India	Quest Global-Mobiliya	Tata Consultancy Services	Zerone Consulting
Almug Technologies	Deloitte Consulting India Pvt Ltd	HDFC Bank	Marlabs	Qure.ai	Tech Mahindra	
ANZ	Drive Analytics	IBM	Mcafee	Rivigo	The Inkers	
Artelus India	DXC Technology	Infosys	NEC Technologies	Samsung R&D Institute – Bangalore	ThinkPalm	
Arya.ai	eClerx	Intelligence Node	Netradyne	Samsung R&D Institute – Delhi	Tiger Analytics	
Asqaured IoT	Fidelity Investments (FMR)	Intello Labs	Niki.ai	Seeknshop	Tricog Health Services	
Avaamo	FirstSource	Johnson & Johnson	Nokia	Senseforth AI Research	Uncanny Vision	
Axis Bank	Flutura	Kernel Insights Technology	NTT Data Services	SetuServ Informatics	Uniphore	
Axtria	Fractal Analytics	Kotak Mahindra Bank	OSI Consulting	Silversparro Technologies	Videoken	
Blueocean Market Intelligence	GE Digital	KPIT Technologies	Pathpartner Technology	Societe Generale	VuNet Systems	
BRIDGEi2i Analytics Solutions	Giscle Systems	L V Prasad Eye	Policy Bazaar	Staqu	Winjit Technologies	
Capgemini	Globallogic	Larsen & Toubro Technology Services	Praktice.ai	str8bat sport tech solutions	WNS	
Cardiotrack	Grey Orange	LatentView Analytics	Predible Health	Streamingo Solutions	Yash technologies	
Cognizant Technology Solutions	Happiest Minds	Light Information Systems	Quantela	Swiss Re	Yodlee Infotech	
Constems AI	Haptik	Locus	Quest Global	Tata Elxsi	Zensar	

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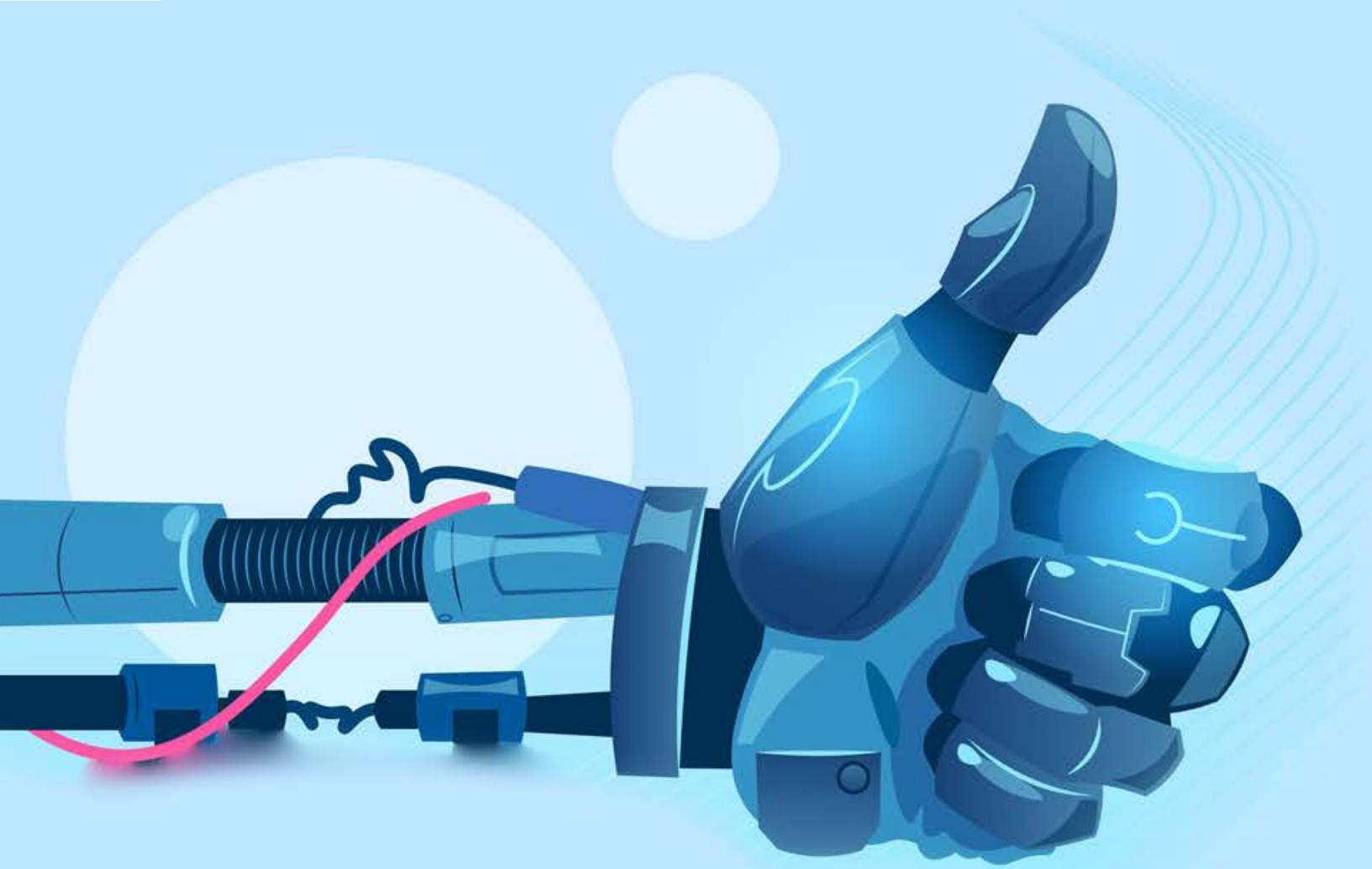
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