# Artificial Intelligence and Machine Learning---Scope in India

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# Future of AI

- A BCG study called ***The Ghost in the Machine: Artificial Intelligence in the Factory of the Future*** recently ranked India on the 13th spot in AI implementation.
- It is speculated that it will soon lead the world in this front when
- its researchers,
- entrepreneurs,
- innovators,
- students and the Government contributes and takes productive measures in this vision.

- Even though the future holds great prospects, India is yet to achieve its full potential in the field.
- There are only a few organizations, institutes or government bodies doing breakthrough work in the field of AI and machine learning:

# AI in Research

- **ISI, Kolkata's MIU (Machine Intelligence Unit):**
- The objective of the MIU is to carry out basic research concerning certain aspects of machine intelligence.
- It conveys the core concept of pattern recognition and machine learning with advanced technologies like fuzzy logic, artificial neural networks, genetic algorithms, fractal and rough sets.
- The investigation that is currently being done in MIU comprises both

➢ the development of these technologies individually and

➢ in an integrated (hybridization) manner, and demonstrating their effectiveness in solving various problems of pattern recognition, image processing, data mining, brain modeling, expert system, vision etc. related to the design of intelligent systems.

# AI in Research

- **ISI Kolkata's Computer Vision and Pattern Recognition Unit:** The CVPR unit is proud of their pioneering development of an ***Optical Character Recognition*** **(OCR) system** for the **script recognition of Bangla and Devanagari scripts** — the most popular scripts in the Indian subcontinent.
- The system performs **document tilt correction**, **script line**, **word and character segmentation**, **character recognition** and finally, **error correction**.
- Its performance has been found to be about 98% accurate.

# AI in Healthcare

- The increasing population is creating huge pressure on the healthcare industry and medical institutes in India.
- Here are a few organizations revolutionizing the industry:
- **Niramai:** It uses Thermalytix, a fusion of sophisticated ML algorithms over thermal images.
- The patented algorithms automate the process of analyzing the 400,000 temperature values measured per person.
- Unique thermal patterns and image characteristics that are typically used by medical professionals while detecting cancer in other modalities like XRay or Ultrasound are also used to make the report accurate as well as understandable by the radiologist.

# AI in Healthcare

- **Tricog** It takes physiological data and ECG's from clinical and personal health devices and upload them to the cloud wherein the next step, AI-powered algorithms process the data and arrive at a diagnosis.
- A team of specialists work in real-time with the algorithm to verify the diagnosis which is then sent back the remote centre.

# Government Initiatives in Healthcare

- **– National eHealth Authority (NeHA)** is an integrated health information system along with the application of telemedicine and mobile health by collaborating with various stakeholders.
- To promote setting up of **state health records repositories** and **health information exchanges** (HIEs) **to facilitate interoperability** and **to lay down data management, privacy and security policies, guidelines and health records of patients in accordance with statutory provisions** and **monitoring health records with AI** for the better cure of patients.

# Government Initiatives in Healthcare

- **– Cognitive Science Research Initiative (CSRI)** works with the challenges related to cognitive disorders and social issues through the use of psychological tools, early diagnosis and better therapies, intervention technologies and rehabilitation program's using AI.

# DRDO

- **Multi-Agent Robotics Framework (MARF):**
- The AI-powered multi-layered architecture is **capable of providing a multitude of military applications**, and will enable collaboration amongst a team of various robots **Indian Army has already built products like**, Wheeled Robot with Passive Suspension, Snake Robot, Legged Robot, Wall-Climbing Robot, and Robot Sentry, among others.

# DRDO

- **Unmanned systems targeted for Military operation:**
- It could only be enabled by intelligence and mobility.
- India has several types of terrain – mountainous, desert, rural, urban, outdoor, and indoor; each presenting its own locomotion challenge to any robotic platform.
- This impediment could only be tackled by undertaking extensive research in locomotion technologies.

# AI in Commercial Space

- India is **one of the biggest consumer markets in the world and it has open the boundaries for AI for different consumers and e-commerce business**. Here is the list how it is being used:
- **Rivigo:** It is a technology-enabled logistics company that aims to deliver reliability through its well-established network and provide transparency and par excellence service to their clients.
- By using AI and ML in building systems **to prevent fuel pilferages using geo-statistical modelling and geo-fencing techniques, analysing and monitoring human behaviour to prevent collisions by using IoMT(Internet of Many Things) sensors and many other applications**

# AI in Commercial Space

- **BlackBuck:** This is building an online marketplace platform for freight where shippers and fleet operators can engage seamlessly.
- They use AI for their products to create infinite value and deliver measurable results for shippers and fleet operators through Instant Availability, Fair and transparent Pricing, Seamless experience.

# AI in Commercial Space

- **Locus** is an intelligent logistics automation platform that helps local companies and enterprises courier, e-commerce, food delivery and FMCG. It enables on-demand businesses to dispatch, track and manage their on-field workforce.
- **Netradyne** It uses AI and deep learning to improve road and driver safety. Netradyne's Driveri, is a driver assistance and monitoring device whose features include Quad HD cameras, LTE, GPS, accelerometer, gyrometer, and a Deep Learning processing unit.
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# ML is all about statistics

- It is often said that machine learning requires a strong background in statistics. While it is true that statistics is a must for ML engineers, but machine learning itself is not only about statistics.
- A machine learning expert requires a basic understanding of statistics and that is because of the data.
- Statistics is a branch of mathematics that deals with analysis, whereas ML is a subsidiary of computer science.
- Both contribute to data science at large.

# Why Are Statistics And ML Thought To Be The Same

- People often ignore the blurred borders between the two fields.
- One major reason is that both use data to solve problems and both have an application in mathematics.
- Also, both ML and statistics work on models to solve problems.
- There are many things that ML cannot do alone and has to rely on statistics.
- Both the spheres here deal with model and both deal with predictions, and are therefore under a constant debate.

- ML and statistics have many similar terms, which is why a lot of people think it to be the same.
- Larry Wasserman, a Canadian Statistician explains in his blog:

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# The Fuzzy Line Between The Two

- **1. Rules**: ML relies on learning from the past data with no strict rules.
- ML learns from data and does not have to rely on strict rules or standard programming practices like object oriented design.
- Most of the work is done on computing and so it provides strong predictive ability with minimal human efforts.
- Statistics, on the other hand, has a set of rules to follow and it does not involve any learning from data.
- It strictly follows the program algorithm and gives a result.
- Statistics does provide the best estimate but with a more human effort as it demands the understanding of the relation that the variable has on an equation.

- **2. Applications**: We need to identify what factors to consider in case of statistics.
- But in ML models, we only need to have more data and the model learns from it. More the data, more will be the accuracy of the model.
- So, all that the model needs is data. ML works with large sets of data and its models are applied to high dimensional datasets.
- Statistical modelling is a lot about studying the relationships between variables in the form of mathematical equations for the purpose of predicting relevant outcomes.
- Statistical models are suitable to low dimensional datasets and it takes fewer attributes.
- ML is a very new subject compared to Statistics, which is a work originated in 1760s, and hence it has better applications as it is an advanced branch.

- **3. Assumptions**: Statistics involves many assumptions. ML models do not need assumptions. It only learns from the input data. In ML fewer assumptions are made due to a better accuracy from the predictive models in comparison to statistical models which is more mathematically based.
- **4. Building block**: ML is governed by algorithms and Statistical models are fundamentals of mathematical equations, which is obvious from the fact that the former is a branch of computer science and later that of Mathematics.

- **5. Result**: One of the most fundamental difference between the two is that, Statistics gives us inferences based on the data that it receives, while ML gives us predictions based on the data.
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- It is indeed true that ML, in a lot of ways, is an inspiration from statistics but it is not all about statistics.
- It takes help from statistics right from understanding the data to modelling.
- But it has used statistics as its support, took all the best outcomes of it and and progressed its own way.
- Statistical models are needed to work through an ML predictive model.
- It provides the basis and compliments the ML models. Statisticians and ML engineers have different paths to travel to conquer their goals and even are suitable for different work a lot of times.
- But it is also true that the two worlds overlap in many applications and compliment each other in remarkable ways.

# Concluding Note

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# AI and Businesses

- The hype around artificial intelligence is very real in India with the country building deep tech pockets in robotics and deep learning areas.
- Research centre's are rife in Bengaluru and Hyderabad where these solutions are being applied in the local economy, businesses and enterprises.
- Even with this progress, many organisations still pose the question: How can businesses benefit from AI.

- According to a study by Accenture, organisations which incorporated AI into their business models predicted that their revenue would rise by 38% by 2035.
- AI has become business-friendly because it simplifies communication with clients by assessing user behaviour patterns.
- AI systems are also being used to control production processes and interconnected devices.
- At Cypher 2018, Dakshinamurthy V Kolluru Of INSOFE highlighted several use cases that indicated the paradigm shift that happened over the last five years with diminishing investments in AI, but output and performance surging, thereby resulting in a higher return on investment (ROI).

- So pegged as the future of growth, AI has become a productivity enhancer, which has the potential to
- Reverse the falling profit growth through automation
- Augment human labour
- A recent research indicates how artificial intelligence has the potential to double annual economic growth, change the nature of work between people and machines and push innovations.
- By 2035, AI is expected to double the annual economic growth rate. The study further indicated that manufacturing, BFSI and information and communication sectors would see the highest growth rate.
- Also, with AI being integrated into the economic processes, it means the bottom line revenue gets boosted.
- The three key methods are:
- Intelligent automation/virtual workforce
- Labour and capital augmentation
- Technology innovations

# AI As A Productivity Solution

- **Automating Back Office Operations**: Leading in the field of white-collar and business process automation would indeed force India to compete on technical developments, rather than price.
- Automating office and IT work is an opportunity for all businesses and markets.
- For this reason, when India proves its dominance in automating and augmenting its BPO and IT services, it will be competing with startups and with large consulting firms on many fronts.

- **BPO Industry Can Capitalise On The AI Boom**:
- Equifax identified scenarios where Indian sectors can leverage AI.
- According to their study, the BPO industry in India may find an opportunity in data cleaning and tagging in massive datasets, which will eventually be used to train and error-correct AI.
- Cheap skilled IT labor can potentially enable this opportunity.
- By leveraging BPO and back-office expertise, India's IT services firms could potentially develop the world's best office automation and BPO AI applications.
- This would allow India to develop a higher margin product industry, in addition to their wide low-cost services sector

- The key for Indian BPO, IT, and tech firms will be to pick the domains of focus where their expertise is strongest as compared to the rest of the countries, and which domain provides maximum economic opportunity.
- **Partnering With Third-Party Vendors**:
- By building an AI roadmap, businesses can plan to broaden their use cases.
- Business leaders and strategic planners from across the business have sufficient grasp of AI to effectively transform existing business plans and to define key decision points and to guide appropriate investment decisions.
- This is a growing trend in India where leading enterprises partner with third-party providers who can work on specific use cases through bleeding edge technology.
- Companies are also pushing for AI integration and upskilling employees to counter the lack of expertise in AI technologies.
- While there are interim roadblocks in implementation, companies are deploying a winning mindset towards AI and have leveraged a continuous, iterative approach.

- However, for AI to become a critical enabler in India, it must go beyond automation to truly harness the potential of self-learning machines.
- The potential benefits of AI can be considerably greater than the past impact of automation.
- According to Bosch, more than $2 billion of additional revenues and savings from the widespread use of intelligent systems and machines by 2020.