

# CONNECTING THE DOTS WITH AI

Relevant for: Science & Technology | Topic: Robotics & Artificial Intelligence

The government has recently rolled out a national strategy for artificial intelligence (AI) and identified five sectors (health care, agriculture, education, infrastructure and transportation) for its adoption. AI, in layman's terms, is 'prediction' using algorithms and data. When a machine uses intelligence to learn from the past data, it mimics 'human-like' ability. Hence the term 'artificial intelligence'.

The fundamental principle behind AI has existed for many decades. What has now changed is our capability to rapidly acquire or generate a large amount of data and use it to derive meaningful conclusions using powerful computers. Success in developing tools and applications based on AI, however, will depend on how well we understand the underlying data and the processes that we put in place towards data generation, annotation, quality control, storage, security, sharing and mining.

How can AI make a real and visible difference to the Indian health-care system and its farmers? Currently, there is no connection between hospital systems around the country and the underlying data on patient health records, diagnosis, and treatment outcome. Additionally, our health-care system is primarily based on providing reactive treatment rather than preventive care.

A nation-wide uniform and centralised data-deposition system is a good first step. This can be incorporated under the recently announced National Health Policy, 2017 and has the potential to significantly change patient diagnosis and treatment, and aid in preventive health management. For example, using mobile phones with a camera, patients in villages can send their eye images to ophthalmologists who can confirm the diagnosis and recommend, if required, immediate clinical intervention.

Such a system has already been tested outside of India. Scientists from the University of California-San Diego, U.S., have shown that it is possible to diagnose retinal disorders and childhood pneumonia quickly and accurately using AI-based tools using images of the human eye and chest X-rays. Scientists in Singapore and from the University of Southern California, U.S., have made AI-based tools to detect outbreaks ahead of time and facilitate accurate and efficient intervention strategies. In India, a similar predictive tool and an underlying system that can integrate data from hospitals, can predict, stop and take pre-emptive measures for future surveillance, safety and follow up in case of outbreaks of dengue or Nipah virus.

There are two instances that farmers can significantly gain from using AI. First, in predicting weather successfully and, therefore guidance, in what to grow and what price they can expect.

Additionally, such tools can help farmers monitor soil health, mine historical weather data including satellite imagery, predict the price of agricultural products and maintain supply-chain efficiency.

Successful development of AI-based applications in both health care and agriculture requires not just in taking care of the underlying data but also in integrating knowledge and innovation from other areas of biotechnology. For example, an AI-based integrated system with data from a large number of patients' genomes along with patient history and disease epidemiology can accurately predict clinical outcomes, like metastasis in cancer patients.

In agriculture, the use of imaging-based AI tools to identify high-metabolite-bearing trees in the field has the potential to increase the productivity of the industry extracting and selling plant-based metabolites. Using simple hand-held devices that can use real-time imaging data, along with back-end database and models, AI has real potential to aid farmers in selecting the right animals for breeding and, thereby, increasing milk, egg, and meat production.

As much as it is one of the crucial technologies for the future, AI must not come at the cost of the privacy of our citizens. The government must put in place proper checks and balances against its misuse through legally enforceable and long-term policy guidelines, and a regulatory framework. By making national data centres for sensitive human data with a robust policy on data collection, use, inference, privacy, release and security, AI-based tools can enhance, rather than hinder, the growth and access to technology related to patient data and prevent misuse of personal data by private individuals, government and corporations.

Binay Panda is at Ganit Labs, Bengaluru

Kamaldeep Peter on her journey from being a person with breast cancer, to survivor, and member of a support group

It is a pilot study involving just 15 people with TB

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