

The dream of being an AI powerhouse

In a recent discussion paper, NITI Aayog has chalked out an ambitious strategy for India to become an artificial intelligence (AI) powerhouse. AI is the use of computers to make decisions that are normally made by humans. Many forms of AI surround Indians already, including chatbots on retail websites and programs that flag fraudulent bank activity. But NITI Aayog envisions AI solutions for India on a scale not seen anywhere in the world today, especially in five key sectors — agriculture, healthcare, education, smart cities and infrastructure, and transport. In agriculture, for example, machines will provide information to farmers on the quality of soil, when to sow, where to spray herbicide, and when to expect pest infestations. It's an idea with great potential: India has 30 million farmers with smartphones, but poor extension services. If computers help agricultural universities advise farmers on best practices, India could see a farming revolution.

Lack of data

However, there are formidable obstacles. AI start-ups already offer some solutions, but the challenge lies in scaling these to cover the entire value chain, as NITI Aayog envisions. The first problem is data. Machine learning, the set of technologies used to create AI, is a data-guzzling monster. It takes reams of historical data as input, identifies the relationships among data elements, and makes predictions. More sophisticated forms of machine learning, like “deep learning”, attempt to mimic the human brain. And even though they promise greater accuracy, they also need more data than what is required by traditional machine learning. Unfortunately, India has sparse data in sectors like agriculture, and this is already hampering AI-based businesses today.

AI garage? — on kickstarting artificial intelligence

Take the Bengaluru-based Intello Labs, for instance. This is a start-up which helps buyers at agricultural mandis evaluate the quality of grains, fruits or vegetables. In the normal course, a buyer determines visually how much wheat is destroyed by pests, and if foreign particles are present, before offering the farmer a price. But this process is subjective and prone to error. Visual inspection relies too much on the buyer's expertise, and corrupt middlemen may cheat farmers. So, a smartphone-based AI product, such as Intello Labs' grading app, can help. To develop this product, the Intello Labs team had to photograph 2.5 million agricultural samples. Experts then identified the contents of these photos — a laborious process called annotation. Next, the team wrote a deep learning algorithm, which was trained using the photos. Today, the algorithm can predict the quality of 12 foods over 95% of the time in a few markets like Delhi and Rajasthan. But in order to expand their basket beyond 12 products and a few States, Intello Labs will need millions of more such images. This can be challenging for a private firm, unless such images are collected, digitised and annotated automatically by the government at agricultural mandis. Such data collection doesn't happen today. “The biggest agricultural data today resides with the government. It's entirely up to them to annotate it and make it usable,” says Nishant Mishra, the chief technological officer of Intello Labs.

In fact, the lack of data means that deep learning doesn't work for all companies in India. One example is Climate-Connect, a Delhi-based firm, which uses AI to predict the amount of power a solar plant will generate every 15 minutes. This is critical because solar electricity generation can change dramatically every hour depending on weather conditions and the position of the sun. When this happens, the plant must communicate expected changes to power distributors, which will then switch to alternative sources. With India planning to install 100 GW of solar power by 2022, such AI will play a central role in power planning.

But to generate such data, Climate-Connect needs historical inputs like the time of sunrise and sunset, and cloud cover where the plant is located. Unfortunately, since most Indian solar plants are recent, data are available only for a couple of years, whereas deep learning needs data over many years to predict generation. Today, the firm uses traditional machine learning technologies such as regression analysis that work with less data. These methods have an accuracy of around 95%. While deep learning can boost accuracy for operations such as Climate-Connect, it hasn't worked very well in the Indian scenario, says Nitin Tanwar, cofounder of the firm.

Domain knowledge

Another problem for AI firms today is finding the right people. NITI Aayog's report has bleak news: only about 50 Indian scientists carry out "serious research" and they are concentrated in elite institutions such as the Indian Institutes of Technology and the Indian Institutes of Science. Meanwhile, only about 4% of AI professionals have worked in emerging technologies like deep learning. A survey of LinkedIn found 386 out of the 22,000 people with PhDs in AI across the world to be Indians. How does this skill gap impact companies? To some extent, open libraries of machine learning code, which can be customised to solve Indian problems, help. This means that companies need not write code from scratch, and even computer science graduates can carry out the customisation.

But open libraries can only go so far. For some technical problems, such libraries don't exist. In Bengaluru, a start-up called Ati Motors is developing an autonomous cargo vehicle to ferry materials in ports and factories. One of the things the vehicle must do is to chart out its trajectory based on the obstacles along its path. There are no standard deep learning algorithms for this, and Ati Motors must write these on its own. This requires some knowledge of mathematics as well as deep learning, says Vinay Viswanathan, cofounder of Ati Motors. But finding people with such knowledge is proving hard. "You can do a fair amount of machine learning without mathematics, but if you get stuck somewhere, you have to know some math to find the solution," he says.

Can India then really become an "AI garage" for 40% of the world, as NITI Aayog envisions? The discussion paper mentions no timeline for this goal. But for any reasonable time frame for execution, much needs to change immediately. First, if the government is serious about AI solutions powering agriculture or healthcare, it must collect and digitise data better under its existing programs.

Second, to close the skill gap, NITI Aayog suggests setting up a network of basic and applied AI research institutes. But if these institutes are to fulfil their mandate, they must collaborate closely with agricultural universities, medical colleges and infrastructure planners. AI is a collaborative process in which scientists developing solutions for certain sectors need an intimate knowledge of those sectors. The NITI Aayog report talks about collaboration. But unless collaboration is the basis for the new crop of institutes, these institutes won't make a difference, experts say.

Third, NITI Aayog's ambitious road map does not mention deadlines or funding. Without these, it lacks accountability. The government must make haste and specify its commitments on these fronts.

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people we come across often in our daily lives.

END

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