

# Reflections on the Ingredients for Success in AI Research: An Interview with Arvind Gupta

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■ *This article contains the observations of Arvind Gupta, who has over 22 years of experience in leadership, policy, and entrepreneurial roles, in both the Silicon Valley and India. Gupta was recently interviewed about the factors that could influence successful artificial intelligence research. At the time of the interview, Gupta was the chief executive officer of MyGov, India. During our interview, he shared with the editorial team his perspectives on investing in artificial intelligence innovations for business and society, in India. The interviewers included members of the special track editorial team from IBM (Biplav Srivastava, Daby Sow, and Ching-Hua Chen) and Rensselaer Polytechnic Institute (Oshani Seneviratne).*

**E**ditorial Team: Please tell us about your role in promoting AI in India.

**Arvind Gupta:** India has been moving aggressively toward data empowerment for Indian citizens. In my various roles we are all about using data-driven governance, and how we use data both for deciding what we do and how to use complex heterogeneous data to solve hard problems. We are contributing toward promoting and developing strategies that democratize AI in India by ensuring that AI gets developed for Indians based on Indian data and the Indian context.

We have been engaged in discussions in India on how to use large-scale data infrastructures that may eventually fuel AI applications. India has been focusing on data governance, leading eventually to the Data and Privacy Policy Report<sup>1</sup> that is planned to be put up to the Parliament in the form of a legislative bill in early 2019.



*Editorial Team:* What opportunities does the Indian government see for applications of AI in India, and what is the government's role in promoting AI?

*Arvind Gupta:* Our primary focus is on solving basic societal problems and improving inclusivity (for example, for health, financial credit, and education). We are focusing on solutions that are practical, affordable, and accessible, that will increase the reach of the benefits of AI. An integral part of India's AI strategy is to create inclusive growth and social development and to extend these solutions to other emerging and developing economies. We expect that the AI solutions we create here, if successful, could also be successful in countries with limited resources. To give an example, a diagnostic tool for the early diagnosis of tuberculosis that is developed and sharpened in India could also be deployed to countries in South East Asia and Sub-Saharan Africa.

To help promote the application of AI in India, the most important task for the government is to create an environment to support research and development for AI. This begins with education and skill development, but also includes research and development funding and easy access to capital for startup companies in this field. The Indian government serves as a catalyst to forge partnerships, provide access to infrastructure and funding, and to create demand for AI solutions.

*Editorial Team:* What infrastructure is in place in India to support AI solutions that target social issues?

*Arvind Gupta:* The Indian government has deployed India Stack, a world leading concept for a digital infrastructure for our 1.32 billion citizens. It started with the Aadhaar program, which gave over a billion people a digital identity. Then we added further functionalities, such as mobile banking and

paperless administrative procedures. India Stack is now a set of APIs not only for the government but also for businesses, startups, and developers to use and create innovative applications on top of it. It is also a tremendous source of data, which enables the creation of an inclusive and representative artificial intelligence ecosystem.

*Editorial Team:* How will the government gauge the impact its investments in AI?

*Arvind Gupta:* The way we think about impact in India is broadly measured by reach and diversity of reach (for example language, economic). For instance, voice-based commands powered by AI should not support only the English language but also other languages, so as to maximize reach within the population and maximize the eventual success in the Indian context. I would look at four factors that correlate with success in India: impact, frugality, diversity, and reach. Given India's democratic governance and societal makeup, the impact of an AI solution should be pertinent to these factors. Until the AI economy in India is more mature, dollar revenue should not be a primary indicator of a successful investment.

*Editorial Team:* What is the Indian government's strategy for investing in AI?

*Arvind Gupta:* India has a dual-pronged strategy for promoting innovation: research and startup. Research funding is always through research institutes like, Indian Institute of Technology (IIT) and Indian Institute of Science. Startup funding for incubation of ideas is growing at a great pace right now. India has allocated a budget of ₹3,073 crore (\$480 million)<sup>2</sup> in 2018–2019 for promoting the AI research ecosystem under the Digital India program. This also includes research in the internet of things, 3D printing, and blockchain technology. AI funding in India has

grown from \$44 million to \$73 million<sup>3</sup> within the past year.

*Editorial Team:* Please tell us more about how the Indian government is investing in AI startups?

*Arvind Gupta:* In the last few years, the Indian government has supported AI-focused funds and also supported a broader ecosystem of early stage venture capital through a Startup Fund of Funds, which has a total worth of \$1.5 billion. The Startup Fund of Funds only invests in funds and not directly in startups. The objective of this fund is to bring in a rate of return and stimulate job creation. We expect this investment to create a market of 7.5 billion dollars. As a rule of thumb, around 8 to 10 percent of the Startup Fund of Funds is invested in data and AI-related startups. Each fund within the Startup Fund of Funds has its own investment strategy with part of their portfolio that may be in AI. The Small Industries Development Bank of India manages the fund for the government. Venture capital cycles are 6 to 7 years long. We believe that we are successful because we are becoming an anchor investor with funds that are now raising their own money.

Let me provide here some examples of the startups that have benefited from this scheme. All these companies are solving very specific problems in India. Note that all the names given here are examples illustrating the impact of the Funds of Funds schemes; we are not endorsing these companies here.

In the space of healthcare, we have MFine, that connects individuals to the best doctor for them using an AI-powered healthcare platform. Sigtuple is creating computer-vision-based diagnostics for blood diseases. Niramai is a sensitive thermography solution capable of detecting early malignant cases of breast cancer. These companies have a very significant reach and impact in the context of India in healthcare. There are many other examples that could be provided in other sectors, such as education and financial inclusion (for example, Active.ai, Embibe, Niramai, Skymet, AskArvi, Ten3T).

Other funds supported by the Indian government include the Electronic Development Fund, which has a total worth of \$1 billion<sup>4</sup> and contains a sector focus for startups. There are other funds like Stellaris that have the backing of the Indian government, but they have a diverse portfolio (with AI constituting about 8 percent of their total portfolio). A few funds specialize in AI such as Pi Ventures.

The startup funding schemes I mentioned above have given startups new sources of capital. The National Strategy for AI<sup>5</sup> that National Institution for Transforming India Aayog, a government policy think tank, has published in June 2018 also mentions the creation of AI hubs for research and development in AI. These would function as one-stop-shops where startups would find all the support they need, including assistance in acquiring funding.

*Editorial Team:* Can you describe some of the Indian government's initiatives in healthcare and AI?

*Arvind Gupta:* In the space of health, one of our key initiatives is the recent rolling out of the world's biggest medical insurance policy, targeting the poorer, lower-middle class, consisting of up to half of the nation's population. If a citizen falls under a certain income threshold and is not getting covered through their employer, he or she is eligible for this policy. This program is called the Ayushman Bharat<sup>6</sup> and provides \$8000 of medical insurance per family per year.

By way of an open-architecture the National Health Stack has been proposed,<sup>7</sup> health records for insured patients will come to a central repository in specific formats with the right data governance policies that gives the patient full control on her or his data. As an individual, even if you don't want to be enrolled in the health insurance policy you can make your data available in the cloud to use these services.

This is huge! Just imagine the data of 100 million families (about 500 million people) in a single managed repository that can fuel data-driven and AI applications. This data are very rich and diverse, with different diagnoses, health parameters, treatments, claims, and so forth. Access to such a data set is a dream for many AI researchers. Startups can access this data to come up with unique innovative AI solutions. The current thinking is that the biggest impact of AI in healthcare is around fraud detection in medical claims (mismanagement, exorbitant claims), and also matching of patients with the right provider. Across all the three stages of care (that is, prevention, detection, and treatment) the role of data to optimize patient outcomes is becoming critical.

*Editorial Team:* Can you describe some of the Indian government's initiatives in finance and AI?

Our initiatives in the financial industry are older and more mature than the health ones. In the first 21 months following its rollout, it has achieved significant results. The de-monetization of Indian currency was rolled out on November 8, 2016.<sup>8</sup> We have the payment stack, which is linking citizens' mobile devices to their bank accounts through the Unified Payments Network. The payment stack democratizes the credit-granting process for consumers. The scale of this is massive. By October 2018, the payment stack had processed 485 million transactions compared with just 100,000 in November 2016.

India is also using AI in fostering flow-based credit, specifically in the recently launched initiative<sup>9</sup> providing loans up to \$150,000 to a micro, small, or medium enterprise within 59 minutes of their application, based on the financial data of that enterprise. Data and technology are being leveraged to speed up processes with the objective of accelerating the pace of India's development.

*Editorial Team:* What other stacks are there?

*Arvind Gupta:* One that is proposed is agriculture — we call it the agri-stack or the village-stack. This deals with questions like what are the elements or resources required in a village for agriculture? In agriculture,

we seek to implement new AI-based technologies to improve coordination and decrease transaction cost. However, this may not be financially optimal or efficient for the private sector, so a sustained government intervention is needed to improve market conditions for farmers and other actors.

We will also have the governance stack. There are many different welfare schemes (about 434) in India, with about \$60 billion worth of payouts, where the amounts are dispersed directly to the bank accounts through direct benefit transfer.

*Editorial Team:* How will the government protect citizen data?

*Arvind Gupta:* India is coming up with a formal data empowerment and privacy policy. You own your data and you give consent to people for your data. Now we are formalizing and providing a legislative framework for supporting this. India is following a very different approach than GDPR. We are trying to balance data empowerment, access, anonymity, availability, privacy, and innovation, which we call the data empowerment and protection architecture.<sup>10</sup>

*Editorial Team:* What is India doing to build and sustain a workforce that is proficient in building and adopting AI technologies?

*Arvind Gupta:* We need more core science, technology, engineering, and mathematics research in colleges. Also, what we really need is convergence. AI in isolation will not solve problems. We need to develop medical facilities integrated with tech and research. We need to focus on interdisciplinary research that involves areas like health and agriculture. They all need to come together. To solve this problem, we are partnering with AI companies to build capacity at select tech campuses such as IITs and liberal arts colleges. India has excellent research facilities and a large workforce that is trained in IT. This talent pool can be considered the greatest strength of our country in the development of an AI industry. We need to create schemes under which the two come together, so the cutting-edge research that is done for example in our IITs can be leveraged to create real world applications and global intellectual property based on AI. Access to this research and collaboration between scientists and entrepreneurs is an important step to facilitate innovation and growth in this field.

Interdisciplinary research is key to ensure the thorough understanding of problems and developing the right technology and framework to address them.

*Editorial Team:* What types of regulatory issues are anticipated from the use of AI technology in India?

*Arvind Gupta:* Issues of liability, intellectual property, and accountability will be major concerns in helping AI become mainstream. These are very serious issues, and I think harm has to be defined first of all, and also liability, and best-effort basis. A lot more thinking is required on questions such as: Where is the ownership? Who is liable for what? Where does one's loyalty lie?

We have already seen these issues come up with autonomous vehicles. Another example is in using

AI for medical diagnostics. Should the government take action if a patient is harmed by the usage of an AI model? Or should the government ensure that such scenarios do not occur? We need to be able to determine who is liable in situations where there are a lot of codependencies between actors.

An international consortium must be created to set standards for safeguards that are to be respected in the development of AI applications. AI use-cases that have the potential to discriminate against or harm individuals must be subject to prior testing and, where the safety of citizens cannot be guaranteed, the government must step in.

*Editorial Team:* Thank you, Arvind, for taking the time to share your perspectives with us and the AI magazine readership.

*Arvind Gupta:* You're welcome. It was my pleasure.

## Notes

1. The Data and Privacy Policy Report can be read at [meiti.gov.in/writereaddata/files/Data\\_Protection\\_Committee\\_Report.pdf](http://meiti.gov.in/writereaddata/files/Data_Protection_Committee_Report.pdf).
2. See [timesofindia.indiatimes.com/trend-tracking/digital-india-to-push-ai-ml-blockchain-doubles-allocation-to-rs-3073-crore/articleshow/62750007.cms](http://timesofindia.indiatimes.com/trend-tracking/digital-india-to-push-ai-ml-blockchain-doubles-allocation-to-rs-3073-crore/articleshow/62750007.cms).
3. See [yourstory.com/2018/07/artificial-intelligence-can-add-957-b-economy-ai-startups-gaining-momentum-nasscom/](http://yourstory.com/2018/07/artificial-intelligence-can-add-957-b-economy-ai-startups-gaining-momentum-nasscom/).
4. See [economictimes.indiatimes.com/industry/cons-products/electronics/government-approves-electronics-development-fund-of-rs-6831-crore/articleshow/57084507.cms](http://economictimes.indiatimes.com/industry/cons-products/electronics/government-approves-electronics-development-fund-of-rs-6831-crore/articleshow/57084507.cms).
5. See [niti.gov.in/writereaddata/files/document\\_publication/NationalStrategy-for-AI-Discussion-Paper.pdf](http://niti.gov.in/writereaddata/files/document_publication/NationalStrategy-for-AI-Discussion-Paper.pdf).
6. The Ayushman Bharat is available at [www.india.gov.in/spotlight/ayushman-bharat-national-health-protection-mission](http://www.india.gov.in/spotlight/ayushman-bharat-national-health-protection-mission).
7. Information about the National Health Stack is available at [niti.gov.in/writereaddata/files/document\\_publication/NHS-Strategy-and-Approach-Documents-for-consultation.pdf](http://niti.gov.in/writereaddata/files/document_publication/NHS-Strategy-and-Approach-Documents-for-consultation.pdf).
8. [en.wikipedia.org/wiki/2016\\_Indian\\_banknote\\_demonetisation](http://en.wikipedia.org/wiki/2016_Indian_banknote_demonetisation).
9. See [timesofindia.indiatimes.com/business/india-business/psbloansin59minutes-com-becomes-largest-fintech-lending-platform-sanctions-rs-35k-cr/articleshow/68240505.cms](http://timesofindia.indiatimes.com/business/india-business/psbloansin59minutes-com-becomes-largest-fintech-lending-platform-sanctions-rs-35k-cr/articleshow/68240505.cms).
10. Information about the data empowerment and protection architecture is available at [indiastack.org/depa/](http://indiastack.org/depa/).

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