:: **Rahul Sachitanand**

While running a digital marketing agency, Neerav Parekh regularly updated his clients on their campaign performance with reports and charts that were carefully put together. However, the clients were quickly snowed under the blizzard of data, and inevitably demanded that account managers personally visit them and take them through these reports. This was a laborious process and, rather than plod through it repeatedly, Parekh, a serial entrepreneur, turned to artificial intelligence (AI), the science of trying to make computers think and act like humans, for a solution.

His product, Phrazor, is aimed at automating the process of interpreting data and communicating insights. Having used Phrazor for his agency, Parekh has now sought to extend the reach of his product.
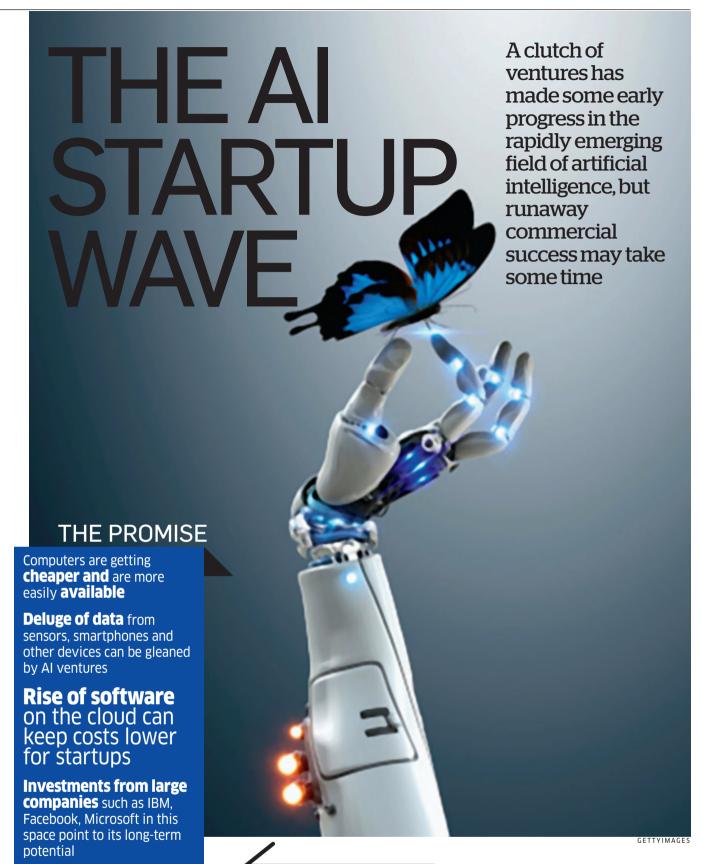
"I realised its enormous potential to change the way data was understood not just in digital marketing but in every other sphere where data was being presented," he says. "Every company has to send performance reports to its employees or customers. The focus of our venture is to help companies communicate the insights in their data to their people at scale." For his 14-month-old firm vPhrase, Parekh has ambitious targets – he eyes companies not just in India but also in the US and targets to be in the rest of Asia and Europe in three years. "There is a huge opportunity both in India and in other countries in the analysis and interpretation of data," he adds.

An Eye for AI

Using AI to pore through, comprehend and piece together numbers and notes is just one use of this rapidly emerging technology. "AI is not new, but its recent reemergence is thanks to the incredible performance of a type of machine learning called deep learning in some of the core problems like image recognition and speech recognition," says Navneet Sharma, cofounder and CEO of Snapshopr, a visual intelligence platform.

Despite the early excitement, he reckons that there is some way to go before AI explodes on the main stage. "There is a lot of hype around AI but there is very little amount of intelligence in current AI systems," contends Sharma. "We are very far from creating really intelligent systems. The AI we are seeing today in different applications is, however, very useful in solving a number of industry-specific problems."

There are other factors that have

THE AI STARTUP WAVE

A clutch of ventures has made some early progress in the rapidly emerging field of artificial intelligence, but runaway commercial success may take some time

THE PROMISE

Computers are getting **cheaper and** are more easily **available**

Deluge of data from sensors, smartphones and other devices can be gleaned by AI ventures

Rise of software on the cloud can keep costs lower for startups

Investments from large companies such as IBM, Facebook, Microsoft in this space point to its long-term potential

GETTYIMAGES

THE PERIL

Severe **shortage of people** with required skills in AI

Investors wary of backing ventures in this untested space

March of the technology behemoths covering large swathes of their target market

Fluid regulatory environment and **concerns over privacy**

Vinay Kumar Sankarapu
cofounder, Arya.ai

FOCUS: Build developer tools to help enterprises make their own complex AI-based systems

INVESTORS: YourNest Angel Fund, VentureNursery

PROGRESS: Works with large companies in the technology and financial services sectors to build these products

PLANS: Simplify Arya.ai so that developers can build their own network in hours, rather than days or weeks

The biggest threat is hype and unrealistic extrapolations... In every phase, we will see over-expectations followed by a correction"

aided the evolution of AI. This field is getting a lot of traction because of the ease with which AI can crunch huge amounts of structured and unstructured data; enhancements in software and hardware, especially with the emergence of GPU-accelerated computing; and, last but the not the least, rapid growth and development of cloud-based infrastructure. (GPU-accelerated computing is the use of a graphics processing unit, or GPU, along with a CPU to accelerate scientific, analytics, engineering, consumer and enterprise applications.) Recent advances in AI, particularly in the field of deep learning, have helped too, agree executives at AI startups in India.

Despite sounding high-brow and barely

"There is a really big opportunity in sectors such as healthcare and automobiles for AI"

Sanat Rao,
partner,
IDG Ventures

out of research labs, AI has actually been in use – and in the news – for a few years. For example, on mobile phones, digital personal assistants such as Siri, Google Now and Cortona all try to learn from the usage and behaviour of phone owners. Video games such as Far Cry and Call of Duty too lean on this field. In the world of business, retailers such as Target and Amazon have used AI to try to predict consumer behaviour, as have banks, media ventures and music-streaming services.

For startups in India, venture capital investments in AI in the United States provide some indication of the exploding interest in this space. According to data from CB Insights, VCs invested barely $415 million in AI ventures in 2012 and this exploded to $2.38 billion in 2015. On a quarterly basis, VC investments in the first three months of 2016 were to the tune of $602 million (143 deals), compared with $491 million (105 deals) in the previous quarter. Still, this financing was down from $901 million in the third quarter of 2015.

In India, startups have focused their energies primarily on the business-to-business side of things, even if some have tried to reach out to consumers.

Sharma's Snapshopr, for instance, has gained some initial traction and – after much sweat and toil – funding. "It was not easy to get funding to grow the business; we were rejected by more than 100 investors before we got funding," says Sharma.

He says Snapshopr, which he cofounded with college mates Debashish Pattnaik and Vivek Gandhi, now works with a dozen commerce and retail firms – to help with search and discovery of their products. He believes AI could be a game changer. "I was very much driven by the idea of using artificial intelligence and its immense potential in a wide range of applications," he adds.

The Next Revolution

Experts and investors in the field of AI say it will bring about the next revolution after the industrial, computer and internet ones. "The advent of machine learning and AI could be extremely disruptive," says Sanat Rao, partner of IDG Ventures, a venture capital company. "A lot of trivial, repetitive things will soon be done by software." While large companies such as IBM, Amazon, Facebook and Google will build horizontal platforms around AI (see *Giants Rush In*), there's a massive opportunity to build vertical solutions for

(L-R) Debashish Pattnaik, Vivek Gandhi and Navneet Sharma,

cofounders, Snapshopr

N NARASIMHA MURTHY

FOCUS: Provide image-recognition technology

INVESTORS: Undisclosed angel funding from Amod Malviya, former CTO, Flipkart, and others such as Pallav Nadhani, Apurva Dalal, Saran Chatterjee, Rahul Chari, Bikas Barai and Bragadish Sureshkumar

PROGRESS: Works with over a dozen ecommerce companies and retailers

PLANS: Double the number of firms they are working with by year-end

"It was not easy to get funding. We were rejected by more than 100 investors before we got funding"

Navneet Sharma

Neerav Parekh

founder, vPhrase

FOCUS: Help companies communicate insights in their data to various stakeholders; vPhrase's technology helps enterprises make sense of mountains of unstructured data

INVESTORS: Venture Catalysts

PROGRESS: Works with two private banks and companies in insurance, media, broking and engineering

PLANS: Have a presence in Asia, US, Europe over the next three years

There is a huge opportunity both in India and in other countries in the analysis and interpretation of data"

BHARAT CHANDA

startups. "There is a really big opportunity in sectors such as healthcare and automobiles for AI," he adds. "Consider a healthcare AI platform that can learn from thousands and even millions of images and can make more accurate diagnosis as it learns."

Rohit Kumar Pandey wants to do just that with his venture Sigtuple, a healthcare-focused firm that he cofounded with Tathagato Rai Dastidar and Apurv Anand in 2014. Prior to this, the trio worked at American Express Big Data Labs in Bengaluru from 2012 to 2014, building the unit from scratch. Sigtuple leans on the advances in AI. "There is a growing gap between the number of patients and doctors across the world," says Pandey. "Although a lot of work is being done to bridge the gap, there is a need for an

intelligent, effective and scalable solution." Sigtuple is building a series of cloud-based screening tools to increase the efficiency and outreach of the healthcare industry. "We are building a series of AI-based solutions, which automate the screening process (and partially diagnosis) in various fields of healthcare," explains Pandey.

The first product, Shonit, is an automated solution for complete blood count. This tool also enables tele-haematology and facilitates the complete blood count analysis of patients living in Tier 2 and Tier 3 cities by senior pathologists or doctors in Tier 1 cities in a few minutes.

Shonit consists of a standard light microscope, a cellphone camera and a cloud-based AI platform to run the analysis. It just completed a comprehensive clinical validation study at a laboratory in Bangalore. Meanwhile, Sigtuple is also developing solutions for andrology (semen analy-

Experts and investors say AI will bring about the next revolution after the industrial, computer and internet ones

Nimble Startups Can Develop Breakthrough Technologies

:: **Richard E Korf**

In the not-so-distant future, children will be amazed by stories that we allowed relative strangers to steer one-tonne machines, relying on human skill and instinct over the capabilities of computers. The field of artificial intelligence has a transformative capability over many things that govern our daily lives.

Consider self-driving cars: about 33,000 people are killed in automobile accidents in the US every year and most fatalities can be traced back to humans. Companies across technology and automobile industries are pouring millions of dollars into using AI to drive new breakthroughs in this field. Already, cars by Tesla have limited self-drive capabilities and we will soon see this rapidly increasing. Legacy companies won't have a choice – consumer demand will compel them to invest in new technologies and AI is a prime example of the breakthroughs they seek. As computers get smarter and learn more, many of the factors causing accidents, injuries and fatalities will disappear. This won't be a sudden explosion in the use of AI – big advancements will be a result of slow accretion of a whole bunch of ideas across software and hardware and many related fields.

The rise of AI has been driven recently by some advancements in important areas such as machine learning, speech understanding and vision learning. Computers will learn more and get even smarter going forward and these machines will be as good as, if not better than, humans at many tasks.

It is only a matter of time until computers take over routine, clerical tasks and there's a shift in jobs – with some losses – among humans. This will perhaps be similar to the shift in the industrial revolution, when a round of modernisation led to inevitable job losses.

In the age of AI, it will be the low-end clerical jobs that may vanish, but others may remain for years to come. I don't think we are ready to let computers run countries, be judges or act as law-enforcement agencies. What we will soon see is not wholesale unemployment, but a shift in the kind of jobs we as humans will do and a significant amount of re-training for humans to adopt to this new environment. It isn't a simplistic question of high-end and low-end jobs; a robot or computer might struggle, for example, to load and unload a dishwasher, a seemingly menial task.

AI will have all sorts of repercussions on life as we know it. For example, once self-driving cars go mainstream, will people want to or need to own cars anymore? This not only affects individual car ownership, but auto companies too, which are being pushed to invest in this field. There are some questions on ethics and morality (will a self-driving car choose to hurt its occupants or onlookers when faced with the possibility of an accident?), although critics are missing an important point. Self-driving cars will soon eliminate many of the reasons that cause humans to make these errors. Technological advancements in AI of this sort will be seeded in academia (such as the development of deep learning and neural networks), even if large corporations will lead the way in commercialising them. Large companies such as Amazon, Facebook, Microsoft and IBM may invest in the development of large horizontal platforms for AI, but there is a lot of scope for the development of breakthrough technologies for nimble startups. And, these companies can be based anywhere in the world. India, with its technical talent and increased availability of risk capital can easily be part of this race

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(L-R) Sachin Jaiswal, Nitin Babel, Shishir Modi and Keshav Prawasi

founders, Niki.ai

FOCUS: Chatbot that helps users discover services and products

INVESTORS: Unilazer, Ratan Tata

PROGRESS: Helps with bill payments, cab bookings, mobile recharge, home services and food ordering

PLANS: Venture into travel with hotel and bus bookings this month, along with 25-plus services in the pipeline for the next quarter, including groceries, movie ticketing, flight bookings and healthcare

> *I firmly believe that AI is the next big thing. As robotics and AI continue to improve, in the future, bots will surely replace most conventional jobs"*
>
> Sachin Jaiswal

N NARASIMHA MURTHY

sis) and analysis of urine, chest X-ray and retina scan. All of these are cloud-enabled, and agnostic of geography and image-capture devices.

As more entrepreneurs try their hand at building ventures around AI, Vinay Kumar Sankarapu, founder and CEO of Arya.ai, along with co-founder Deekshith Marla, wants to provide them with readymade building blocks to hasten their plans. "Our key focus is on simplification of technology through developer tools," says Sankarapu. "Everyone wants to use AI, but it is really tough to build and scale. We are creating tools and languages that can simplify complex tasks and enable any developer or enterprise to build a complex system in a very short time and scale to millions of users."

The Problem Solver

So, rather than create a product for a specific vertical, Arya.ai will be like a horizontal platform for developers to build solutions for multiple industries. "(We want to) make AI simple enough so that any developer can start building their own intelligence within hours," says Sankarapu.

Arya.ai was created as a solution to a problem while Sankarapu was doing research at IIT-Bombay. "With an intelligent research assistant at hand, I could have done better and more effective research," he says. "That is when Deekshith and I mulled over this problem and realised that everyone needs an assistant, no matter what their profession. So, we teamed up and created one."

They have built on their early work to evolve an AI technology platform. Sankarapu is cautious despite some early progress and funding for his firm. "The biggest threat is hype and unrealistic extrapolations. At every phase, we would see over-expectations from everyone, followed by a correction," he says. "Today, AI is used as a buzzword rather than as a product enabler. AI, by its very nature, calls for doing more substantive technology work with little room for hype."

Deepti Yenireddy and Naveen Verma agree on the great promise of AI. Best friends at IIT-Madras, they went their separate ways after graduation – Yenireddy to engineering giant Schlumberger and Verma to a career in technology and research. They kept in touch all through and decided to come together to found Skedool, a task automation venture.

> **As AI develops and business models get firmed up, a breakthrough from an AI-driven Indian startup may be on us sooner than we think**

N NARASIMHA MURTHY

"Rather than choosing AI as a focus area, it all started with a pain point and we realised we could use this technology to solve that problem, given the recent advances in the field," says Yenireddy. "We are just lucky to be living in an era where such great work is being done and major breakthroughs are happening."

Skedool works by learning numerous, repetitive tasks across companies and automating them. "There are so many repetitive tasks that you do everyday at work. Our goal is to automate these tasks and give back your precious time to focus on your core skill set," says Yenireddy. According to her,

scaling up anything in AI is very challenging, since the process needs constant re-evaluation and an extremely focused and dedicated approach to cover the entire breadth of the problem.

Entrepreneurs such as Yenireddy are enthused by the recent progress in AI. "Today, AI is getting very good at outperforming humans in very specific subtasks," she says. "The recent success in Go (when Google's AI-driven computer AlphaGo beat the human world champion in the ancient and complicated Chinese game of Go) is an example of that."

AlphaGo's win has also convinced others

GIANTS RUSH IN

Facebook

As far back as 2010, the social media giant introduced facial recognition technology to identify people in pictures posted on Facebook; then in 2013, Facebook founder **Mark Zuckerberg opened a lab dedicated to AI. More recently, the company has been talking up its technology which will allow the blind to see** – by using neural networks to generate a description for each photo. **Zuckerberg is also joining fellow technology entrepreneur Elon Musk and actor-investor Ashton Kutcher in backing secretive AI startup Vicarious FPC**

Google

In 2014, the search giant made its AI intentions clear when it acquired DeepMind, a **startup in this space for $400 million**. In early April this year, it announced it would make its machine learning system TensorFlow freely available, as it sought to evangelise the potential of AI. The company is betting that **its image recognition technology that can perform simplistic tasks** (spotting a dog in a picture) will one day evolve to take on more challenging tasks – from spotting eye damage to diabetes

IBM

In February 2011, Watson, IBM's supercomputer, beat its human rivals at Jeopardy game, triggering a wave of excitement about the possibilities of machine learning and AI. While machines have not yet taken over the world, IBM has used Watson's learnings in other businesses. In October 2015, IBM announced that it would **invest $1 billion in a new business, the Cognitive Business Solutions group, which would lean on the firm's learnings thus far in AI** and from Watson

Apple

In January this year, the maker of the iPad, iPhone and iPad acquired Emotient, a startup in the AI space. Apple is expected to use this company's **technology to further develop its own facial-recognition capabilities**, according to reports. Earlier in October 2015, Apple had also acquired VocalIQ to hone its voice-recognition skills. Siri, its chat assistant, remains the most visible use of AI for many consumers.

Open AI

A brainchild of Elon Musk, the founder of Tesla and SpaceX, and Sam Altman, the founder of startup accelerator Y Combinator, this nonprofit **aims to develop AI that would help rather than harm humanity**. To achieve this lofty goal, the firm has signed up heavy hitters such as LinkedIn cofounder Reid Hoffman, PayPal cofounder Peter Thiel, and Greg Brockman, former CTO of payments venture Stripe, besides investments from companies such as Infosys and Amazon Web Services to meet its goals

Microsoft

Microsoft is committed to the future of AI, with Project Oxford, which has a face, emotion and speech API. **The tech giant's VC arm, Microsoft Ventures, has backed CrowdFlower, an AI startup**

(L-R) Rohit Kumar Pandey, Tathagato Rai Dastidar and Apurv Anand

cofounders, Sigtuple

FOCUS: AI-based medical technology solutions provider

INVESTORS: Accel Partners, Sachin Bansal, Binny Bansal

PROGRESS: Shonit, an automated solution for complete blood count test, has completed a comprehensive clinical validation study at a reputed diagnostic laboratory in Bangalore

PLANS: Develop solutions to analyse andrology, urine, chest X-ray and retina scan images

There is a growing gap between the number of patients and doctors, and there is a need for an intelligent, effective and scalable solution"

Rohit Kumar Pandey

such as Sachin Jaiswal, CEO and cofounder of the chatbot Niki, that he is on the right path. "We are focusing on revolutionising conversational commerce by creating a seamless and fun-filled buying experience," he says. "Currently, Niki resides on Android as an app, but going forward, Niki will be a platform-independent, plug-and-play software development kit on any interface."

Jaiswal, who idolises Apple's Steve Jobs, and Niki.ai cofounders Nitin Babel, Keshav Prawasi and Shishir Modi, believe AI will soon become commonplace. "AI is the next big thing," says Jaiswal. "As robotics and artificial intelligence continue to improve, in the future, bots will surely replace most conventional jobs."

The founders of Niki.ai began with chat, but quickly realised that deployment of chat agents limited the scale of operations and proved costly. "Thus we moved to a chatbot, powered by AI," says Jaiswal.

"Our service offerings are bill payments, cab bookings, mobile recharge, home services and food orders." What's more, the company is venturing into travel with hotel and bus bookings this month, along with 25-plus services in the pipeline for the next quarter, including groceries, movie tickets, flight bookings and healthcare.

This kind of ambition clearly has impressed investors – the firm has snared funding from Ratan Tata and Ronnie Screwvala's Unilazer Ventures. Jaiswal thinks his company can do much more; in the near future, he claims, Niki will become a sales assistant who knows every brand out there, and knows personal preferences as well.

As the field of artificial intelligence continues to develop and business models and investor backing get firmed up, a breakthrough from an AI-driven Indian startup may be on us sooner than we think. ∎

"People do so many repetitive tasks everyday at work. Our goal is to automate these tasks and give back their precious time"

Deepti Yenireddy, cofounder, Skedool