Machine learning and artificial intelligence in a brave new world

Intelligence service: How the latest advances in AI will revolutionise business—and beyond

For some, a mention of artificial intelligence (AI) summons images of robots running amok as humans valiantly try to put the genie back in the bottle. But the reality is that today's AI—the ability of machines to learn from experience and perform tasks once only possible for humans—is already a reality and full of possibilities to enrich and improve human lives.

Machine learning, one of the key building blocks of AI, has been a part of the technological world since the 1950s, when the earliest programmers asked computers to make sense of large sets of data. Programmers have increasingly refined the ability of machines to study data in order to detect patterns that allow computers to then organise information, identify relationships, make predictions and detect anomalies. Today, modern applications of AI have already given us self-driving cars and virtual assistants and have helped us detect fraud and manage resources like electricity more efficiently. Sectors as diverse as retail, sports, banking, manufacturing and healthcare have all found applications for machine learning and AI.

Today's machines are now capable of performing narrowly defined tasks with great precision, but—and it's an important caveat—that precision is only as good as the quality and, in some cases, the

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quantity of the data that drives the model. The current state of play in machine learning will, with the input of carefully considered data, make possible countless enhancements to existing products and, eventually, the development of free-standing AI, although not the fully autonomous AI devices of the "robots running amok" kind.
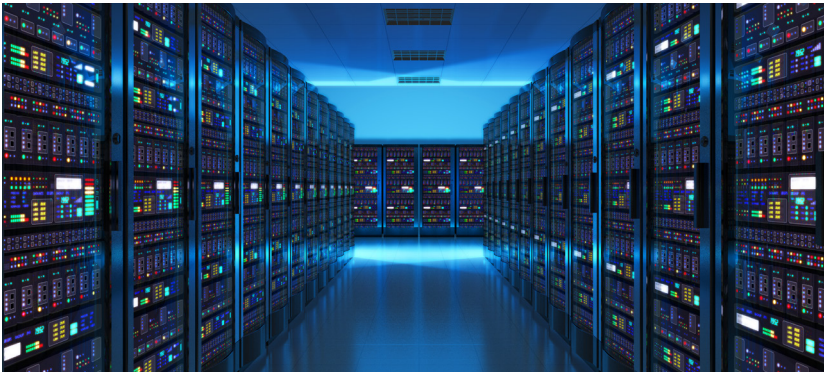
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Today's machine learning tasks are tackled in four primary ways through:

- **Machines that need to be taught by example before they can apply the resulting insight to similar tasks**
- **Machines that can extrapolate from a general pattern and apply it to other data**
- **Machines that can, unsupervised, study data to find patterns, getting better with experience (though never autonomous)**
- **Machines that can work with and exploit a given set of rules to move towards a desired outcome**

But as machine learning gets deeper, we are embarking on the next step towards increasingly sophisticated AI: deep learning. The sophisticated analysis of deep learning is achieved through "neural networks", so called because they loosely mimic the interconnected structure of the human brain to provide a many-layered functionality.

These "neural networks" are so sophisticated, in fact, that the path a machine takes to reach its conclusion is not yet readily understood. Deep learning uses huge, self-improving neural networks— only possible and more widely accessible because of recent advances in computing power—to achieve extremely complex pattern spotting like recognising speech or images.

"Deep learning is only going to be used when it really makes sense—where it can quickly find intricate, variable relationships hidden in large volumes of data that we haven't been able to pull out in any other way yet," explains Mary Beth Ainsworth, global product marketing manager of artificial intelligence and text analytics at SAS. "But deep learning means a machine can look at a problem through a completely different analytic lens than its human counterpart. It could be used to tackle all sorts of issues. The potential in all the data we collect every day is yet to be realised."

Progress is also being seen in how a second key building block of AI, natural language processing (NLP), has evolved into natural language understanding (NLU). If NLP is the ability to translate spoken or written language into a form an algorithm can understand and then respond with results in a spoken or written language that people can understand, then NLU is altogether more familiar:

the ability to infer meaning in language and then respond accordingly, as people do instinctively. Siri and Alexa are first steps on a path to giving AI a much simpler, more human ease of use.

And, contrary to the dystopian results some may imagine, humans remain very much in the picture. Setting up and maintaining useful machine learning requires human interaction and insight, as does validating AI conclusions by testing them against new data—an essential component of any AI deployment. Moreover, selecting the right algorithm for the job, configuring it for best performance, refining the data it will work on, getting the ideal balance between the sophistication of the machine and its ability to consume data and interpreting the results with the understanding that prediction is not the same as causation are part science, part art and all people power.

Small wonder then, as a recent SAS survey of its clients in Europe, the Middle East and Africa suggests, that one of the greatest concerns that businesses have about the adoption of artificial intelligence is having the human expertise to manage it.

"Businesses may want to jump on the AI bandwagon because it's such a hot topic, but they have to identify what they want to do with it," advises Ms Ainsworth. "By the same token, other people perhaps still have a negative perception of AI, from how it's often portrayed, such that it can seem overwhelming. But in many cases they're already leveraging forms of machine learning every day when they run a search on the internet, upload photos to social media or shop online with major retailers. Ultimately, it's about using the right tool for the right job. AI requires a strategy with clearly defined tactical steps to successfully implement that larger plan. AI can provide valuable insights, but what you do with that information still requires human direction."

It's already clear that AI is set to be revolutionary; more so, most likely, than the move to automating repetitive manual tasks through robotic hardware. AI will require some dramatic culture shifts. But it will not only boost productivity—identifying maintenance problems before they happen, for example, or allowing for real-time online pricing—but it will save time, too. AI will work away in the background while we're freed up to innovate or to attend to other tasks that require human attention. Much as Amazon's distribution centres use robotics to select merchandise but people to pack it, commerce, and many other areas of life, will become a question of teamwork. Human and machine will work together.

Learn more about how SAS is helping companies innovate with data and analytics.