

Artificial intelligence will transform labour markets

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The jobs and employment prospects of educated professionals could soon be under threat following rapid advances in artificial intelligence (AI). Although artificial intelligence has been used in industry since the 1990s, its application and impact on labour has been confined to lower level, unskilled or semi-skilled jobs. However, the declining cost of sensors and computing power, recent digital data deluge from social networking, and new ways of interacting with computers via mobile devices, have given rise to a new form of 'cognitive computing'.

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Impact

- As a result of `smart` machines and IT automation, 47% of jobs in the United States are at risk from computerisation.
- By 2025 intelligence applications in knowledge work could account for 40% of productivity gains.
- It is predicted that 'technological singularity', when artificial intelligence surpasses natural intelligence, will be achieved by 2029.

What next

Leading technological and information-intensive firms are making rapid strides in the development of AI platforms. These will not only transform the nature of work, but also create a new source of competitive advantage over traditional firms -- disrupting existing business models and labour markets globally.

Analysis

AI is the branch of computer science concerned with making computers (or machines) behave like humans. It is not new. Since the late 1990s, thousands of AI applications have been deeply embedded in the infrastructure of every industry, though this has not been widely acknowledged. Early adopters of AI were the finance sector, medicine, telecommunications, toys and games and aviation. AI includes a number of areas of specialisation such as:

- programming computers to play games against human opponents;
- programming computers to make decisions in real-life situations (for example, some expert systems help doctors diagnose diseases based on symptoms);
- programming computers to understand natural human languages;

- neural networks, or systems that simulate intelligence by attempting to reproduce the types of physical connections that occur in animal brains; and
- robotics that involve programming computers to see, hear and react to sensory stimuli.

Key growth drivers

AI is now entering a new phase of rapid development that is likely to transform not only the workplace but also the competitive landscape. Three key trends are driving this development:

- the relentless fall in the cost of computer power and sensors;
- the availability of vast swathes of digital data (see INTERNATIONAL: Firms, officials face 'big data' issues - April 26, 2013); and
- new ways of interacting with computers (tablets and smartphones), which make it easier for non-technical humans to work with machines on complex tasks.

'Smart' new world

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As robots become mobile, they will be increasingly capable of extending the reach of humans or replacing them

The growing power of 'computer vision' is a crucial first step for the next generation of computing, robotic and artificial intelligence systems. Once machines can identify objects and understand their environments, they can be allowed to move around in the world. As robots become mobile, they will be increasingly capable of extending the reach of humans or replacing them. Self-driving cars, factory robots and a new class of farm hands known as ag-robots are already demonstrating what mobile machines can do. The rapid advance of computer vision is just one of a set of artificial intelligence-oriented technologies -- others include speech recognition, dexterous manipulation and navigation.

The enormous amount of data being generated by inexpensive sensors has been a significant factor in altering the centre of gravity of the computing world. It has made it possible to use centralised computers in data centres -- 'the cloud' -- to take artificial intelligence technologies like machine-learning and spread computer intelligence far beyond desktop computers. This will be taken a stage further with ubiquitous computing -- commonly referred to as 'the internet-of-things' (see INTERNATIONAL: Security will lag 'Internet of Things' - March 21, 2014). This involves embedding powerful microprocessor chips and sensors in everyday objects, converting them from 'dumb' to 'smart' objects. Ultimately, this will give rise to smart homes, smart cars, smart health, smart robots, smart science, smart cities and smart computer-human interactions.

New source of competitive advantage

Firms that are first movers into the AI field stand to make substantial gains in competitive performance over traditional organisations as data and intelligence have replaced capital as the most valuable resource:

- IBM. IBM was an early mover with the development of its Watson artificial intelligence programme. The computer maker initially planned to test the system as an expert adviser to doctors. The idea was that Watson's encyclopedic knowledge of medical conditions could aid a human expert in diagnosing illnesses, as well as contributing computer expertise elsewhere in medicine. However, IBM went a step further by announcing a general-purpose version of its software, the IBM Watson Engagement Advisor. The idea was to make the company's question-answering system available in a wide range of call centres, technical support and telephone sales applications.
- Google. Google currently is assembling what looks like the greatest AI laboratory on Earth. By virtue of its massive data set, resulting from the 1 billion people who use it every single day, the firm already has a neural network and massive, distributed global 'brain'.

Large web-based companies utilise advances in machine learning and natural language systems to derive smarter intelligence

Large web-based companies have a distinctive competitive advantage over traditional non-platform firms by being information monopolies. This enables them to utilise advances in machine learning and natural language systems to interrogate their vast data sets to derive smarter intelligence. For example, Amazon (the world's largest cloud-based firm) already is experimenting with pro forma ordering based on past buying patterns and Facebook is currently matching subscriber interests from e-mail data generated on its social networking site.

Outlook

In addition to developing its own autonomous vehicles, Google recently has bought almost every machine-learning and robotics company available. It also spent 3.2 billion dollars on smart thermostat maker Nest Labs and recently acquired UK AI start-up DeepMind for 242 million pounds (403 million dollars).

However, these are only the big deals. Google also acquired Bot & Dolly, Meka Robotics, Holomni, Redwood Robotics and Schaft and another AI start-up called DNN research; it hired Geoff Hinton, a UK computer scientist who is regarded as the world's leading expert on neural networks. If AI and technological singularity is achievable by 2029, Google will be well positioned to reap the benefits and rewards. Nonetheless, this could well mean that computers take over human jobs at a faster rate than new roles can be created resulting in significant levels of unemployment, not just at the lower levels of the economy, but also among knowledge workers ranging from clerical to professional services. This may, in turn, feed the global phenomenon of rising income inequality and a 'hollowing out' of the middle class.