

A Time to Think

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Man vs Machine

Less than 20 years ago, Deep Blue, an IBM super computer defeated Garry Kasparov, a reigning world champion Chess master. This month, Google DeepMind (AlphaGO) beat Lee Sedol, one of the world strongest GO players with a 9-dan ranking.

What are the key takeaways from these two world historical events associated with Human Intelligence¹ and Artificial Intelligence² (AI)?

Basically, Deep Blue was designed based on telling the computer what we know and letting its brute computing power “evaluate” against a huge database of master chess games to derive the best option for a particular scenario. Put in another way, it is to select the best “If-Then” option. In real-life situation, it means the computer will beat us in executing activities that can be defined clearly in a structured process.

This programming approach is limited because there are many activities that our human brain could perform but cannot be explained clearly. Some of these include riding the bicycle, swimming, etc. GO is one of such activities where human players know more than they could tell – identifying a familiar face in a photo with many people in it.

To overcome this constraint, AlphaGO is designed differently to mimic the human brain; deep learning and reinforcement learning.

For deep learning, the software has a network of billions of “nodes” and “connections” that use “training sets” to strengthen these connections (similar to neurons in our brain) in responding to stimuli (a GO process) and elicit a response (the next move). As part of reinforcement learning, the computer played millions of GO games against itself to “remember” those moves that worked well.

A couple of friends insisted the recent GO game isn’t about Machine vs Man but a triumph for mankind because after all, AlphaGO is built by human programmers.

Let’s put on our critic hat – was this the case?

Big Data

Before we enter into endless discussions, one common denominator between Deep Blue and DeepMind is the huge databases of past games (Data). Without these data, both computers are in no position to “evaluate” If-Then options or perform deep learning and reinforcement learning.

In the present environment, data has to be specifically collected and fed to these computer systems but this situation is changing rapidly with “Cloud Computing” or the “Global Computer”.

On social media platforms, millions of users across the globe are posting and sharing more data voluntarily and more frequently. Increasingly, data are also collected without our explicit knowledge when we browsed pages on our computers or mobile phones, set our mobile phones

with default location tracking feature or activate auto-upload on our wearable devices that track our daily activities, heart beats and sleep patterns.

Adding to these input sources are other little sensors and transmitters collectively known as Internet of Things (IOT) that are increasingly invading many aspects of our daily lives. Each day, the list comprising CCTV cameras, thermostats, smoke detectors, air-quality detectors, water detectors, baby monitors and even pacemakers, etc becomes longer.

Have we ever wondered why companies such as Google, Facebook, and Apple are collecting data vigorously?

Data has value.

In aggregated form, it provides information of emerging and new trends; at individual levels, it is valuable to marketers for sending targeted information. Data analytics also support decision making, facilitate development of products or services to address existing or new needs and for some organisations, selling of customer data is their core revenue stream.

Two years ago, one of the leading fitness tracker companies started working with corporations in Singapore to provide fitness trackers to staff as part of their corporate wellness programmes. To-date, more than 2,400 employees from some 20 companies have enrolled in various schemes. These fitness trackers are usually sold to companies at bulk discount with some companies subsidising or sharing the cost with employees.

These schemes look like a win-win situation for all parties. The fitness tracker company sells more products and with more data points; they get inputs on how to refine and improve upon its products. The companies benefit from a group of more health conscious employees and even save on medical costs and employee insurance schemes.

In smart homes, thermostats monitoring outside and room temperature automatically adjust temperature of air-conditioners or heaters; infra-red sensors turn lights on and off depending on presence or absence of human bodies (heat); baby monitoring system sending remote alert to parents in case of irregularities of baby movements are just some of the many examples facilitated by IOT devices.

Smarter = Better?

The problem starts when our data are used against us in the scenario when companies and insurers use the stick instead of the carrot approach. Imagine salary or bonuses of employees are deducted for a less healthy lifestyle or a higher premium for corporate medical schemes.

Also consider the situation when energy companies decide to remotely tune the temperatures of our home cooling/heating appliance in their own interest; to level out the power loading on the electricity grid to save costs on electricity generation.

The combination of IOT and AI has become such a power threat that it warrants James R. Clapper, Director of US National Intelligence to highlight the concerns to the US Senate Select Committee on Intelligence on 10 Feb 2016. In the Report³, IOT and AI were listed as the first 2 items under the chapter, "Global Threats: Cyber and Technology".

Threats from IOT were described by Clapper as follows: *"Security industry analysts have demonstrated that many of these new systems can threaten data privacy, data integrity, or*

continuity of services. In the future, intelligence services⁴ might use the [Internet of Things] for identification, surveillance, monitoring, location tracking, and targeting for recruitment, or to gain access to networks or user credentials.”

Other than IOT, the report is specifically concerned about the rise of AI as “AI systems are susceptible to a range of disruptive and deceptive tactics that might be difficult to anticipate or quickly understand. Efforts to mislead or compromise automated systems might create or enable further opportunities to disrupt or damage critical infrastructure or national security networks.”

In an [earlier article](#)⁵ by this author, the latest 007 movie; “Spectre” dramatises the scenario of an international terrorist group turning surveillance devices against us and bringing “IOT” to the next level with “Smart Blood”. These reel scenarios could become reality much sooner than we expected.

Looking Ahead

There is always the flip side to everything including the use of smart technology, AI, IOT and being always connected to the super computer (Cloud). Issues concerning the uncertainties of AI outcome due to its complexity, loss of privacy arising from inappropriate use of collected data, monetary and asset losses from security breaches due to our ignorance and laziness (not changing default values), etc can and will happen.

The short answer to the above is to make time to think about and stay on top of these developments. Be vigilant against and report potential suspicious activities.

References:

¹ Human Intelligence

Linda Gottfredson et al: Very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience....

² Artificial Intelligence

The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages

³ Statement for the Record - Worldwide Threat Assessment of the US Intelligence Community dated 09 Feb 2016: <http://www.popsoci.com/clapper-americas-greatest-threat-is-internet-things>

⁴ “Intelligence services” refers mostly to spy networks from other countries

⁵ Reeling in 2016: http://www.innovar.com.sg/more.htm#Reeling_in_2016

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