Artificial Intelligence

There Is Still One Domain Which Machines Can't Take Over: Human Creativity

Without this unique ability, there would be no poetry, no internet and no space travel.

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❝**Machines come up** with innovations by using generative methods. But how does this work exactly? There are different approaches, but the state of the art is called generative adversarial networks. As an example, consider a machine that is supposed to create a new picture of a person. Generative adversarial networks tackle this creation task by combining two sub-tasks.

The European Patent Office recently turned down an application for a patent that described a food container. This was not because the invention was not novel or useful, but because it was created by artificial intelligence. By law, inventors need to be actual people. This isn't the first invention by AI – machines have produced innovations ranging from scientific papers and books to new materials and music.

That said, being creative is clearly one of the most remarkable human traits. Without it, there would be no poetry, no internet and no space travel. But could AI ever match or even surpass us? Let's have a look at the research.

How machines create

From a theoretical perspective, creativity and innovation is a process of search and combination. We start from one piece of knowledge and connect it with another piece of knowledge into something that is new and useful. In principle, this is also something that can be done by machines – in fact, they excel at storing, processing and making connections within data.

Machines come up with innovations by using generative methods. But how does this work exactly? There are different approaches, but the state of the art is called generative adversarial networks. As an example, consider a machine that is supposed to create a new picture of a person. Generative adversarial networks tackle this creation task by combining two sub-tasks.

The first part is the generator, which produces new images starting from a random distribution of pixels. The second part is the discriminator, which tells the generator how close it came to actually producing a real looking picture.

How does the discriminator know what a human looks like? Well, you feed it many examples of pictures of real person before you start the task. Based on the feedback of the discriminator, the generator improves its algorithm and suggests a new picture. This process goes on and on until the discriminator decides that the pictures look close enough to the picture examples it has learned. These generated pictures come extremely close to real people.

The human touch

But even if machines can create innovations from data, this does not mean that they are likely to steal all the spark of human creativity any time soon. Innovation is a problem-solving process – for innovation to happen, problems are combined with solutions. Humans can go either direction – they start with a problem and solve it, or they take a solution and try to find new problems for it.

An example for the latter type of innovation is the Post-it note. An engineer developed an adhesive that was much too weak and was sitting on his desk. Only later a colleague realised that this solution could help prevent his notes falling out of his scores during choir practice.

Using data as an input and code as explicit problem formulation, machines can also provide solutions to problems. Problem finding, however, is hard for machines, as problems are often out of the boundaries of the data pool that machines innovate upon.

What's more, innovation is often based on needs we didn't even know we had. Think of the Walkman. Even if no consumer ever uttered the wish to listen to music while walking, this innovation was a huge success. As such latent needs are hard to formulate and make explicit, they are also unlikely to find their way into the data pool that machines need for innovation.

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Humans and machines also have different raw material that they use as input for innovation. Where humans draw on a lifetime of broad experiences to create ideas from, machines are largely restricted to the data we feed them. Machines can quickly generate countless incremental innovations in forms of new versions based on the input data. Breakthrough innovation, however, is unlikely to come out of machines as it is often based on connecting fields that are distant or unconnected to each other. Think of the invention of the snowboard, which connects the worlds of skiing and surfing.

Power of two

Also, creativity isn't just about novelty, it is also about usefulness. While machines are clearly able to create something that is incrementally new, this does not mean that these creations are useful. Usefulness is defined in the eye of those potentially using innovations and is hard to judge for machines. Humans, however, can empathise with other humans and understand their needs better.

Finally, creative ideas generated by AI may be less preferred by consumers simply because they have been created by a machine. Humans might discount ideas from AI since they feel these ideas are less authentic or even threatening. Or they might simply prefer ideas of their kind, an effect that has been observed in other fields before.

As of now, many aspects of creativity remain uncontested terrain for machines and AI. However, there are disclaimers. Even if machines cannot replace humans in the creative domain, they are great help to complement human creativity. For example, we can ask new questions or identify new problems that we solve in combination with machine learning.

In addition, our analysis is based on the fact that machines mostly innovate on narrow datasets. AI could become much more creative if it could combine big, rich and otherwise disconnected data.

Also, machines may get better at creativity when they get better at the kind of broad intelligence humans possess – something we call "general intelligence". And this might not be too far in the future – some experts assess that there is a 50% chance that machines reach human-level intelligence within the next 50 years.

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Off The Cuff: Books Are Dying, Not Storytelling

Most people were watching movies on their laptops or reading from a Kindle

MAHMOOD SABERI

Scottish writer, historian and storyteller, William Dalrymple, was having a great time at the Times Lit Fest in Bengaluru, informing his engrossed audience on how the Brits looted India.

As he was describing how the East India Company, a spice-trading company, was run by a flamboyant merchant and entrepreneur (later Governor of the Company) named Thomas Smythe, someone similar to financial fugitive Vijay Mallya (owner of the now defunct Kingfisher Airlines), I was wondering whether to buy the author's new book, 'The Anarchy', in hardcover, because I already had the book in my Kindle.

Incidentally, the East India Company easily decimated, with the help of Marwaris, local Indian moneylenders, the mighty Mughal Empire, which was managing an India that had a GDP of 22 per cent of the world economy at that time, in 1600.

I am what is known in the tech universe as a late adapter and buy geeky stuff years after everyone has discarded it and moved on. I wanted the device as I had noticed while in a plane that nobody was reading printed books

- Mahmood Saberi

India's gross domestic product was larger than Europe's, including Britain's, and only second behind China, and the Company reduced the economy to what it is now, Dalrymple said, to embarrassed laughter from the audience.

At every literature festival, I spend an inordinately long time standing in a queue, shuffling from foot to foot, waiting for the author to sign my copy
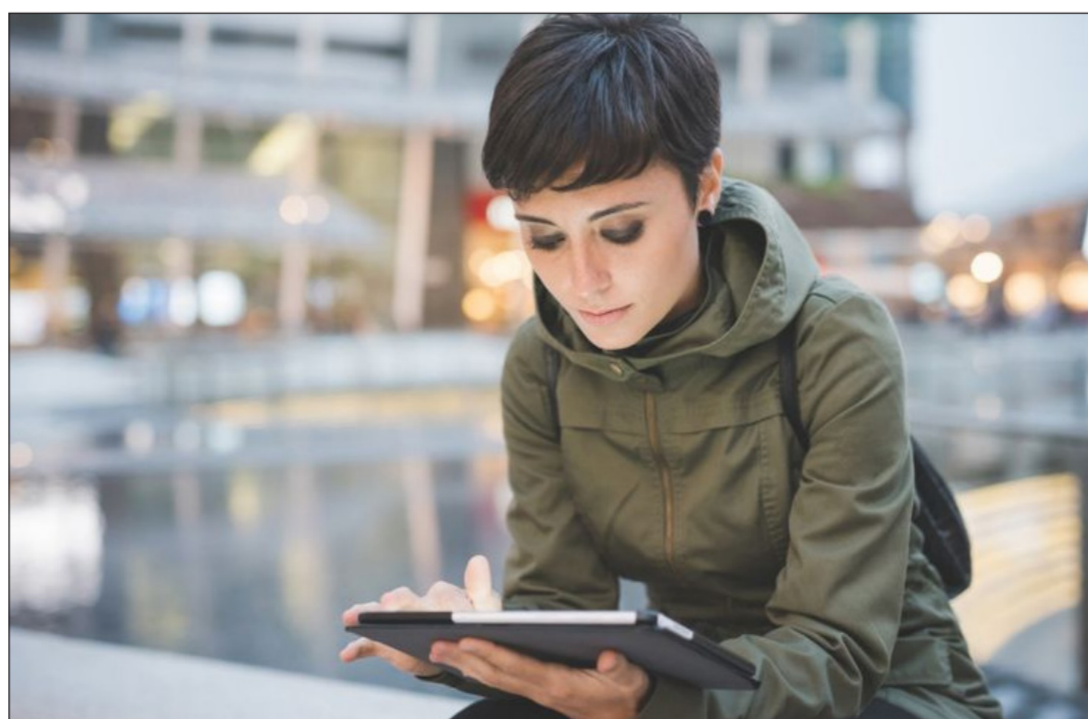
of his book. I am not sure who suffers the most, the writer, or the reader, at such meetups and book promo events.

"Can you please sign this for my wife," I usually tell the author hesitantly. For some reason, none of the autographed books in our bookshelves is signed to my name, though I pretend to be the reader in our family.

I remember standing in a queue in a bookstore in Dubai for what seemed like eternity while women were hugging and kissing Paulo Coelho, lyricist and novelist, as they approached him to sign their copy of his books.

Unbridled impatience

At the Dubai literature festival, I was holding a hefty book that I thought would take a lifetime to read, and looked at the queue next to me that had excited kids, having a great time and waiting with unbridled impatience and eager to meet their fav graphic horror novel writer (artist?).

I even got former journo and politician M.J. Akbar to sign his book, 'The Shade of Swords', years ago in Dubai, where he had come to launch his latest work. (Nobody at that time had any clue that he would be accused of being a serial sexual assaulter in the newsroom, as #MeToo India was still very distant in the future.)

When our eldest was visiting from Toronto, I asked him to buy me a Kindle as it was much cheaper than buying it here in Bengaluru.

The Kindle I wanted was the Paperwhite, now also waterproofed (presumably to read in the tub) and was for sale in India for Rs12,999 (about Can$240) while in Toronto, it cost just Can$139.99 (about Rs7,555).

I am what is known in the tech universe as a late adapter and buy geeky stuff years after everyone has discarded it and moved on. I wanted the device as I had noticed while in a plane that nobody was reading printed books; they were either watching a movie on their laptops, or playing games on their smartphones, or reading from a Kindle.

Back to the fest and my wife dissuaded me not to buy the hardcover version of Dalrymple's book. "Remember, we are trying to get rid of books," she whispered, as the crowd around us was a serious book-loving crowd.

Some years ago she had spent her whole summer holiday trying to sell or discard the books her mother had collected over the years. It is sad but nobody wanted the books, some dating back 100 years, and now we have a bookshelf full of historical mouldy books.

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