4 Mind-Blowing Ways Facebook Uses Artificial Intelligence

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After writing several articles intended to act as basic introductions to Artificial Intelligence such as Machine Learning and Deep Learning, I thought it would be good to look at some examples of how they are being used in practice.

Facebook builds its business by learning about its users and packaging their data for advertisers. It then reinvests this money into offering us new, useful functionality – currently video and shopping - which it also uses to learn even more about us.

As the way it enables communication and conversation between people has proven to be hugely valuable to us, it has become a magnet for a huge amount of data about us – who we are, where we spend our time and what we like. The problem for Facebook's data scientists who have to try to make sense of this is that much of this data is very messily unstructured.

With 1.2 billion people uploading 136,000 photos and updating their status 293,000 times per minute, until recently Facebook could only hope to draw value from a tiny fraction of its unstructured data – information which isn't easily quantified and put into rows and tables for computer analysis.

Deep Learning is helping to play a part in changing that. Deep Learning techniques enables machines to learn to classify data by themselves. A simple example is a deep learning image analysis tool which would learn to recognize images which contain cats, without specifically being told what a cat looks like. By analyzing a large number of images, it can learn from the context of the image – what else is likely to be present in an image of a cat? What text or metadata might suggest that an image contains a cat?

This helps it to give structure to unstructured data, by quantifying it and representing it in a form from which analytical tools can derive insights. They try to answer questions such as - how often does a company's products appear in pictures which also contain cats? Should we focus on displaying our ads to people who like cats, or not?

That's the basic principle of why Deep Learning (DL) is useful to Facebook, and as DL algorithms become more sophisticated they can increasingly be applied to more data that we share, from text to pictures to videos.

So here's a couple of specific use cases where DL is used to gain value and help Facebook achieve its goals of providing greater convenience to users, and enabling them to learn more about us.

1. Textual analysis

A large proportion of the data shared on Facebook is still text. Video may involve larger data volumes in terms of megabytes, but in terms of insights, text can still be just as rich. A picture may paint 1,000 words, but if you just want to answer a simple question, you often don't need 1,000 words. Every bit of data which isn't essential to answering your question is just noise, and more importantly, a waste of resources to store and analyze.

Facebook uses a tool it developed itself called DeepText to extract meaning from words we post by learning to analyze them contextually. Neural networks analyze the relationship between words to understand how their meaning changes depending on other words around them. Because this is semi-unsupervised learning, the algorithms do not necessarily have reference data – for example a dictionary – explaining the meaning of every word. Instead, it learns for itself based on how words are used.

This means that it won't be tripped up by variations in spelling, slang or idiosyncrasies of language use. In fact, Facebook say the technology is "language agnostic" – due to the way it assigns labels to words, it can easily switch between working across different human languages and apply what it has learned from one to another.

At present the tool is used to direct people towards products they may want to purchase based on conversations they are having – this video gives an example of how it decides whether providing a user with a shopping link is appropriate or not, depending on the context.

2. Facial recognition

Facebook uses a DL application called DeepFace to teach it to recognize people in photos. It says that its most advanced image recognition tool is more successful than humans in recognizing whether two different images are of the same person or not – with DeepFace scoring a 97% success rate compared to humans with 96%.

It's fair to say that use of this technology has proven controversial. Privacy campaigners said it went too far as it would allow Facebook – based on a high resolution photograph of a crowd - to put names to many of the faces which is clearly an obstacle to our freedom to move in public anonymously. EU legislators agreed and persuaded Facebook to remove the functionality from European citizens' accounts in 2013. Back then the social media giant was

using an earlier version of the facial recognition tool which did not use Deep Learning. Facebook has been somewhat quiet about the development of this technology since it first hit headlines, and can be assumed to be waiting on the outcome of pending privacy cases before saying more about their plans to roll it out.

3. Targeted advertising

Facebook uses deep neural networks – the foundation stones of deep learning – to decide which adverts to show to which users. This has always been the cornerstone of its business, but by tasking machines themselves to find out as much as they can about us, and to cluster us together in the most insightful ways when serving us ads, it hopes to maintain a competitive edge against other high-tech competitors such as Google who are fighting for supremacy of the same market.

4. Designing AI applications

Facebook has even decided that the task of deciding which processes can be improved by AI and Deep Learning can be handled by machines. A system called Flow has been implemented which uses Deep Learning analysis to run simulations of 300,000 machine learning models every month, to allow engineers to test ideas and pinpoint opportunities for efficiency.

Open source

Facebook is a strong supporter of Open Source and makes most of the work of its AI labs Facebook Artificial Intelligence Research (FAIR) freely available for anyone to use or modify however they like. Most of Facebook's Deep Learning is built on the Torch platform, a development environment focused on the development of deep learning technologies and neural networks.

It has even open sourced the design of its graphics processer unit (GPU)-driven AI hardware – super-fast computers optimized for carrying out Deep Learning tasks, which are often processing-power intensive due to the vast numbers of calculations involved and the speed of the incoming data they are built to handle.

Looking to the future

Deep Learning is likely to continue to play a key part in the future development of Facebook. Although it is tight-lipped about potential new applications at the moment, ideas which have been suggested include automatically generating audio descriptions of pictures to assist the visually-impaired, and to predict where greater coverage is required in its mission to roll out internet access to poorly served parts of the world. In the long-run work of their well-resourced AI and Deep Learning labs is likely to provide benefit to countless other organizations too, either directly through use of their services, or indirectly thanks to their support of open source principles.

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