

*Read the article about how artificial intelligence works and answer the questions that follow.*

## **Artificial Intelligence**

Elon Musk, a tech entrepreneur, says artificial intelligence (AI) is a bigger threat to humanity than nuclear weapons. On the other hand, Mark Zuckerberg, the CEO of Facebook, thinks AI will save lives.

Regardless of whether you agree with Musk's or Zuckerberg's argument, what is clear is that AI is reshaping the world we live in. It's leading to improvements in medicine and self-driving cars, shaking up businesses from manufacturing to marketing. And although we may not be aware of it, we already use it in our Facebook news feeds when we talk to Siri on our iPhones or ask our Alexa-enabled speakers to play a track.

Yet, although it powers products and services we use every day, AI remains a mystery to many. So Facebook AI experts Yann LeCun and Joaquin Quiñero Candela have set about simplifying this complex field of computer science in a series of educational videos and blog posts.

'Not magic, just code'

"Artificial intelligence is not magic," write LeCun, head of Facebook's AI research, and Candela, Facebook's Director of Applied Machine Learning, in their blog. "But we've already seen how it can make scientific discoveries that seem like magic and help us do everyday things like identify objects in photos, recognize speech, drive a car, or translate an online post into dozens of languages."

How does it do this? Many intelligent machines and systems use algorithmic techniques loosely based on the human brain. These neural networks can learn to recognize patterns, translate languages, do simple logical reasoning, create images, and even come up with ideas.

"All of this happens at blinding speed through a set of coded programs designed to run neural networks with millions of units and billions of connections," write LeCun and Candela. "Intelligence emerges out of the interaction between this large number of simple elements."

If, for example, you want to teach a computer to tell the difference between a car and a dog, instead of programming it to carry out the task, you can train it to recognize objects in images so that it learns for itself.

So what is deep learning?

Deep learning is a type of machine learning that structures neural networks into multiple processing layers. This helps a computer identify what is in an image or learn to recognize speech and text.

“In a park, we can see a collie and a chihuahua, but recognize them both as dogs, despite their size and weight variations,” write LeCun and Candela. “To a computer, an image is simply an array of numbers.” Local patterns, like the edge of an object, are easy to spot in the first layer of this set of numbers.

“The next layer would detect combinations of these simple motifs that form simple shapes, like the wheel of a car or the eyes in a face.”

“The next layer will detect shape combinations that form parts of objects, such as a face, a leg, or an airplane wing.”

“The last layer would detect combinations of parts that form objects: a car, an airplane, a person, a dog, etc. The depth of the network, with its multiple layers, allows it to recognize complex patterns in this hierarchical fashion.”

Deep learning is helping to push forward research in fields including physics, engineering, biology, and medicine. It is also at the heart of developing autonomous systems such as self-driving vehicles.

What about AI’s impact on jobs?

Despite growing anxiety over automation eliminating jobs, LeCun and Candela believe that AI will create new roles for humans in manufacturing, training, sales, maintenance, and management of intelligent robots.

“AI and robots will enable the creation of new services that are difficult to imagine today.” “But health care and transportation will be among the first industries to be completely transformed by it,” they write.

“Increasingly, human intellectual activities will be performed in conjunction with intelligent machines.” “Our intelligence makes us human, and AI is an extension of that quality.”