***Artificial Intelligence and Machine Learning:***

***How Computers Learn***

**From picking our favorite restaurants to predicting weather and correcting global food shortages, artificial intelligence is already augmenting everyday life.**

Firmly rooted in the realm of science fiction, artificial intelligence (AI) has often felt external – something happening out there. In reality, AI is a huge part of our everyday lives. We just don’t recognize it.

Bank alerts of suspected fraudulent charges, smartphone notifications to exercise, Siri or Cortana’s ability to recognize voices – are all examples of AI.

“Artificial intelligence is basically where machines make sense, learn, interface with the external world, without human beings having to specifically program it,” said Nidhi Chappell, director of machine learning at Intel.

AI improves lives in many other areas too. By measuring biometrics in sports, data can help measure how an athlete’s playing time impacts injury likelihood. It helps farmers know when to water crops for optimal yields, lets meteorologists gauge snowmelt. Smart cities use data for power management, healthcare professionals use AI to detect perform [genomic sequencing](http://iq.intel.com/technology-powers-bioscience-in-fight-against-cancer/), and track treatments.

AI is an umbrella term and under it Machine Learning (ML) is the set of techniques and tools that allow computers to “think” by creating mathematical algorithms based on accumulated data. Also under the umbrella, Deep Learning (DL), a subset of ML, uses neural network models to do things like image recognition and language processing.

“Think of a child growing up,” said Chappell. That child observes the world, notes how people interact, learns society norms – without explicitly being told the rules. “That’s the same as artificial intelligence. It’s machines learning on their own without explicit programming.”

Chappell said AI is doing three things: step one is perceiving the world, using data to detect patterns. Step two is recognizing those patterns, and step three is taking an action based on that recognition.

For example, you post a lot of hiking pictures on Facebook. The algorithms notice there are a lot of pictures of you summiting a mountain with a certain person. It recognizes that person and that you like hiking, so it suggests other people or hikes you might like.

“All of this is machine learning,” said Chappell. “Machines are getting smarter, helping us make better decisions and helping us to research faster.”

**Assuaging the Skeptics**

There’s a healthy level of skepticism about artificial intelligence – fear that machines are taking over. But Chappell said a computer’s ability to learn actually helps humanity in many ways.

“AI actually augments what human beings are doing,” she said. “We are not trying to replace humans, we are actually trying to augment them with more intelligence. This is making our lives easier.”

She said gone are the days of pulling out a paper map while driving. Today people can rely on the data-rich, dynamic map apps that learn when roads change or new bridges are built, can help monitor traffic and optimize driving time.

Both AI and ML technologies have been used for decades in fields such as [education](http://www.npr.org/sections/ed/2016/03/16/470011574/what-artificial-intelligence-could-mean-for-education), [finance](http://news.bbc.co.uk/2/hi/business/1481339.stm) and [medicine](http://spectrum.ieee.org/the-human-os/robotics/medical-robots/autonomous-robot-surgeon-bests-human-surgeons-in-world-first), and Chappell said AI continues help move society. It can be used to reduce online harassment and help with issues like human trafficking or increasing crop yields, thereby reducing global hunger. [AI can help with viruses](http://iq.intel.com/mobile-health-data-that-prevents-epidemics/), such as Zika, by predicting migrant patters of mosquitoes and identifying those most likely to transfer disease.

**Managing the Data**

The more sophisticated the learning becomes, the more data is required for machines to learn, Chappell said. The higher-performance the compute power, the faster computers can learn.

“It is proven that the more data you give to a machine to learn, the more accurate the machine gets at predicting things,” said Chappell, adding that as the complexity of the learning goes up, so do the data requirements to make sense of it.

As more machine learning takes hold, the data requirements will be astounding.

In his keynote address at the 2016 Intel Developer Forum (IDF), Intel CEO Brian Krzanich said the average person generates 600 to 700 megabytes of data per day just doing normal things like posting to Snapchat, sending emails, playing games.

By 2020, Krzanich said, that number will jump to 1.5 GB per day. That’s just people. The average[autonomous vehicle](http://iq.intel.com/autonomous-cars-road-ahead/) will generate 4,000 GB per day and a smart factory will produce 1 million GB of data daily.

Chappell said autonomous cars are a good example of AI and ML at work. A car could have a computer on board that begins to learn on its own, but having other cars on the road send data to the cloud helps other cars learn too.

Think of it as crowd-sourcing data. For example, if a single car detects a construction sign, it helps that car. But if it can send that information to the cloud, that alert can be sent to other autonomous cars. The more cars that “learn” about that obstacle, the more smoothly traffic can flow.

AI, ML and DL have evolved from science fiction to science fact.

“AI is around us everywhere,” said Intel’s Diane Bryant, executive vice president and general manager of the Data Center Group. “It is transforming the way people engage with the world.”

[*Deb Miller Landau*](http://iq.intel.com/author/debword/)*, iQ Managing Editor and Contributor*