

Machine Learning and AI: The Next Frontier of Federal Technology

By FedScoop Staff



The next generation of space explorers won't be limited just to astronauts. No, NASA and its Jet Propulsion Lab (JPL) believe that with the power of the cloud, Machine Learning and artificial intelligence, the ability to voyage through space will be open to all people—whether they're standing on the surface of Mars or in the comfort of their homes.

"The idea with this is we're all going to be the future explorers," said JPL's IT Chief Technology and Innovation Officer, Tom Soderstrom, at a recent conference. "Your children are the ones who are one day going to walk on Mars, whether it is virtually through augmented reality or physically as astronauts."

Powered by Amazon Web Services's automatic speech recognition (ASR) and natural language understanding (NRU) service Lex—the same deep-learning technologies that drive the Amazon's Alexa—JPL developed NASA Mars, an app that allows humans to ask questions about Mars and engage them with the agencies' missions. JPL engineers installed the software on an actual mini rover, Rov-E, allowing people to verbally interact with the small vehicle in real time and probe it with questions in the moment—even to control its movements, including a follow-me mode. "You can use your joystick to drive it. But that's so yesterday. You're going to be able to drive it with Amazon Alexa...And you can ask it questions about Mars," Soderstrom said. "This is all about exploring and getting crowdsourcing and getting people to care and understand about Mars, and ask new questions."

Amazon Lex is just one of Amazon Web Services's offerings in the emerging arenas of AI and Machine Learning. And while

many federal agencies are tentative of a move toward this evolving intelligence paradigm, early adopters have realized that their growing mountain of data that's often sitting around unused can be put to good use.

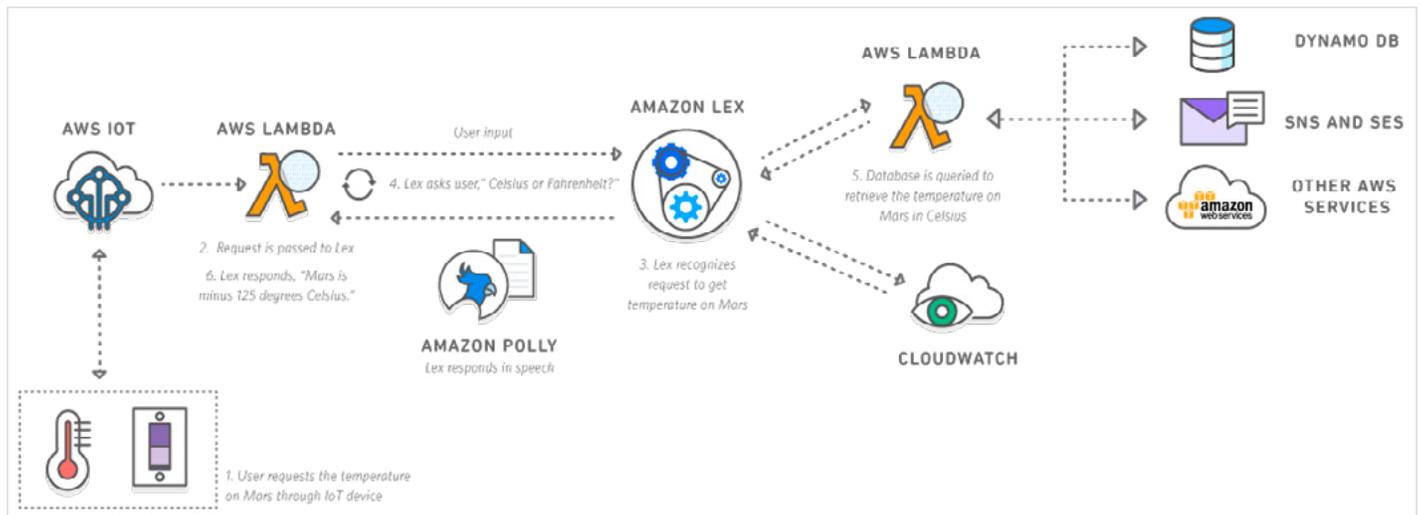
Agencies, for instance, are leveraging Amazon Rekognition, an image-detection service. The service leverages deep neural network models to detect and label thousands of objects and scenes in images, new labels and facial recognition features continually added to the service.

Machine Learning vs Artificial Intelligence

Artificial Intelligence: the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using the rules to reach approximate or definite conclusions), and self-correction. Particular applications of AI include expert systems, speech recognition and machine vision.

Machine Learning: a type of artificial intelligence that provides computers with the ability to learn without being explicitly programmed. Machine Learning focuses on the development of computer programs that can change when exposed to new data.

**Definitions provided by Whats.com*



On the surface, Amazon Rekognition is powerful in that the facial recognition can match a selected image from a set of collections of faces owned by the customer. Beyond that, however, the fully managed service can also generate sentiment analysis, detecting emotions from live facial images.

There's also Amazon Polly, a service that brings text to life, used by various organizations such as the Royal National Institute of Blind People (RNIB), a UK charity offering information, support and advice to almost two million people in the UK with sight loss. Fraud.net uses Amazon Machine Learning in ways that many federal agencies could easily adopt. The crowdsourced fraud prevention platform is identifying fraudulent activities by training models using supervised learning and using that to identify potential fraudulent activities that are coming in in real-time.

The applications of Amazon Machine Learning are endless, particularly for those organizations with troves of data at their disposal, like the the Financial Industry Regulatory Authority. FINRA uses AWS Cloud and Amazon Machine Learning technology to collect a massive amount of information from industry—processing 75 billion records each day—and bring “all this data together and look at it over days weeks and months...and we run complex, sophisticated surveillance queries against that data to look for suspicious activity,” the agency’s CIO Steve Randich said.

If big data is the root of such Machine Learning and AI applications, consider the Internet of Things the continually expanding bridge to connect the two as mainstays in enterprise information technology. Many teams that aren't ready to jump headfirst to adopt Machine Learning are testing the waters in similar applications driven by IoT technologies.

Running on AWS GovCloud (US), the State Department operates C3 IoT's platform to deploy predictive analytics and energy management technology at more than 22,000 of its facilities. State Department can pull data from those buildings and HVAC systems into AWS, combining it with other traditional datasets to predict failures and the need for repair based on maintenance schedules and performance, all the while identifying how they can optimize and lower energy consumption.

“With sensors being deployed across 22,000 buildings worldwide, the State Department is ready to employ big data analytics to reveal insights that will drive operational efficiencies across the agency and deliver substantial taxpayer savings,” said Ed Abbo, president and CTO of C3 IoT. “By transforming its operations and standardizing energy management best practices, the State Department is becoming a strong environmental steward and global leader in the emerging Internet of Things.”

While these use cases serve as a body of evidence for more federal agencies to begin their exploration into the depths of Machine Learning and artificial intelligence, many are hesitant.

“There are limited number of agencies and departments that are exploring and doing things in this space at this point,” but nowhere close to what the private sector is doing, said Sri Elaprolu, global lead for public sector IoT practice at AWS. “But the pockets that are doing it, they’re seeing the results. More and more agencies and departments are getting comfortable with the notion of running solutions in the cloud, which is almost a prerequisite for them to think about large scale IoT and/or Machine Learning projects.”

But for those ready to see results, AWS—with its robust catalog of cloud services and wealth of industry partners—has positioned itself the leading solution to help begin that journey.

