Changing the World,
One Artificial Intelligence (AI) Application at a Time

There is no one-size-fits-all profile of the ideal artificial intelligence (AI) and machine learning (ML) customer, user, or developer. AWS is making AI and ML technologies more accessible with managed services that let anyone embed intelligence into their applications. It is why some of the most exciting uses for AI and ML are coming from unexpected places – public sector organizations with a mission to make the world a better place.

Learn from some of the many public sector customers re-defining what it means to use AI to solve big challenges.

Intervening before College Students Drop-Out

Ivy Tech Community College (ITCC) is the largest community college in the United States. About 170,000 students register for classes each year, and the school keeps enrollment open for two years—whether or not a student is actively taking classes—leading to an ongoing student database with about 1.7 million records. Ivy Tech uses an Amazon Redshift data warehouse to analyze its student data proactively, and help students who are at risk of dropping out, before it's too late. ITCC can now predict with over 80% accuracy which students are likely to fail a course within the first two weeks of class.

"We have an analysis kit we run every day, looking at data, comparing patterns over previous years' information, and in a matter of seconds, we can tell if a student is likely to succeed or fail. The results have been phenomenal," said Lige Hensley, CTO, ITCC.

Predicting Famines and Crisis to Intervene Early

Today, 124 million people live worldwide live with crisis levels of food insecurity, relying on urgent humanitarian assistance to survive. Over half of these populations live in conflict zones. That's why the World Bank, United Nations, and International Committee of the Red Cross have teamed up with cloud service providers including AWS, to identify areas at risk for famines and save lives before a crisis evolves.

As of January 2019, the **FAM coalition** built a proof-of-concept to anticipate crisis zones, and take action earlier. AWS provides FAM with conflict-related data, and a machine-learning pipeline from data ingestion and storage in Amazon S3, to AI model deployment using Amazon SageMaker. The data includes different causes of famine, and includes satellite imagery, conflict data, weather forecasts, local food prices, and agricultural production, and trains machine learning models so they can identify patterns in regions and countries earlier, and intervene and save lives before it is too late.

"90 percent of famine in the past few decades has happened in countries affected by conflict directly or indirectly, so AWS is focusing on providing this data. AWS is also helping us with forecasting; this means instead of having reports every six months at a country level about the amount of food and security and what percentage is at crisis level, we are aiming for better forecasting on a six to twelve month period of what percentage of the population will be at risk. This will enable us and our partners to provide financing much earlier than is the case today," Franck Bousquet, senior director of fragility, conflict, violence and forced displacement at the World Bank Group says.

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Speech Recognition Transforms Student Learning in Classrooms

Tech entrepreneur Fred Singer is the CEO and founder of **Echo360**, a company he launched after a visit to his son's classroom and realizing that technology could engage students and become a more integral part of their lives.

> *"My son has learning issues, and when I walked into his classroom, I began to see it through his eyes. The question that struck me was, 'how could it be that kids—born to a generation in which smart phones and laptops are a part of their everyday existence—have to sit in a classroom where someone just talks to them?' They get bored and they get on their phones and the schools get mad and ban the phones. Most kids today don't even learn cursive, so note taking itself has already changed," says Fred.*

The Echo360 interactive platform captures whatever is going on in the classroom via video, and turns it into searchable and referenceable content. This allows students to review curriculum as often as they need to; many students spend an average of 18-20 minutes going through the videos and scrolling to the exact moment they need to review. And teachers benefit too. For example, if you're teaching weather and trying to figure out if the class understands the concept of an 'eye of the storm,' the system will tell you that five percent of your forty children, gets it or not.

Accurately Diagnose Autism with AI

The nonprofit **Brainpower** gauges fidgeting as a behavioral biomarker in kids with autism. The group invented what they affectionately call "Fidgetology," to quantitatively summarize fidgeting and other body motions, by analyzing clinical trial videos of children with autism and/or ADHD. This analysis has resulted in a new clinical outcome that doctors can use to measure improvements in symptoms, after the use of augmented-reality systems.

Brainpower automatically detects people in the full-speed videos, and track their motions in real time by feeding its Amazon Kinesis Video Stream to Amazon Rekognition video (a deep-learning toolset to track objects and people in images). When new records appear in their raw data stream, Brainpower's Motion Analytics algorithm (using an AWS Lambda function) is triggered, computing derived metrics on faces such as rotational/translational motion velocities, which can be used as features to gauge attention and engagement.

With Brainpower's technology gauging patient outcomes in new and novel ways, more can be done improve therapies that make life better for kids with autism.

Making Vital Information Available to Blind People

The **Royal National Institute of Blind People** changes the way services are delivered to the blind by using AWS speech-to-text technology.

> *"We are currently using Amazon's speech-to-text technology to create and distribute accessible information in the form of synthesized audio content for our many B2B and B2C customers, including utility companies, financial institutions, and media companies, as well as other customer-facing material such as magazines and publications. [With Amazon Polly], we're excited about the ability to provide an even better experience to these customers by delivering incredibly lifelike voices that will captivate and engage our audience," said John Worsfold, Solutions Implementation Manager, Royal National Institute of Blind People.*

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Making Test Taking Easier for the Blind

The nonprofit **Education Testing Services** (ETS) uses Amazon Polly to make test taking more fair for Graduate Record Examination (GRE) test takers who are blind.

> *"These tests are timed, so if you're a sighted test candidate, you see a countdown timer on your screen and you get prompts that pop up at ten, five, and three minutes. You can with a glance, always know how much time you have left. But you can't do that if you're blind, which is unfair to the blind candidates," notes Harkku "Mark" Häkkine, who leads the Accessibility Standards and Inclusive Technology Research Group at ETS.*

ETS solved their challenge by creating a kind of auditory glance: a short chime that lets blind test takers know that a message is coming, followed by messages letting them know you how many minutes were left in the test. This simple solution levels the test taking experience for all participants.

ICMEC Finds Missing and Exploited Children Faster

By moving to the AWS Cloud, the **International Centre for Missing & Exploited Children** (ICMEC) pushed its IT teams to advance its mission of eradicating child abduction, sexual abuse, and exploitation. ICMEC created the GMCNgine, a centralized platform that uses artificial intelligence, machine learning, and Amazon Rekognition to scour the internet for photos of children to compare against images from ongoing cases of missing children from across the globe, on the dark and clear webs. The results provide law enforcement and NGOs with leads on the possible whereabouts of missing children.

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