

Professional Learning

Session Notes



Machine Learning

Future Sessions:
bitlink.com.au/newsletter/



Background & Context

These notes and lesson ideas have been prepared as an accompaniment to a Professional Learning session that took place in Launceston, Tasmania on March 17th, 2023. At that session, Chris Allen from Cressy High School shared a range of tips and lesson ideas, including sharing his experience working with machine learning in a primary classroom. That section of the presentation was the inspiration for this guide.

More Information

If you would like to access more design and digital technologies supporting materials, or keep an eye out for future events, check out the Bitlink website and sign up for our mailing list.

 bitlink.com.au/newsletter/


What is machine learning?


Machine learning is a subset of artificial intelligence, in which computers are programmed to imitate intelligent human behaviour.

Often, when we think of artificial intelligence, we think of people (computer programmers) who have written highly sophisticated programs to tell a computer exactly how to behave in certain situations. Machine learning, is an approach to artificial intelligence where the computer learns over time through exposure to stimulus, in a way that aims to approximate how people learn. In this way, the computer learns, not through following explicit instructions, but by drawing inferences through patterns in data.

For example, in 2017, Google demonstrated that their artificial intelligence system "DeepMind" was able to evolve a walking behaviour using machine learning. The researchers created a digital character, put it in a virtual world with physics, and gave the system tools to apply force to the character's limbs. They gave the system a goal, then let it experiment with different methods of applying force to achieve that goal. After many iterations, the system would evolve its own kind of walking behaviour.

 [Machine Learning, Explained \(MIT\)](#)

 [Google's DeepMind AI Just Taught Itself To Walk \(Insider Tech\)](#)

 [Producing Flexible Behaviours in Simulated Environments \(Google\)](#)

How is machine learning used?

Machine learning has become one of the most commonly used approaches to artificial intelligence. It is an approach that works best when there is lots of data that can be used to help train artificial intelligence models. When Netflix recommends shows for you to watch, or Spotify recommends music for you to listen to, there is a machine learning system behind the scenes. Banks and credit card companies use machine learning within their anti-fraud systems.

One of the higher-profile examples of machine learning in recent years is the push towards self-driving cars. Smart cars are collecting video from multiple cameras, and telemetry data from systems within the car itself. All of this data is collected from each car and used to help improve the AI driving models for all other cars.

Machine learning is also frequently used for pattern recognition systems. Pattern recognition is something that humans are typically very good at, and computers, historically, have always done badly. Now, using machine learning, computers can learn to recognise objects in photographs, patterns in speech, and, analyse CT scans. Behind every "Hey Siri", there is a machine learning model, being used and being trained.

 Examples of AI and Machine Learning in Practice (Forbes)

Primary School Ideas: Teachable Machine

One of the best ways to explore machine learning in a primary school classroom is through Google's "Teachable Machine". This website enables you to upload sample data for different classes, then train your machine learning model to recognise those different classes. After the initial training, the AI will be able to recognise examples of your classes that it has never seen before.

Teachable Machine can accept three kinds of data: images, sounds and poses. The process for training a model is quite simple. You need to upload or generate data for your different classes (such as photos of trees contrasted with photos of flowers, finger snaps contrasted with hand claps or standing poses contrasted with crouching ones). Once you have a few examples for each class you want to learn to recognise, you train your model, and then it will attempt to recognise new examples based on what it has learned so far.

At a primary school level, there are lots of things that you can do, just with the Teachable Machine. You could teach it to help sort recycling by recognising what belongs in what bin using a webcam, you could teach it to recognise different species of plants or animals, or you could teach it to recognise different kinds of music. Because it is so easy to get started, you can also encourage your students to come up with their own ideas for how this tool might be used and experiment with those.

 [Teachable Machine \(Google\)](#)




 [Teachable Machine FAQ \(Google\)](#)

Secondary School Ideas: Scratch and Machine Learning for Kids

At a secondary school level, there is a bit more scope to actually start building your own machine learning systems using code.

One of the best ways to get started is to use the resources found on the Machine Learning for Kids website, which includes a range of machine learning projects that can be built in Scratch. Some of the projects use machine learning in the context of a game that is taking place on the screen and some use a webcam to collect data from the world and enable people to interact with their games via that interface. Some of the more advanced projects even collect data from the wider internet, such as a project that performs sentiment analysis on tweets. These projects are a great starting point but also be remixed and become a useful building block for students to explore their own inquiry.

As secondary students build their skills and become more competent they can start incorporating external hardware with their machine learning models, such as Husky Lens, micro:bits and LEGO Mindstorms (still in the experimental phase)

-  [Machine Learning for Kids \(Website\)](#)
-  [Machine Learning for Kids \(Worksheets\)](#)
-  [Husky Lens](#)

