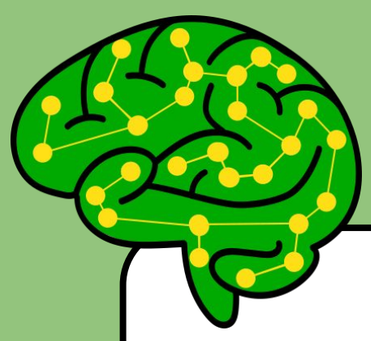
Artificial Intelligence and Machine Learning

Artificial intelligence and machine learning have many exciting applications, from computer vision to automatically playing video games. But what do we mean by the terms "artificial intelligence" and "machine learning", and what tasks are these tools capable of?

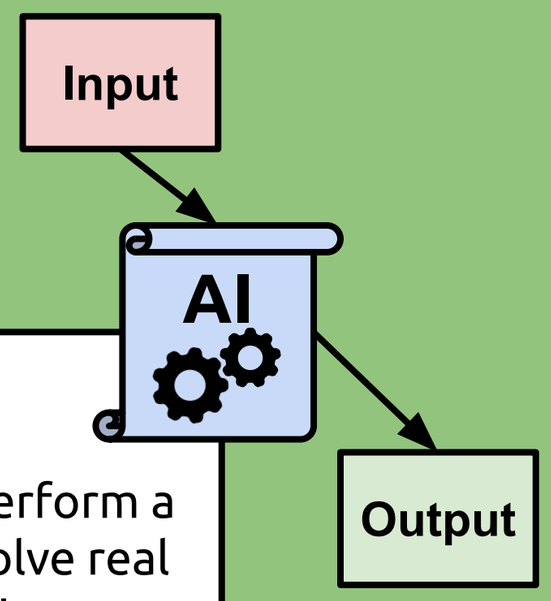
Artificial Intelligence (AI)

A general term for any software that makes "intelligent" decisions based on its inputs.



General AI

AI that adapts to any task with "human-like" intelligence. Often seen in science fiction, but not in science reality (so far).



Narrow AI

AI that is designed to perform a specific task. Used to solve real problems today!

Machine Learning (ML)

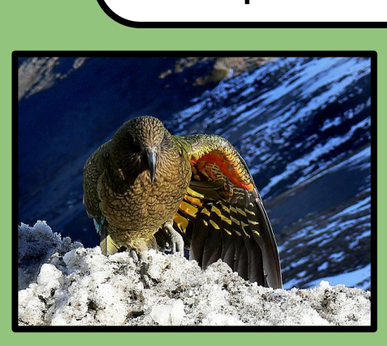
An approach for narrow AI where software "learns" from patterns in data to perform a task without manual programming.

Supervised ML

Providing example inputs and expected outputs to "train" the machine to predict outputs for new inputs.

Classification

Using Supervised ML to train a machine to predict category/label outputs.



Classification

Kea

Regression

Using Supervised ML to train a machine to predict numeric outputs.

No. rooms, Location, etc.

Regression

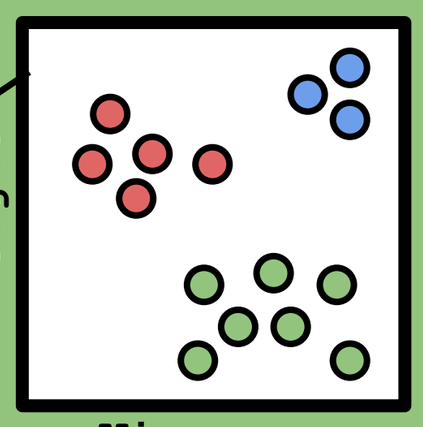
House Price($)

Unsupervised ML

"Learning" directly from patterns in data without examples of expected inputs and outputs.

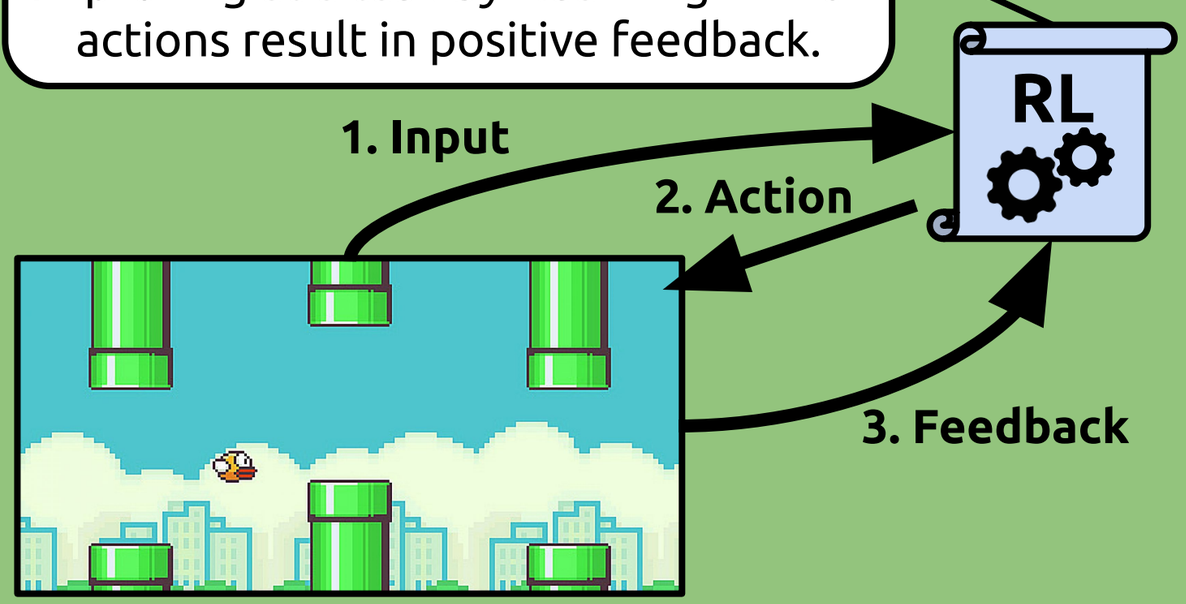
Clustering

Identifying groups of similar objects in a dataset.



Reinforcement Learning

Improving at a task by "learning" which actions result in positive feedback.

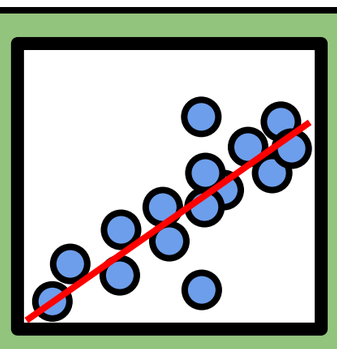


Models

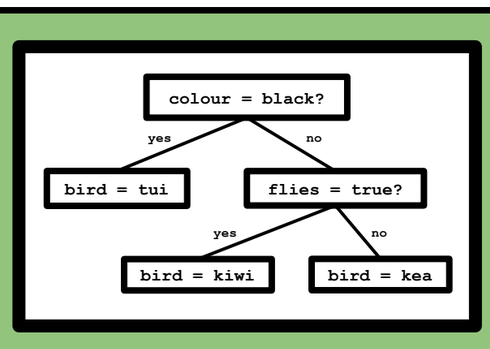
A model is a simplified, digital representation of a concept - the "knowledge" learned through machine learning. A decision-making model is sometimes called an algorithm, but the machine learning technique that produces the model is also an algorithm.

```
If colour = black:
   bird = tui
If flies = false:
   bird = kiwi
```

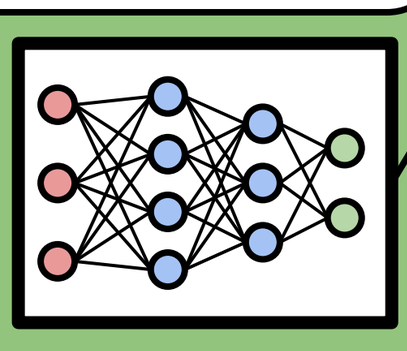
Rules



Linear Models



Decision Trees



Neural Networks

Deep Learning

Recent advances in machine learning from text and image data have come from very large, many-layered neural networks referred to as **deep neural networks**.