Real Quick Intro to Machine Learning

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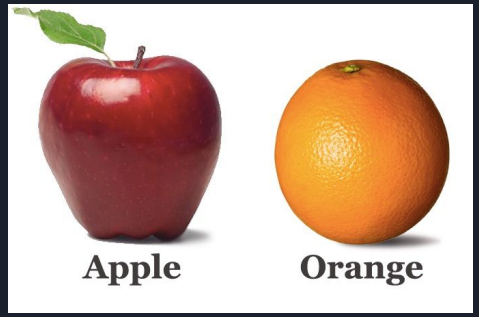
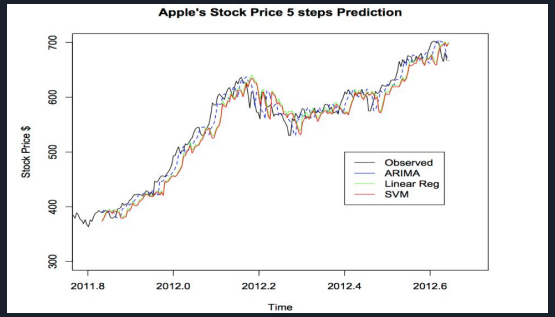
- Including
  - Some general concepts
  - No maths (sort of)
  - No code!
  - Example: a point-and-click-adventure

Machine Learning can be used for

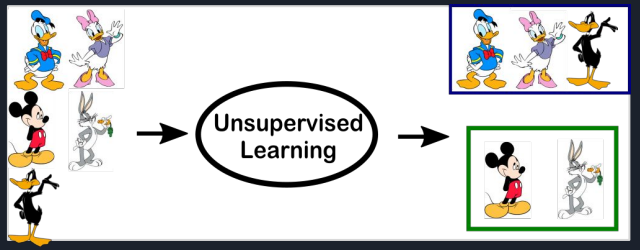
Classification



Prediction



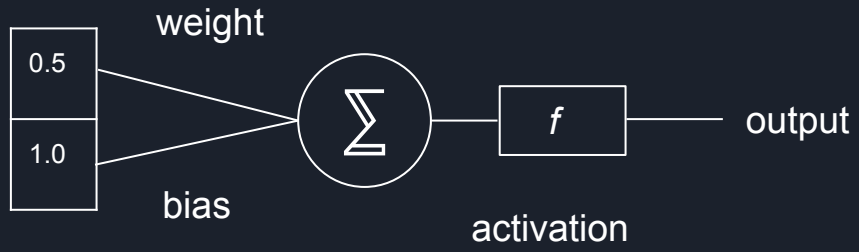
Clustering

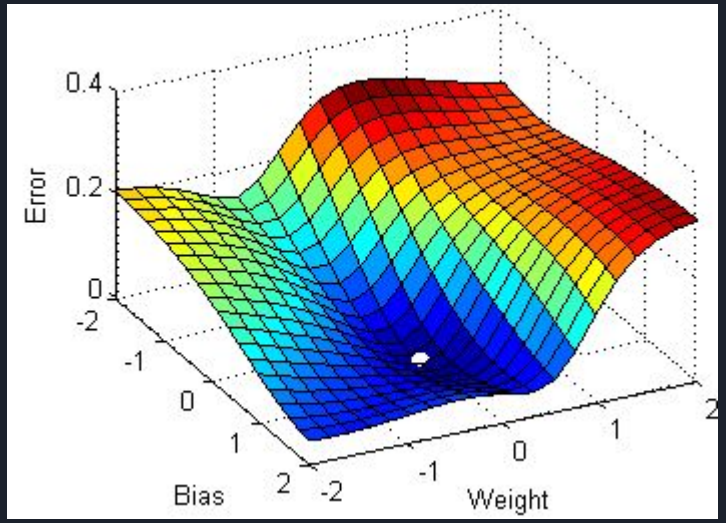


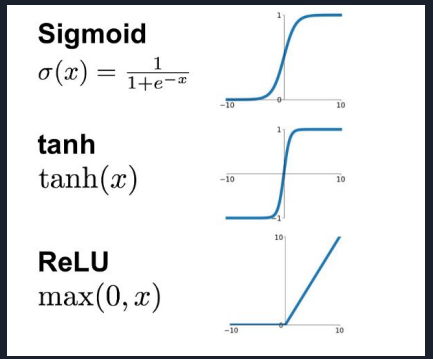
There are many techniques to solve these and other problems

Today we'll look at neural networks and image classification

Artificial Neuron





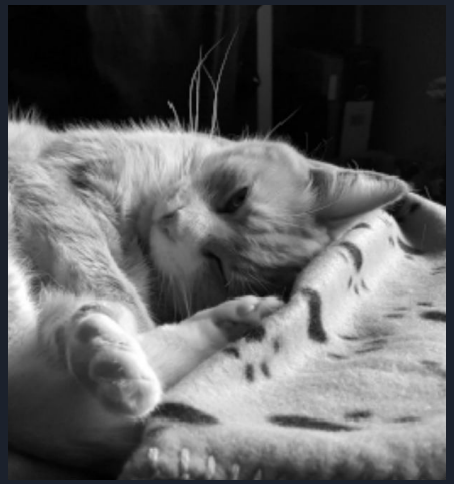


- Provide training examples
- Compute error between output and true value
- Use gradient descent to modify parameters
- *Backpropagation*

Image Filters

Filters can be manually designed e.g.

Can a neural network learn kernels appropriate to the task?

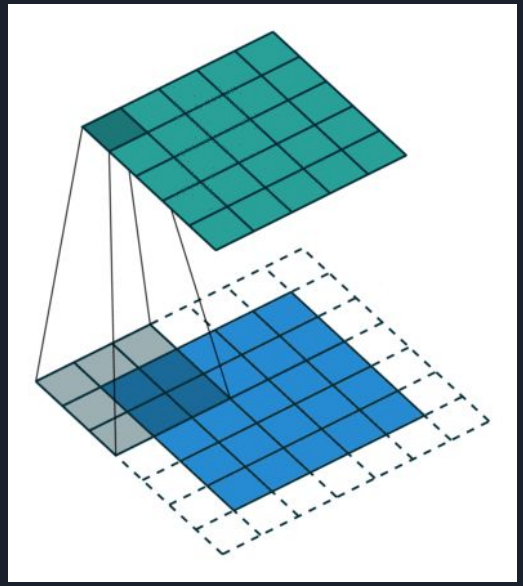


input

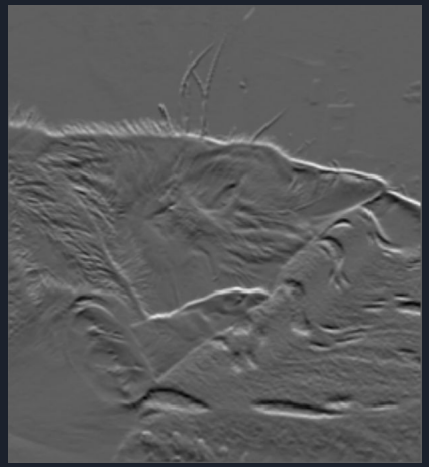
1	2	1
0	0	0
-1	-2	-1

Sobel kernel

feature = vertical gradient

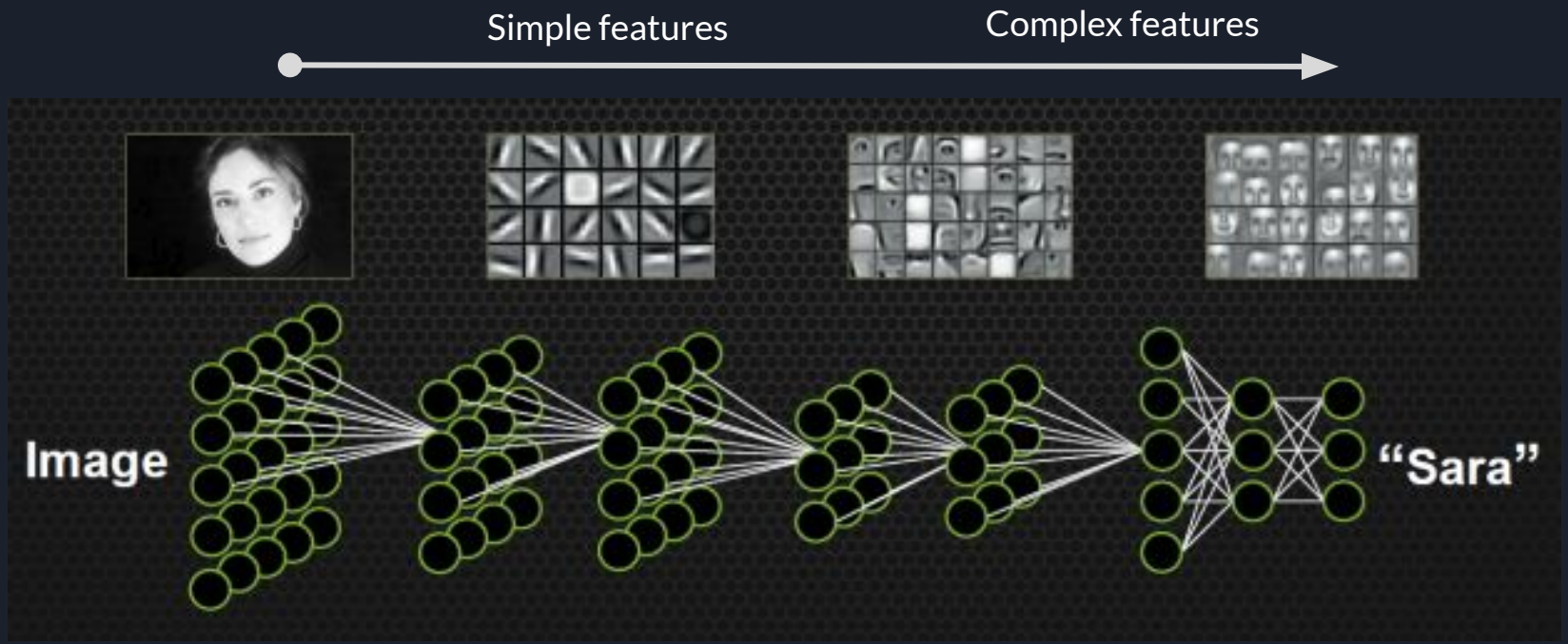


convolution

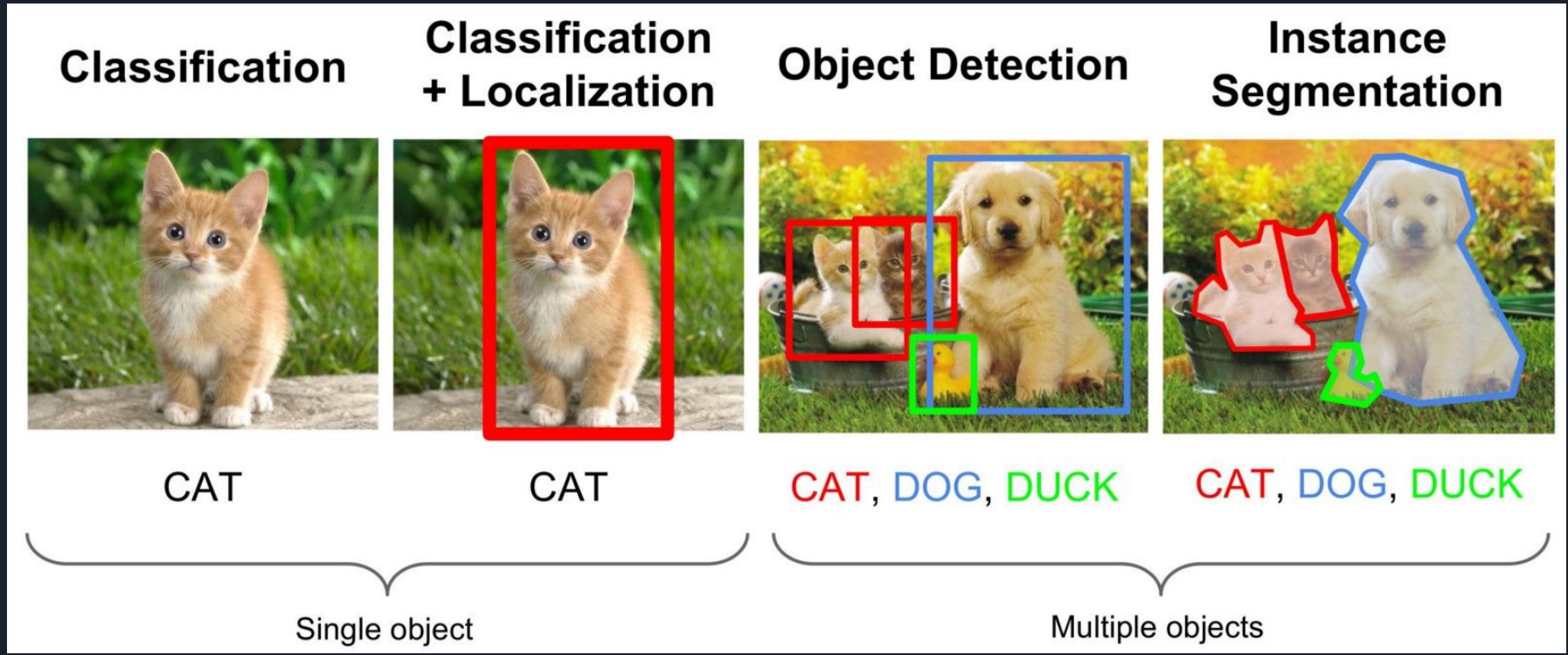


output

Deep Convolutional Neural Network



More than just classification



Tools


Keras
A deep learning library


TensorFlow ™


python ™


jupyter
Notebook


R


NVIDIA
DIGITS


scikits
learn


MATLAB


PyTorch

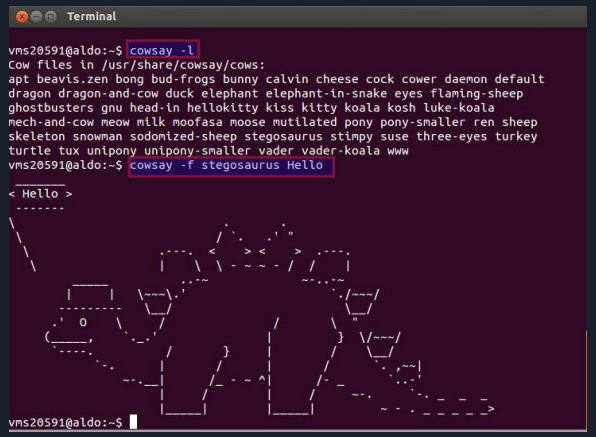
Quality of Life

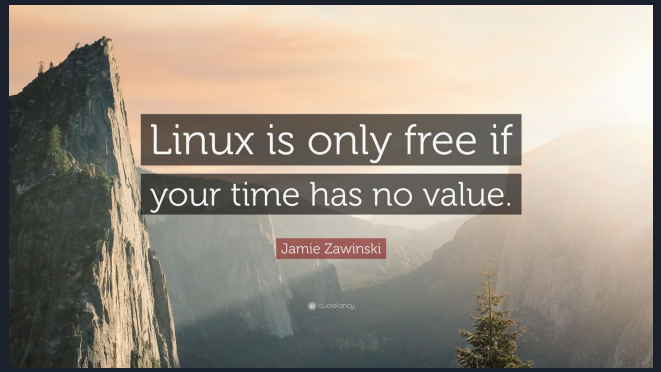
ubuntu

NVIDIA

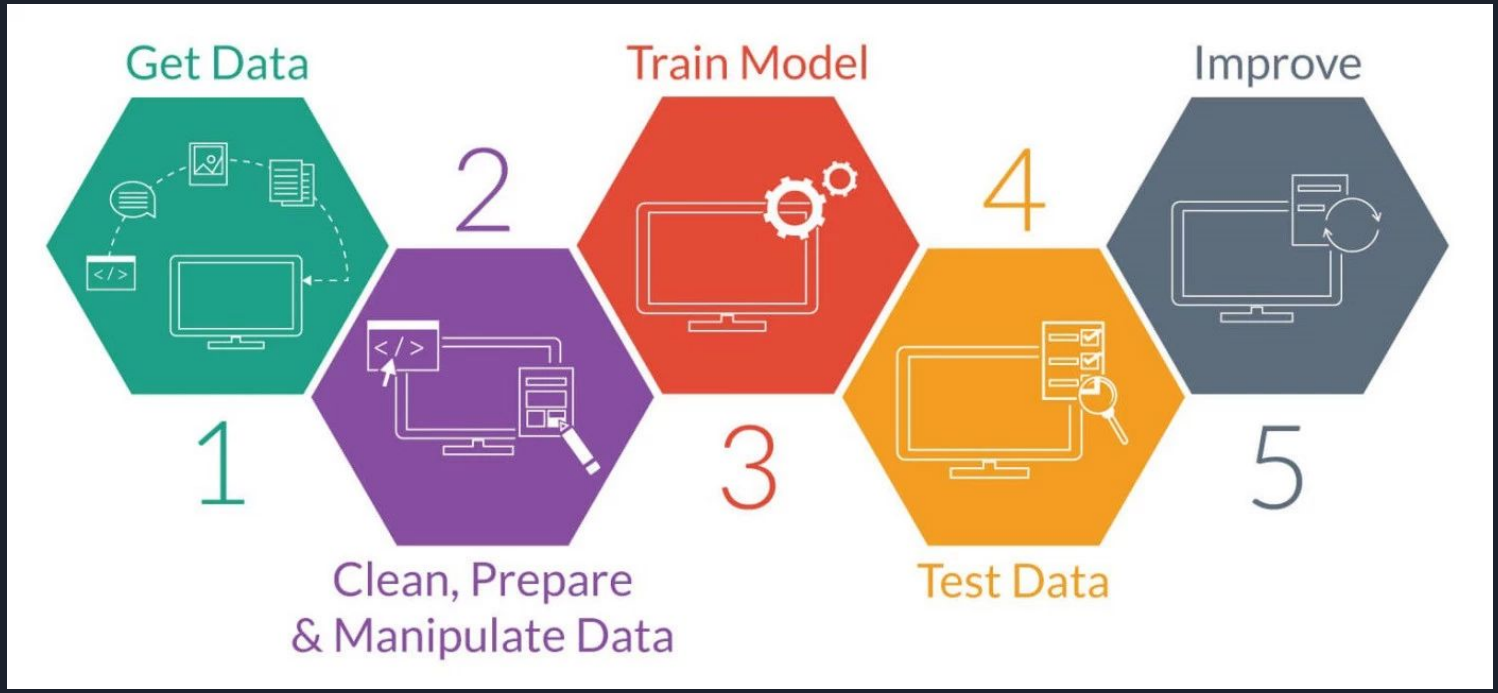
nectar cloud

docker



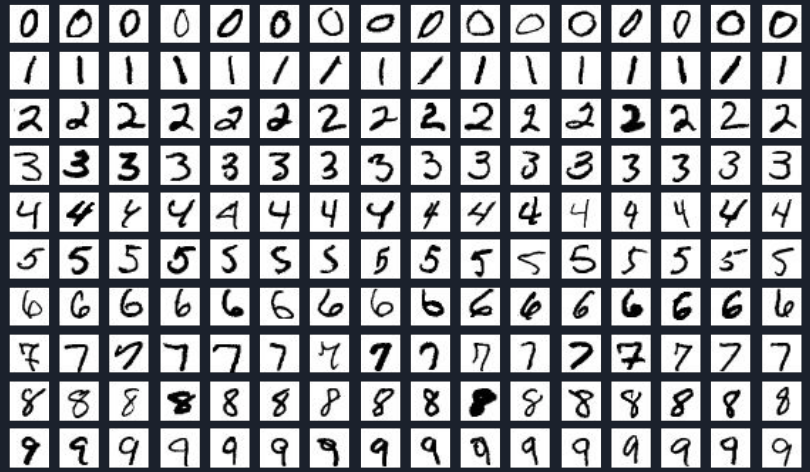


So what does a ML workflow look like?



NVIDIA DIGITS

Simple user interface for image processing tasks using neural networks



MNIST - handwritten digit classification dataset

10 classes: 0 - 9

Data: 28x28 grayscale images