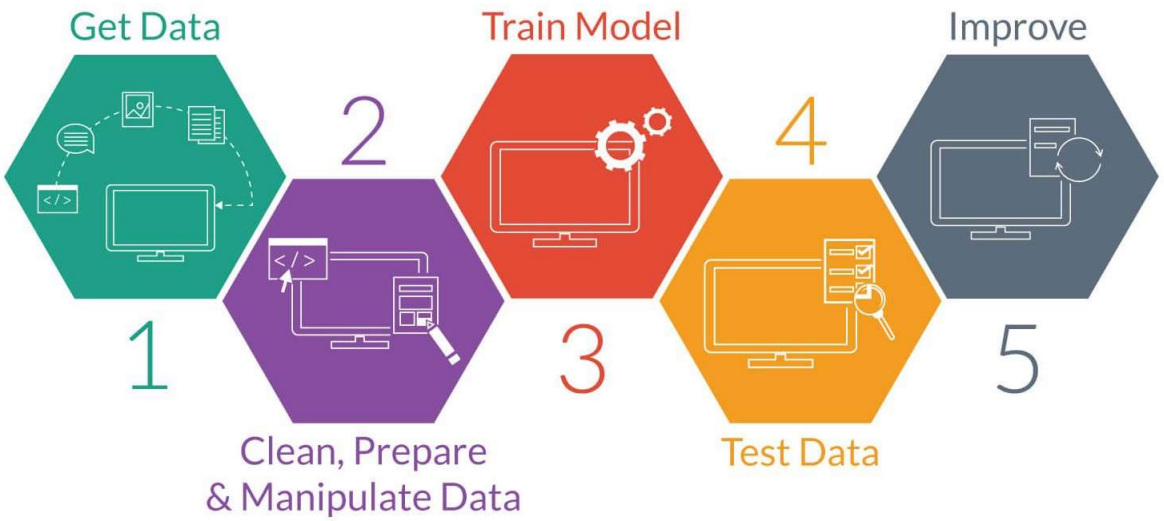
PDGAN Additional Information

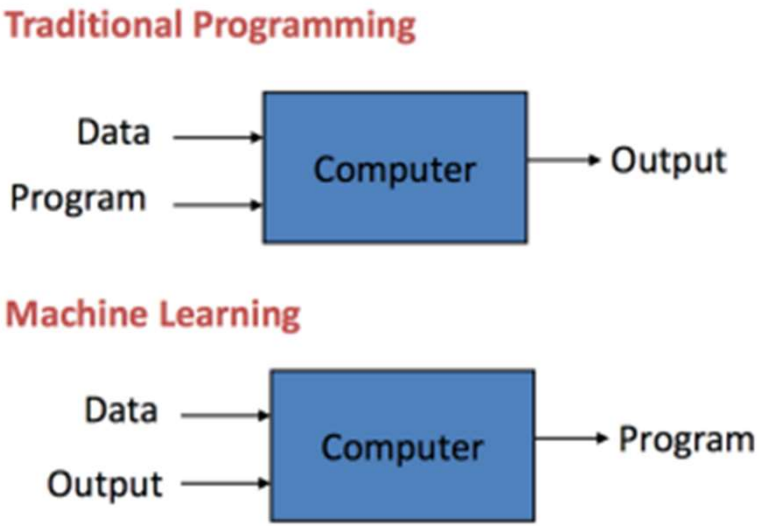
Machine Learning Background

What is Machine Learning?

Machine Learning entails:

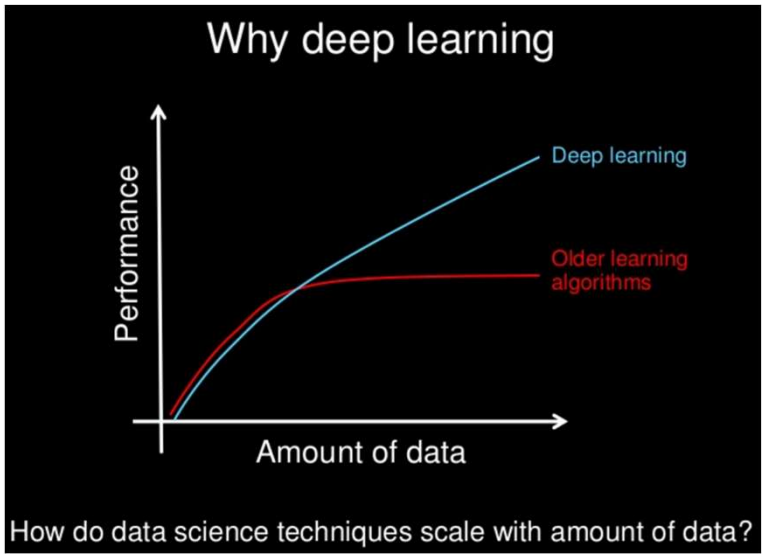
- Forming Patterns from Data
- Making Predictions based off Patterns

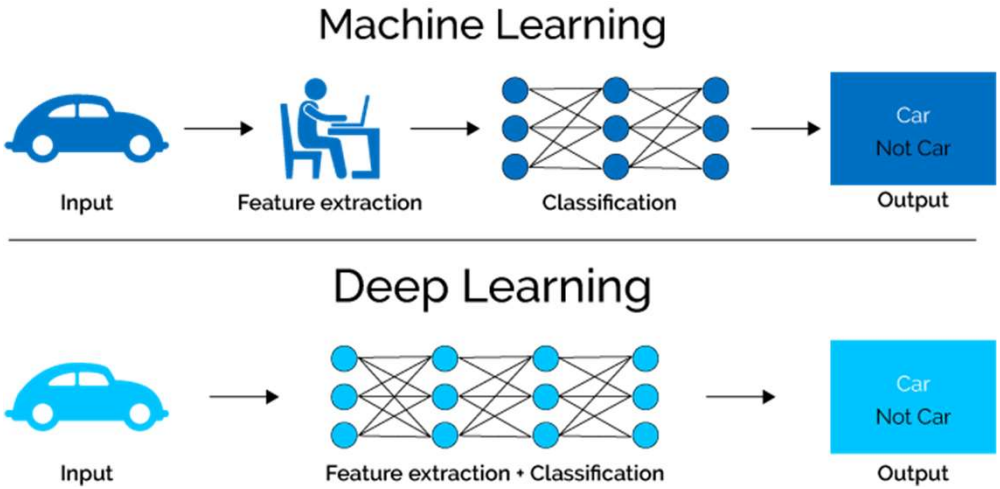




What is Deep Learning?

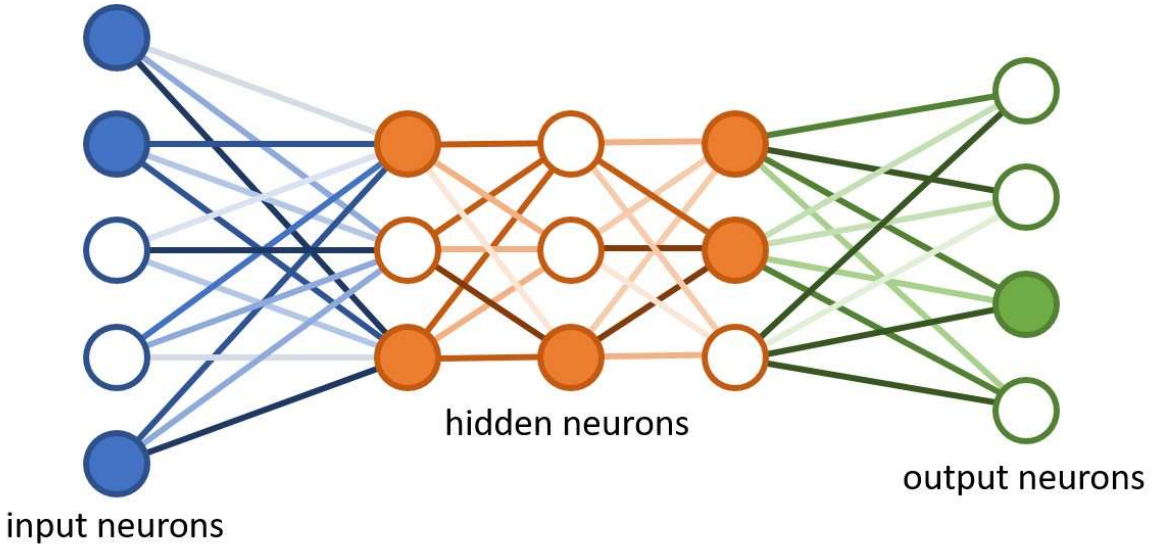
Deep Learning is a branch of Machine Learning that enables computers to process more complex patterns and finer differences in inputs. Deep Learning is essential for the intersection of ML and Medicine.





Neural Networks

Neural Networks are the most common Deep Learning model. They are modelled after how the brain makes decisions (through Neurons).



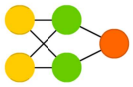
A mostly complete chart of

Neural Networks

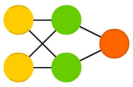
- Backfed Input Cell
- Input Cell
- Noisy Input Cell
- Hidden Cell
- Probablistic Hidden Cell
- Spiking Hidden Cell
- Output Cell
- Match Input Output Cell
- Recurrent Cell
- Memory Cell
- Different Memory Cell
- Kernel
- Convolution or Pool

Perceptron (P)

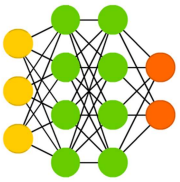
Feed Forward (FF)



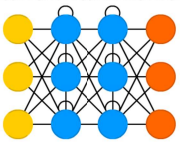
Radial Basis Network (RBF)



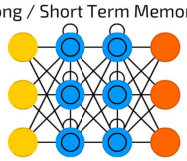
Deep Feed Forward (DFF)



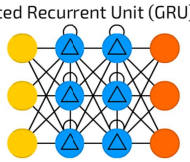
Recurrent Neural Network (RNN)



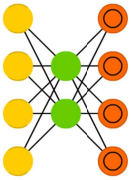
Long / Short Term Memory (LSTM)



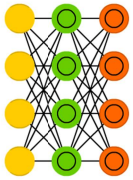
Gated Recurrent Unit (GRU)



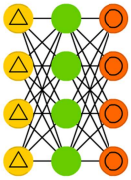
Auto Encoder (AE)



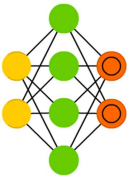
Variational AE (VAE)



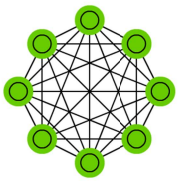
Denoising AE (DAE)



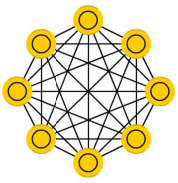
Sparse AE (SAE)



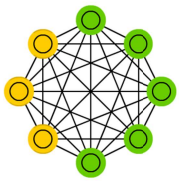
Markov Chain (MC)



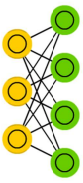
Hopfield Network (HN)



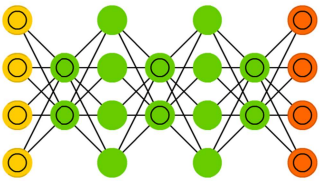
Boltzmann Machine (BM)



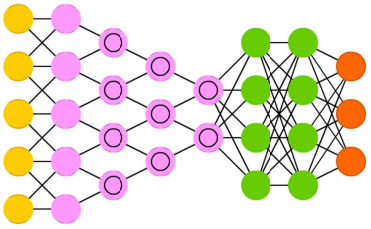
Restricted BM (RBM)



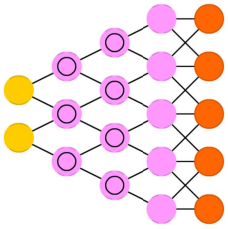
Deep Belief Network (DBN)



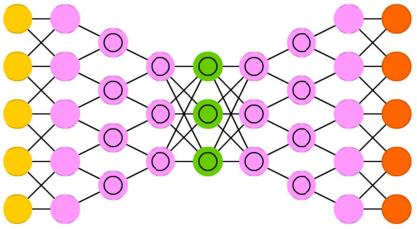
Deep Convolutional Network (DCN)



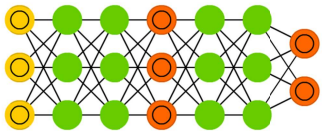
Deconvolutional Network (DN)



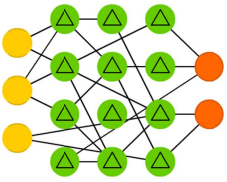
Deep Convolutional Inverse Graphics Network (DCIGN)



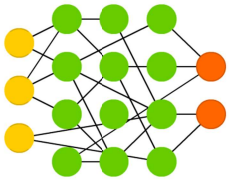
Generative Adversarial Network (GAN)



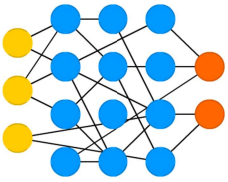
Liquid State Machine (LSM)



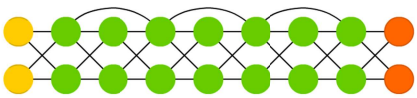
Extreme Learning Machine (ELM)



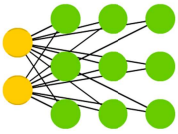
Echo State Network (ESN)



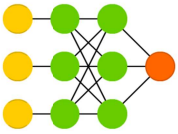
Deep Residual Network (DRN)



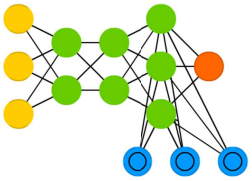
Kohonen Network (KN)



Support Vector Machine (SVM)

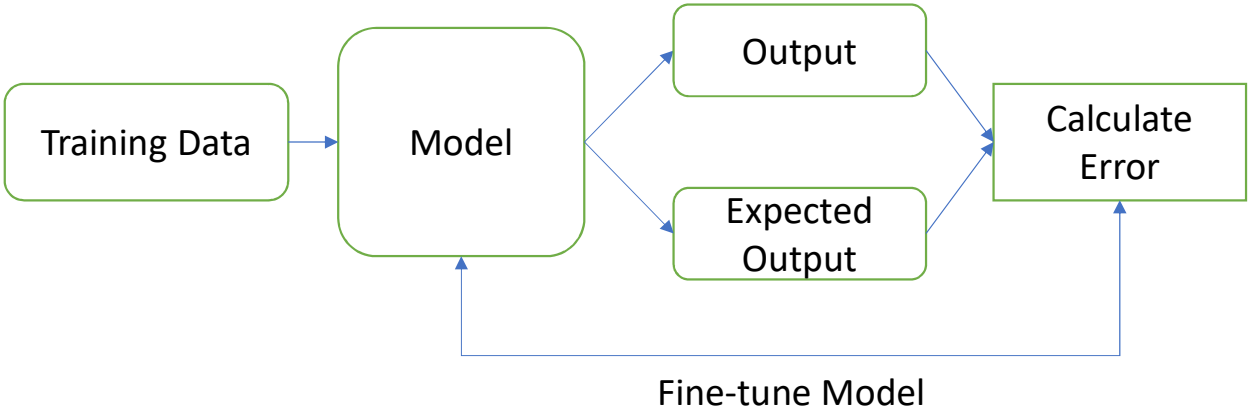


Neural Turing Machine (NTM)

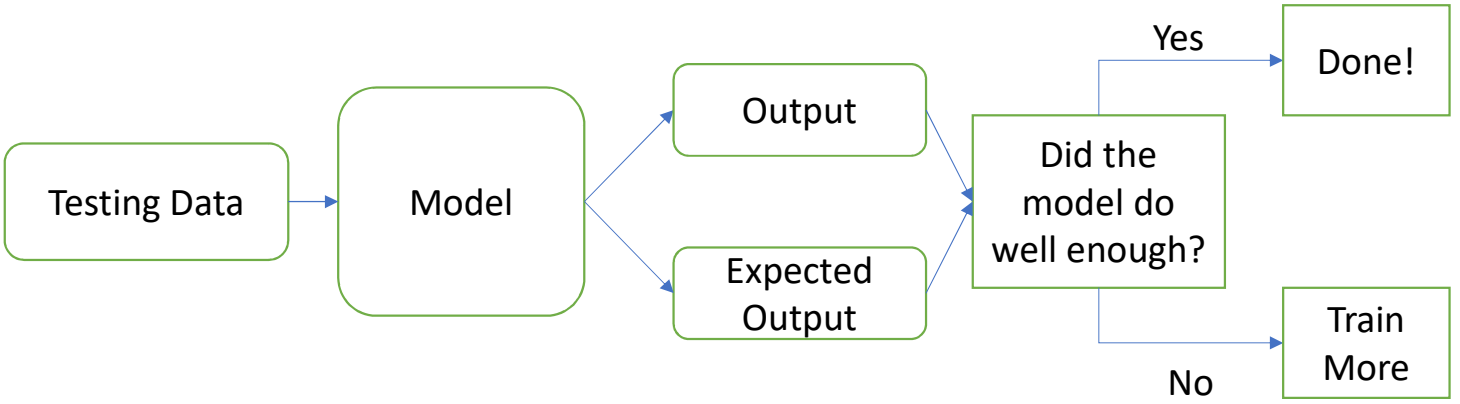


Machine Learning Process

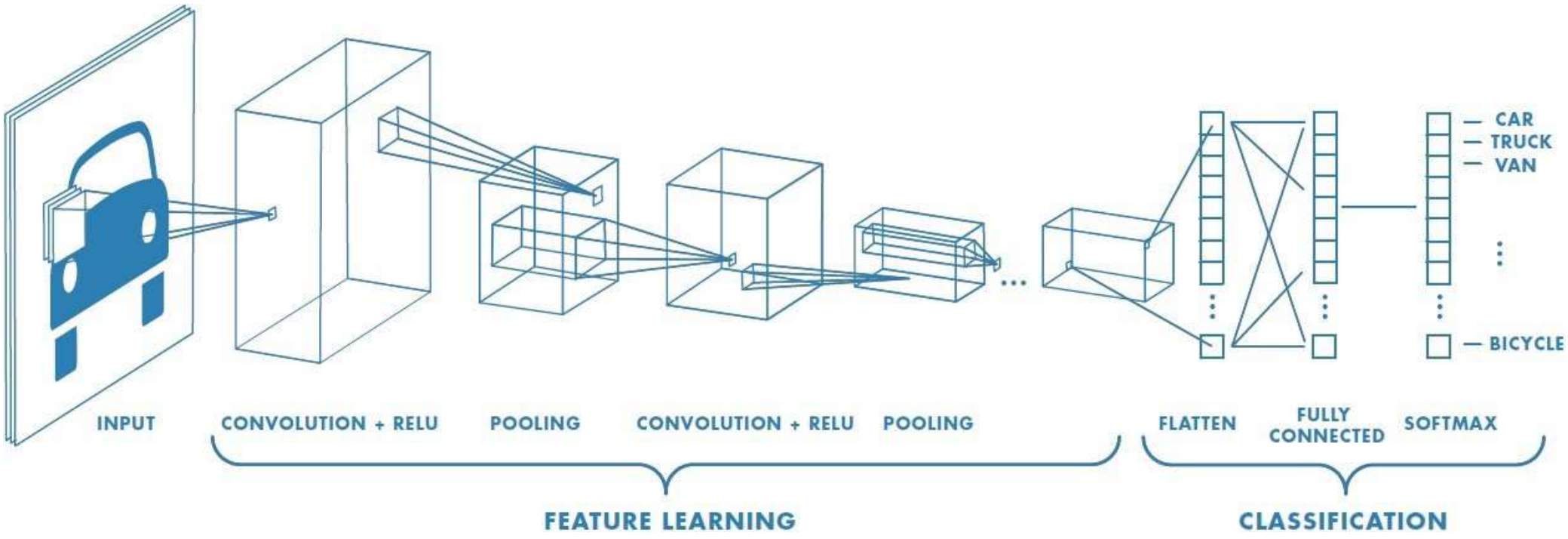
Training



Testing



Convolutional Neural Networks



Generative Adversarial Networks

1. The Generator makes fake images.
2. The Discriminator determines if any random image is real or fake.
3. The Generator wants the Discriminator to do badly, so it tries to make realistic “fake” images.
4. Image Generation!