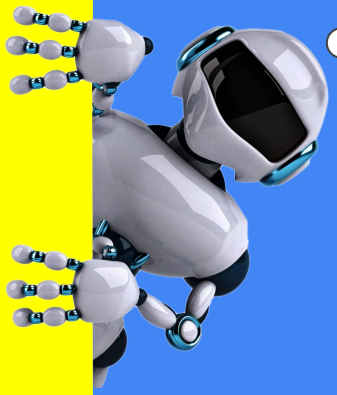
Introduction to Artificial Intelligence

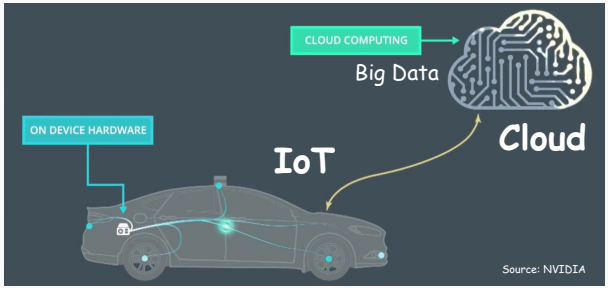


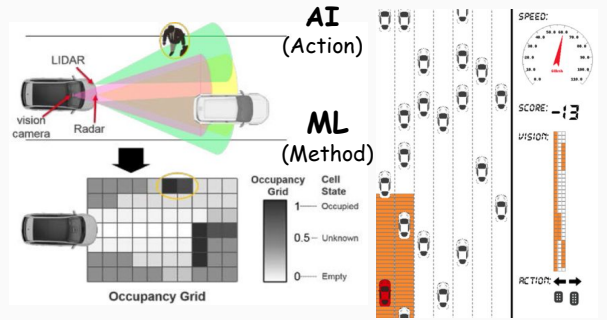
Artificial Intelligence
Machine Learning
Neural Networks
Deep Learning
Python Programming

Data Science
Data Engineering
Data Mining
Data Analytics
Data Visualization

Cloud Computing
Big Data
Internet of Thing
Hardware & Sensors
Mobile Devices

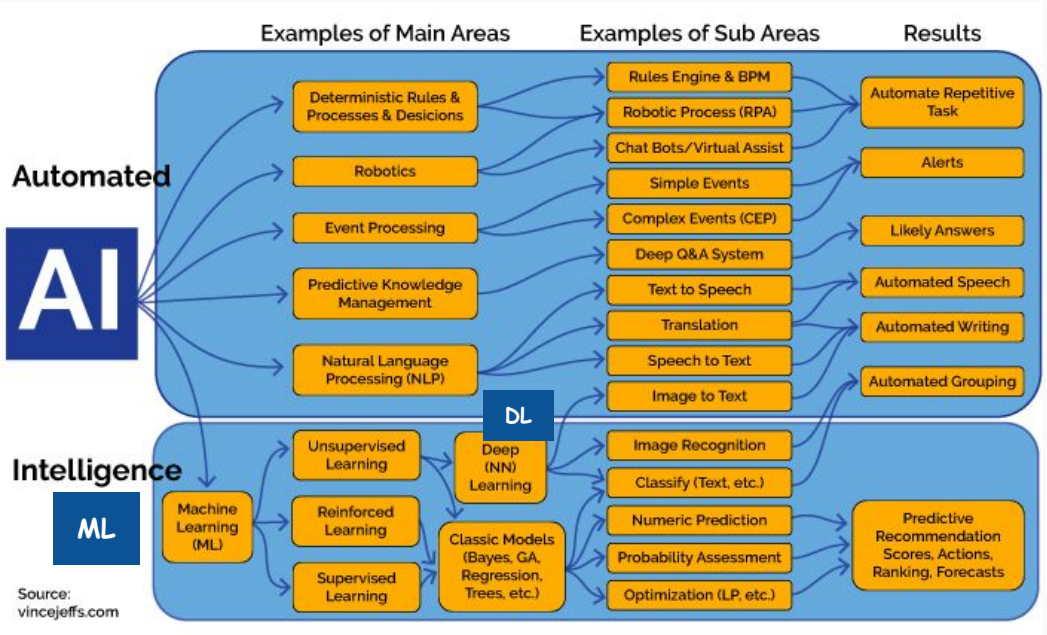
Introduction to Artificial Intelligence: Self-Driving Car



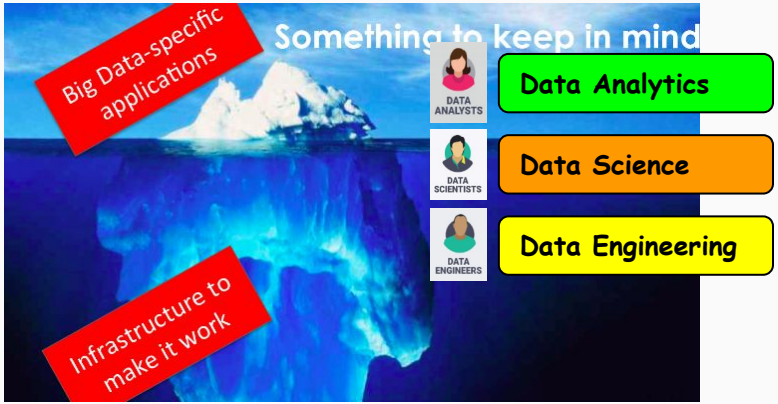


AI & Data Science & Cloud Computing

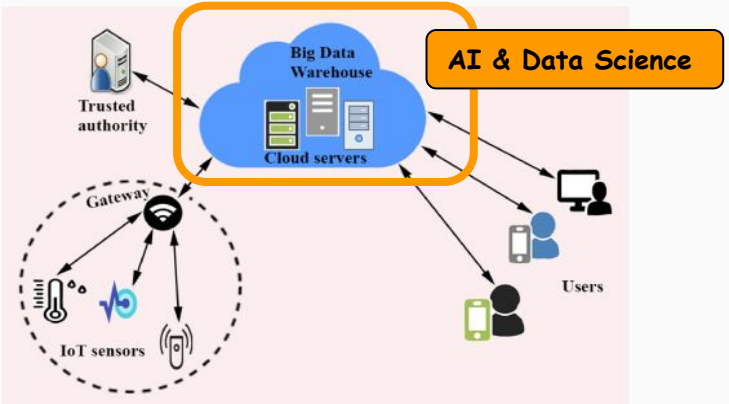
Artificial Intelligence (Automated & Intelligence)



Data Science (Data & Insight)

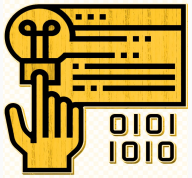


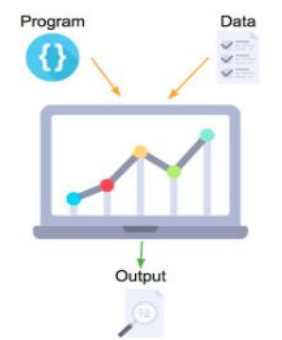
Cloud Computing (Big Data & IoT & Mobile Devices)



Traditional Programming VS Machine Learning

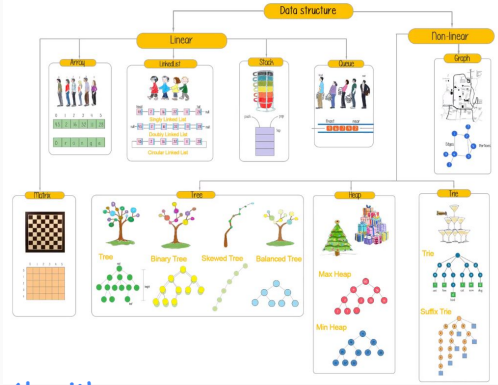
Traditional Programming





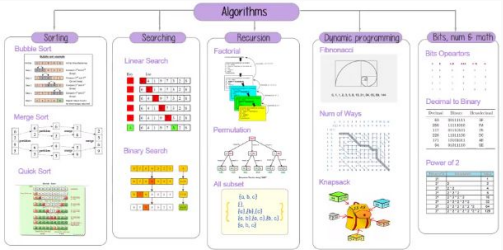
Data Structures

Linear: Array, Linked List, Stack
Non-Linear: Queue, Tree, Graph

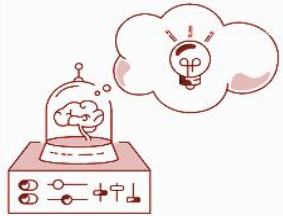


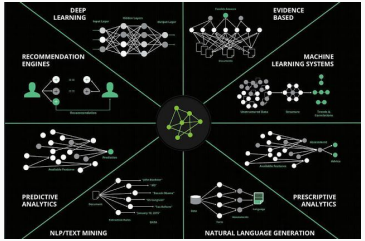
Algorithms

Sorting, Searching, Recursion, Dynamic Programming, Bits, Num & Math



Machine Learning



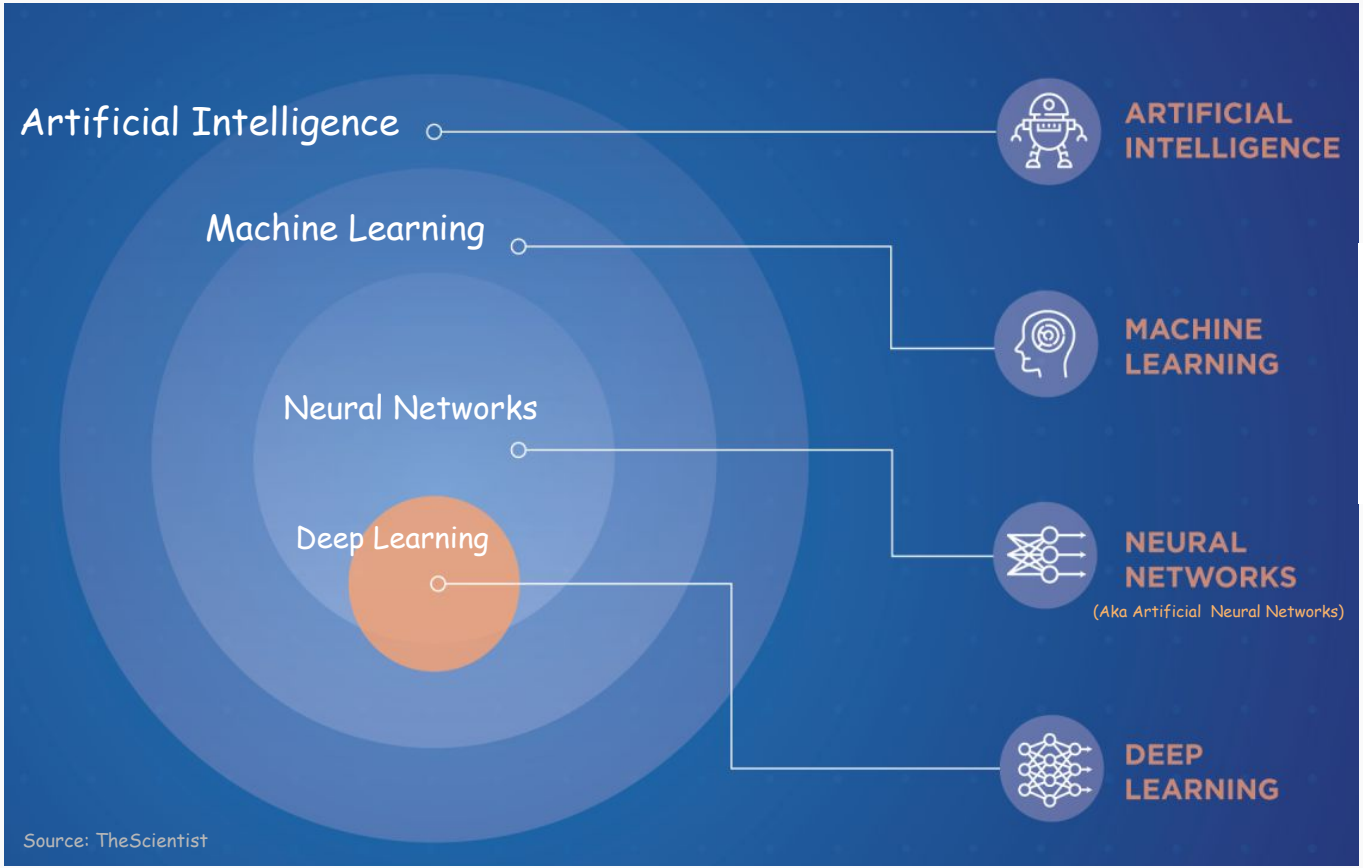


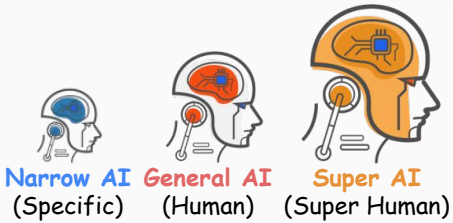
Machine Learning Algorithms

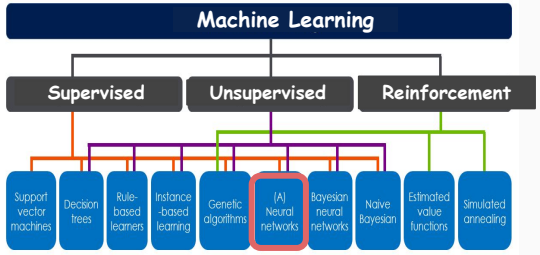
1. **Regression Algorithms**
   - Ordinary Least Squares Regression (OLSR)
   - Linear Regression
   - Logistic Regression
   - Stepwise Regression
   - Multivariate Adaptive Regression Splines (MARS)
   - Locally Estimated Scatterplot Smoothing (LOESS)
2. **Instance-based Algorithms**
   - k-Nearest Neighbour (kNN)
   - Learning Vector Quantization (LVQ)
   - Self-Organizing Map (SOM)
   - Locally Weighted Learning (LWL)
3. **Regularization Algorithms**
   - Ridge Regression
   - Least Absolute Shrinkage and Selection Operator (LASSO)
   - Elastic Net
   - Least-Angle Regression (LARS)
4. **Decision Tree Algorithms**
   - Classification and Regression Tree (CART)
   - Iterative Dichotomiser 3 (ID3)
   - C4.5 and C5.0 (different versions of a powerful approach)
   - Chi-squared Automatic Interaction Detection (CHAID)
   - Decision Stump
   - M5
   - Conditional Decision Trees
5. **Bayesian Algorithms**
   - Naive Bayes
   - Gaussian Naive Bayes
   - Multinomial Naive Bayes
   - Averaged One-Dependence Estimators (AODE)
   - Bayesian Belief Network (BBN)
   - Bayesian Network (BN)
6. **Clustering Algorithms**
   - k-Means
   - k-Medians
   - Expectation Maximisation (EM)
   - Hierarchical Clustering
7. **Association Rule Learning Algorithms**
   - Apriori algorithm
   - Eclat algorithm
8. **Artificial Neural Network Algorithms**
   - Perceptron
   - Back-Propagation
   - Hopfield Network
   - Radial Basis Function Network (RBFN)
9. **Deep Learning Algorithms**
   - Deep Boltzmann Machine (DBM)
   - Deep Belief Networks (DBN)
   - Convolutional Neural Network (CNN)
   - Stacked Auto-Encoders
10. **Dimensionality Reduction Algorithms**
    - Principal Component Analysis (PCA)
    - Principal Component Regression (PCR)
    - Partial Least Squares Regression (PLSR)
    - Sammon Mapping
    - Multidimensional Scaling (MDS)
    - Projection Pursuit
    - Linear Discriminant Analysis (LDA)
    - Mixture Discriminant Analysis (MDA)
    - Quadratic Discriminant Analysis (QDA)
    - Flexible Discriminant Analysis (FDA)
11. **Ensemble Algorithms**
    - Boosting
    - Bootstrapped Aggregation (Bagging)
    - AdaBoost
    - Stacked Generalization (blending)
    - Gradient Boosting Machines (GBM)
    - Gradient Boosted Regression Trees (GBRT)
    - Random Forest
12. **Other Algorithms**
    - Computational intelligence (evolutionary algorithms, etc.)
    - Computer Vision (CV)
    - Natural Language Processing (NLP)
    - Recommender Systems
    - Reinforcement Learning
    - Graphical Models

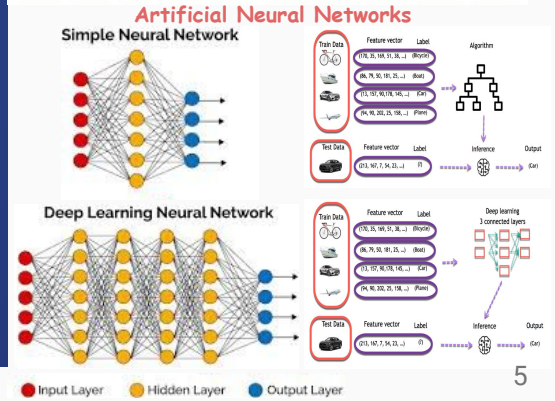
Source: Towards Data Science, La Vivien, Victoria Holt, Data Science Central

Artificial Intelligence (AI)

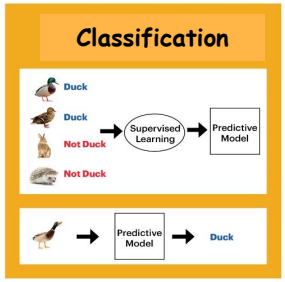


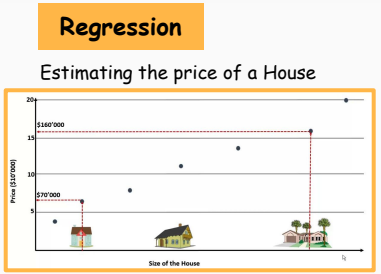


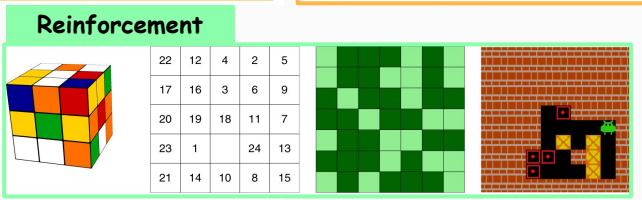


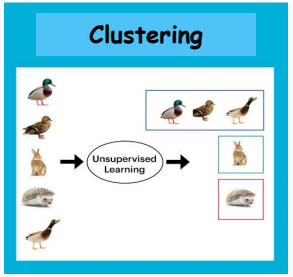


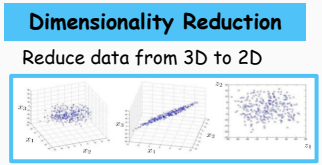
Machine Learning Examples

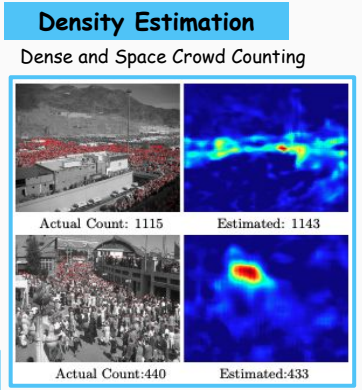








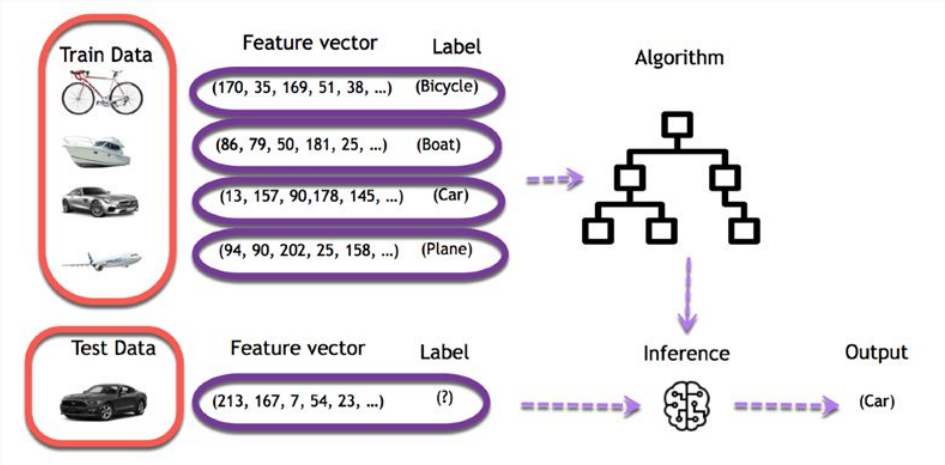


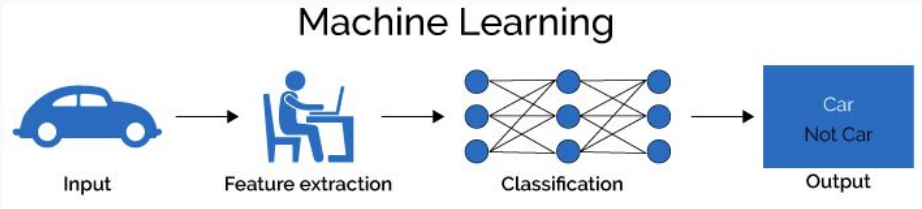


Source: Springer, Western Digital, Mustapha, Nature Machine Intelligence, Nanonets

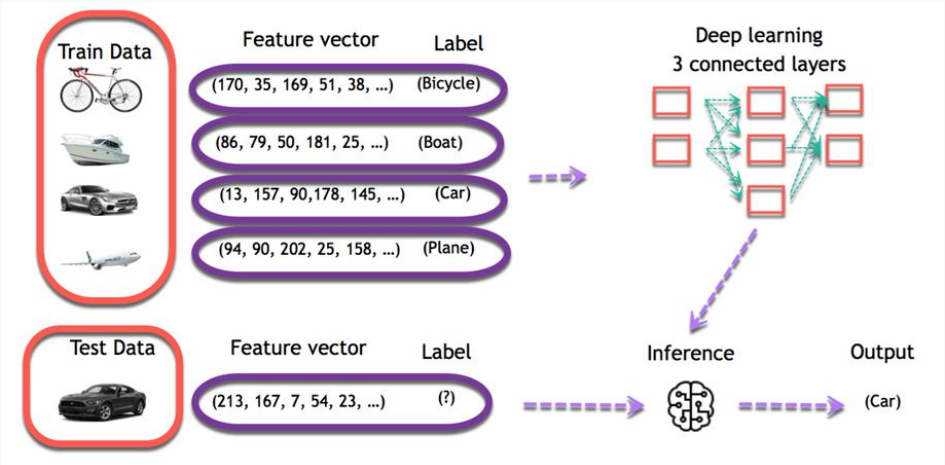
Machine Learning VS Deep Learning

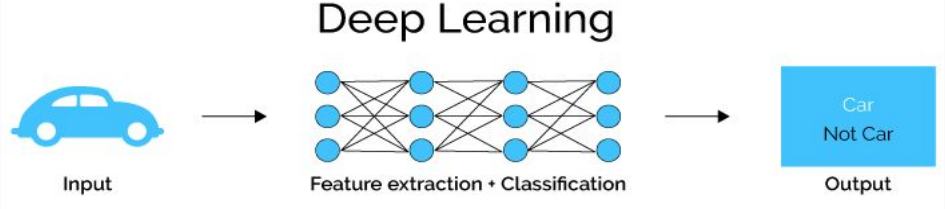
Machine Learning





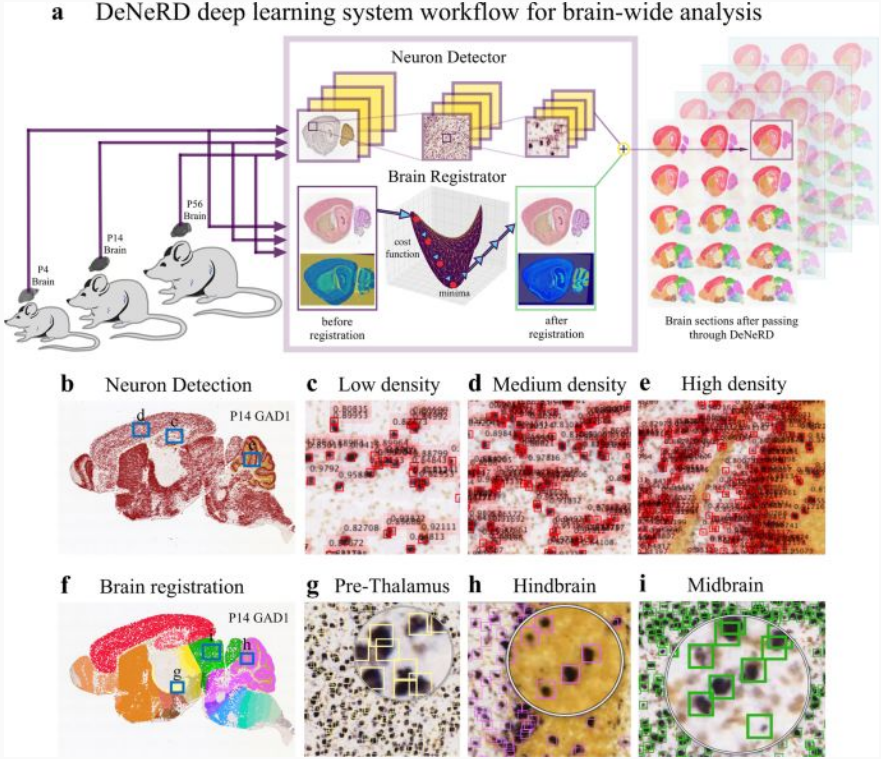
Deep Learning

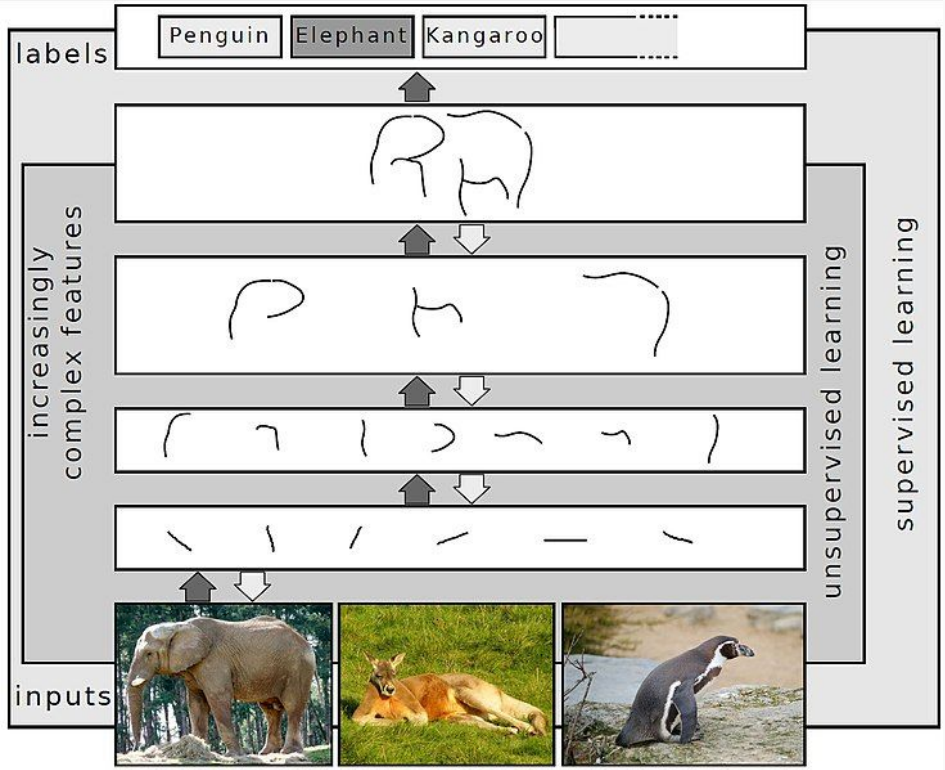




Source: Thai Programmer, Aware

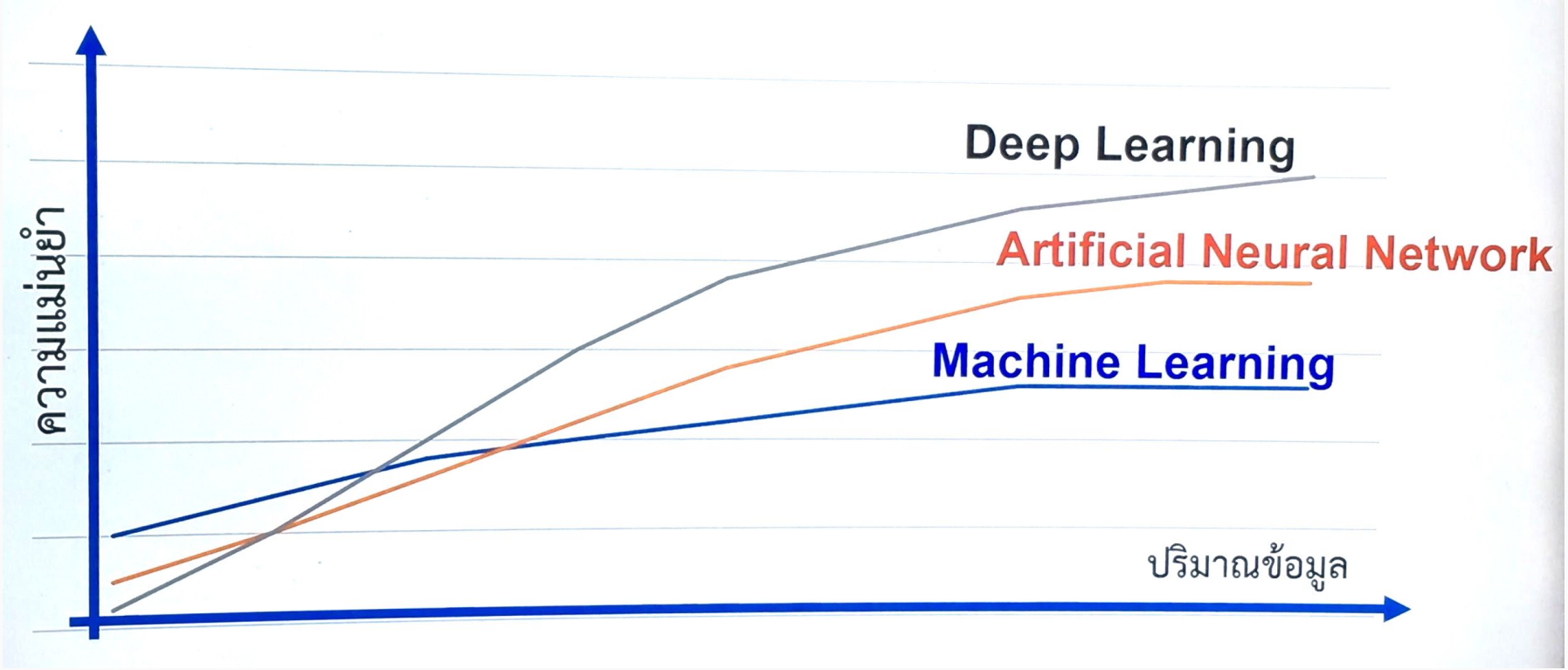
Deep Learning Examples





Source: Asim Iqbal, Hannes Schulz

Performance of Machine Learning, ANNs, & Deep Learning

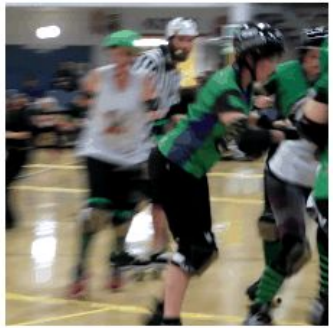


Source: AIAT

Python for AI Applications

Action Recognition with an Inflated 3D CNN

```
1 to_gif(sample_video)
```



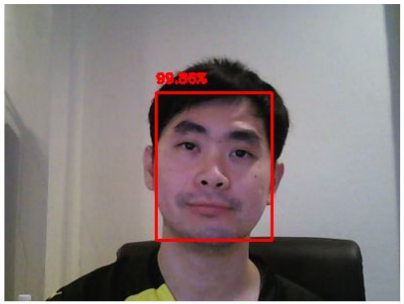
```
[15] 1 predict(sample_video)

Top 5 actions:
  roller skating          : 96.85%
  playing volleyball      :  1.63%
  skateboarding           :  0.21%
  playing ice hockey      :  0.20%
  playing basketball      :  0.16%
```

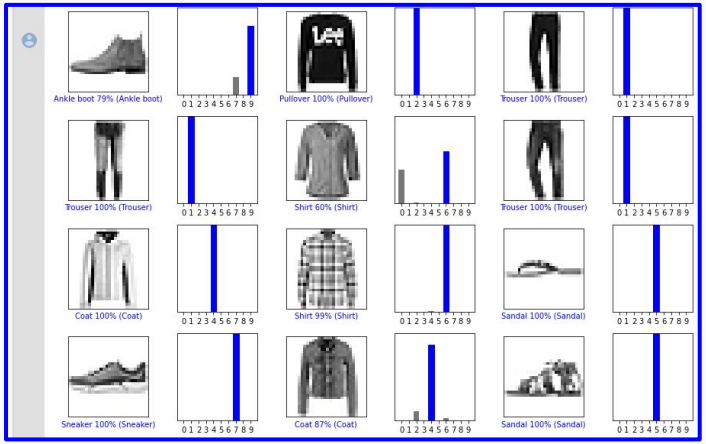
Face detection using pre-trained model

Show the resulting image

```
1 cv2_imshow(image)
```



Classify images of clothing

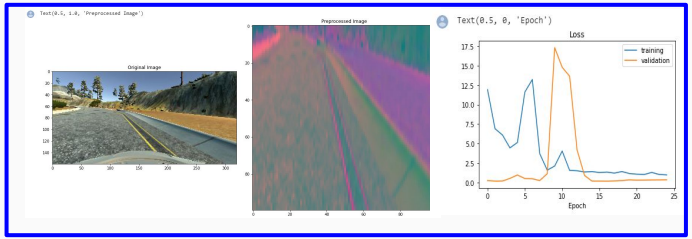


The Iris classification

Figure 1. Iris setosa (by Radomil, CC BY-SA 3.0), Iris versicolor, (by Dlanglois, CC BY-SA 3.0), and Iris virginica (by Frank Mayfield, CC BY-SA 2.0).

```
Example 0 prediction: Iris setosa (96.8%)
Example 1 prediction: Iris versicolor (80.4%)
Example 2 prediction: Iris virginica (82.9%)
```

Behavioral Cloning For Self Driving Cars



Assignment 2

ให้นักศึกษา Review ตัวอย่าง Python for AI Applications คนละ 1 ตัวอย่าง เขียนผ่าน Online Blog และนำเสนอในคาบเรียนครั้งถัดไป

สิ่งที่ต้องมีใน Online Blog

1. References (URL or Link Google Colab)
2. Problem
3. Data Input
4. Algorithm & Process
5. Source Code & Reponds
6. Output
7. Outcome
8. Future Work
9. Link VDO Presentation