Basics And Types of ML

- What is Machine Learning
- Types of Machine Learning
- Artificial Intelligence
- Applications of AI
- AI effect - Weak AI & Strong AI
- AI / ML History
- References

Jithin J Kumar
Fellow ID - JK12904613

Machine Learning ?

Machine learning is the science of getting computers to act without being explicitly programmed.

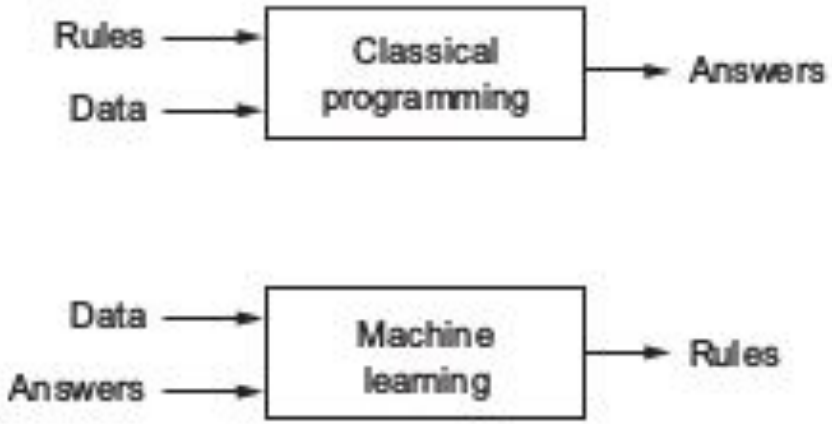


Figure 1.2 Machine learning: a new programming paradigm

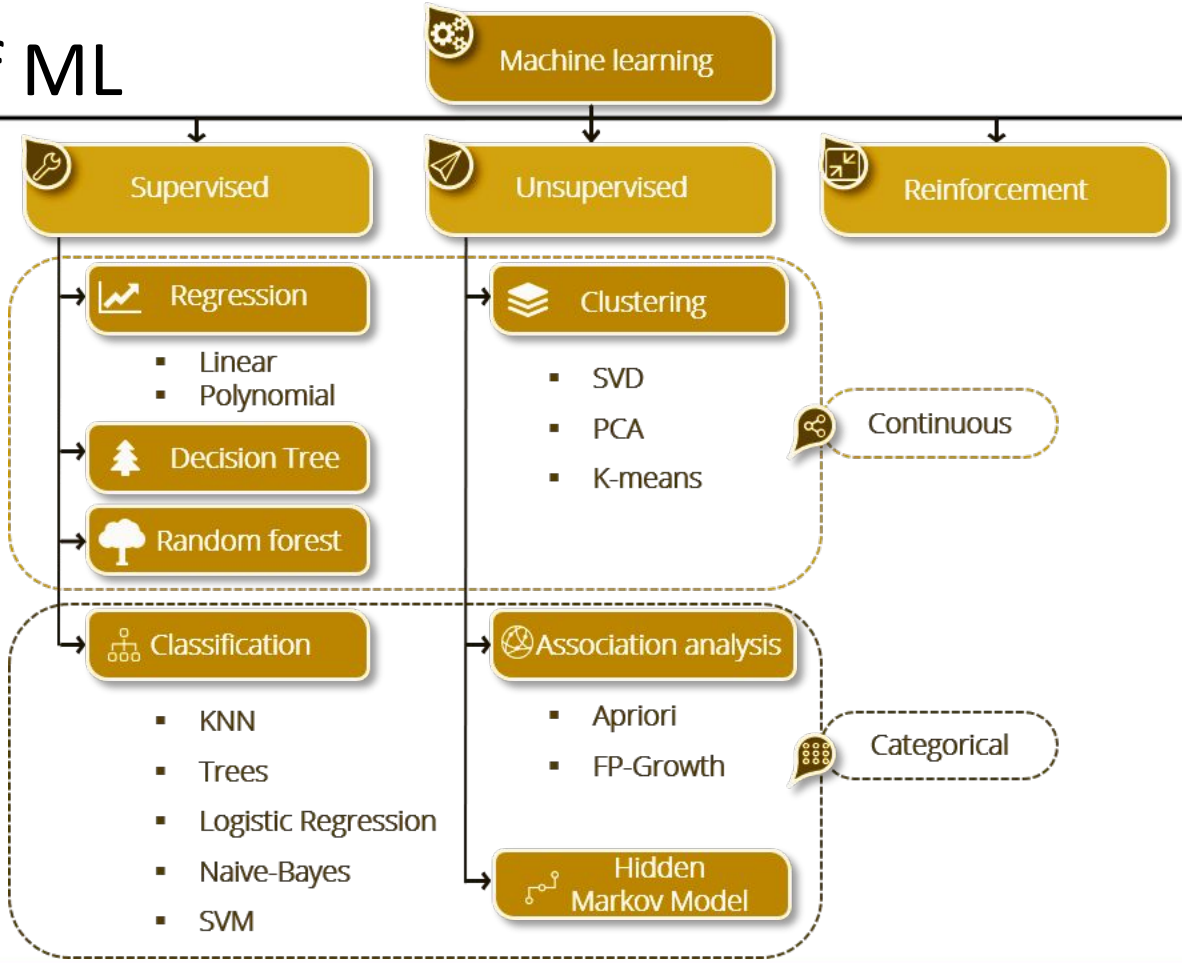
Types of Machine Learning Algorithms

- Supervised Algorithms
  - Model relationships and dependencies between the target prediction output and the input feature
- Unsupervised Algorithms
  - There are no output categories or labels here based on which the algorithm can try to model relationships which help in deriving meaningful insights and describe the data better to the users.
- Reinforcement Algorithms
  - Often called the agent, continuously learns from the environment in an iterative fashion. In the process, the agent learns from its experiences of the environment until it explores the full range of possible states.

Types of ML

- Probablistic Modelling -
  - *Principles of statistics to data analysis.(till 1950's)*
- Kernal Methods -
  - *classification algorithm to find best boundary*
- Decision trees/ random forest/ gradient boosting-
  - f*low chart like structure for better data representation and intuition building*
- Neural Networks/ Deep Learning-

Types of ML


Machine learning
Supervised
Unsupervised
Reinforcement
Regression
Linear
Polynomial
Decision Tree
Random forest
Clustering
SVD
PCA
K-means
Continuous
Classification
KNN
Trees
Logistic Regression
Naive-Bayes
SVM
Association analysis
Apriori
FP-Growth
Categorical
Hidden Markov Model

AI the Big Brother of ML

What is AI?

- Simulate any intellectual task
- Goals
  - Search / planning (eg chess)
  - Reasoning / knowledge representation (eg Watson on Jeopardy)
  - Perception (Visual Recognition)
  - Ability to move and manipulate objects
  - Natural language processing (communication)
  - Learning

AI Applications

Applications

- Autonomous vehicles (drones, self-driving cars)
- Medical diagnosis
- Creating art (such as poetry)
- Proving mathematical theorems
- Playing games (such as Chess or Go)
- Search engines
- Online assistants (such as Siri)
- Image recognition in photographs
- Spam filtering
- Prediction of judicial decisions
- Targeting online advertisements

AI Effect

When a technique -> mainstream, no longer AI: "AI effect"

- Pre-programming
- Weak AI vs Strong / AGI
  a. Weak ai -do a specific task.
  b. Strong ai - not invented yet, perform well at any challenge

Machine learning - Sub field of AI

- Pattern / Predict / Learn
- Versus AI
  - The "whole" (robotics, planning, etc)
  - Professional: ML more interesting, subsuming other fields; ML is starter
  - Conversation "AI when wow-ing or colloquial, ML when being professional.
- Versus Stats - ML is applied Statistics
- Versus Data Science: ML is a subfield of Data Science and Advanced Mathematical Computing.

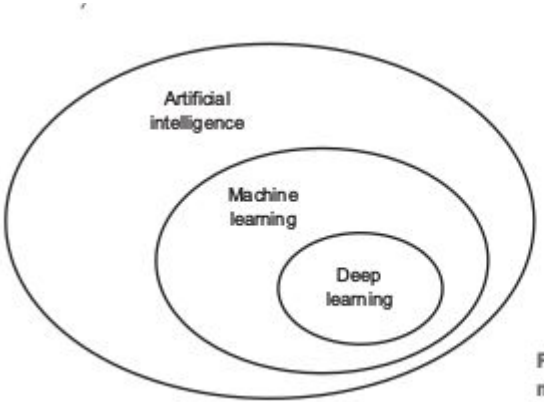


Figure 1.1 Artificial intelligence, machine learning, and deep learning

AI/ML - History

- First attempt: Ramon Lull, 13th century - Automaton - walking models / moving based on external factors
- Davinci's walking animals
- 1700s-1800s: Statistics & Mathematical decision making
  - Thomas Bayes: reasoning about the probability of events
  - George Boole: logical reasoning / binary algebra
  - Gottlob Frege: Propositional logic
- 1832: Charles Babbage & Ada Byron / Lovelace: designed Analytical Engine (1832), programmable mechanical calculating machines
- 1936: Universal Turing Machine
  - Computing Machinery and Intelligence - explored AI!
- 1946: John von Neumann Universal Computing Machine
- 1943: Warren McCulloch & Walter Pitts: cogsci rep of neuron; Frank Rosemblatt uses to create Perceptron (-> neural networks by way of MLP)

AI/ML - History

- 50s-70s: "AI" coined @Dartmouth workshop 1956 - goal to simulate all aspects of intelligence. John McCarthy, Marvin Minksy, Arthur Samuel, Oliver Selfridge, Ray Solomonoff, Allen Newell, Herbert Simon - To Simulate AI
  - Newell & Simon: Hueristics -> Logic Theories, General Problem Solver
  - Slefridge: Computer Vision
  - NLP
  - Stanford Research Institute: Shakey
  - Feigenbaum: Expert systems
  - GOFAI / symbolism: operations research / management science; logic-based; knowledge-based / expert systems
- 70s: Lighthill report (James Lighthill), big promises -> AI Winter
- 90s: Data, Computation, Practical Application -> AI back (90s)
  - Connectionism optimizations: Geoffrey Hinton: 2006, optimized back propagation
- Bloomberg, 2015 was whopper for AI in industry
- AlphaGo & DeepMind

References

1. PDFVersion - THE QUEST FOR ARTIFICIAL INTELLIGENCE - http://ai.stanford.edu/~nilsson/QAI/qai.pdf

2. Machine learning Guide - Podcast series - History of AI/ML
   a. http://ocdevel.com/mlg/2

3. DeepLearning with Python - Francois Chollet

Thank You…!

Open For Questions..