

Machine Learning Fundamentals

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Problem 1

"You need to predict how much user "A" will like a movie that she hasn't seen based on her ratings of movies that she has seen."



Problem 2

"You need to predict how much transaction "T" is likely to be fraudulent based on previous transactions."



Ways to solve

- Traditional Methods
- Machine Learning

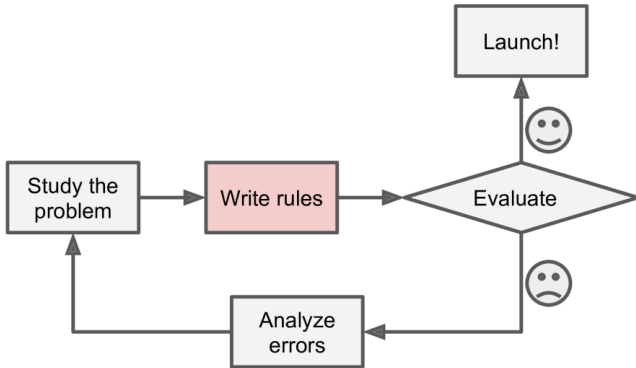


Traditional Methods

- Complex rules
- Hard to maintain



Traditional Methods

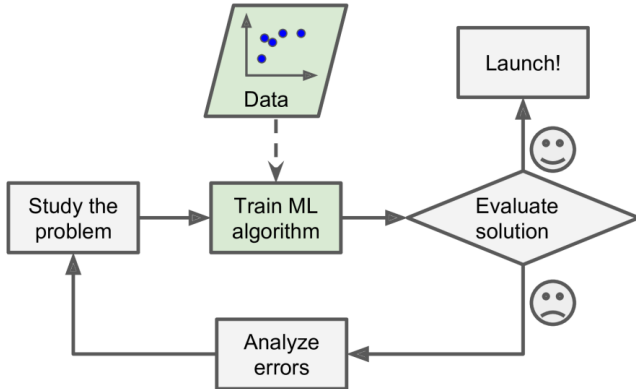


Machine Learning

- Automatic pattern learning
- Ease to maintain
- Adopt to changes
- More accurate



Machine Learning



Machine Learning

What does it mean to **learn**?

- In Machine Learning an important concept is **Generalization**, the ability to generalize.



Machine Learning

A computer program is said to learn from **experience** E with respect to some **task** T and some **performance** P , if its performance on T , as measured by P , improves with experience E .

- Tom Mitchell, 1997.



Checker Learning Problem

- **Task T** : Playing Checker.
- **Experience E**: Playing practice game against itself.
- **Performance Measure P**: % of games won against opponents.



Types of Machine Learning

- Supervised Machine Learning
- Unsupervised Machine Learning
- Semi-Supervised Machine Learning
- Reinforcement Learning



Machine Learning Algorithms

Supervised Machine Learning Algorithms

- Training data includes the desired solutions called **labels**.



Machine Learning Algorithms

Some Supervised Machine Learning Algorithms

- Linear & Logistic Regression
- Decision Trees
- Support Vector Machines
- Random Forest
- K-Nearest Neighbors
- Neural Networks



Machine Learning Algorithms

Unsupervised Machine Learning Algorithms

- They only **extracts pattern** from the provided data during learning.



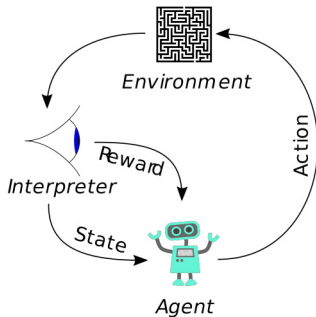
Machine Learning Algorithms

Some Unsupervised Machine Learning Algorithms

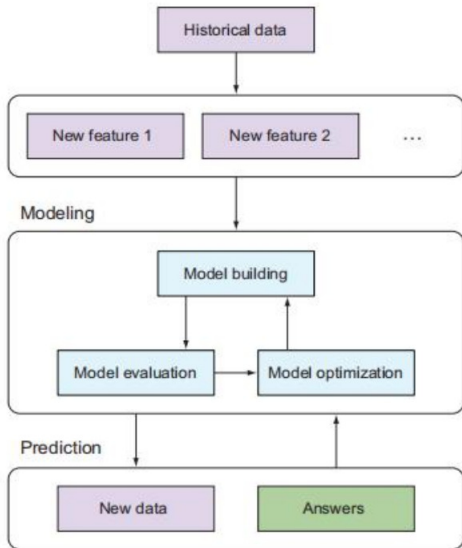
- Clustering
- Anomaly Detection
- Dimensionality Reduction



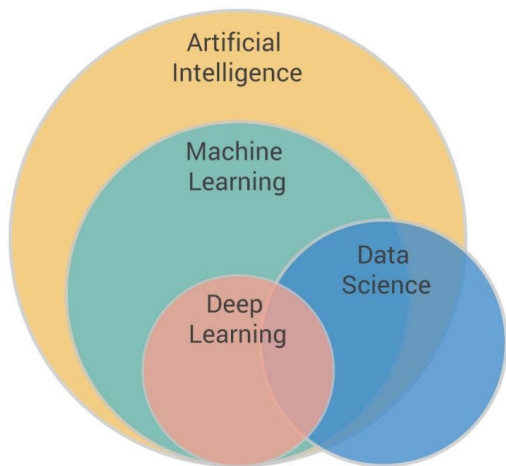
Reinforcement Learning Algorithm



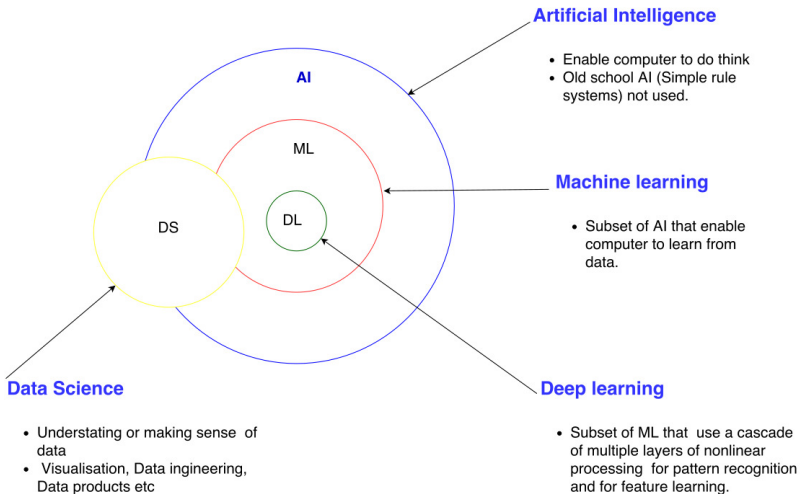
Machine Learning WorkFlow



What is the difference between DS, ML, AI, and DL?



What is the difference between DS, ML, AI, and DL?



Applications of Python

- Web Development
- Game Development
- Machine Learning and Artificial Intelligence
- Data Science and Data Visualization
- Desktop GUI
- Web Scraping Applications
- Embedded Applications e,g IoT



Python Libraries for DS and ML



NumPy

matplotlib



Seaborn

Pandas



scikit

learn



statsmodels



SciPy

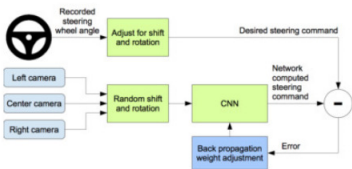


Python Libraries for DL



Applications of ML/DL

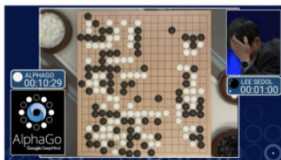
Self driving car



Drones



Game



Cyber attack prediction

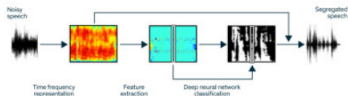


Applications of ML/DL

Machine translation



Speech Processing



Automatic Text Generation

Documents reveal IoT-specific televisions can be used to secretly record conversations
Criminals who initiated the attack managed to commandeer a large number of internet-connected devices in current use
Documents revealed that microwave ovens can spy on you - maybe if you personally don't sit
sequences of the sub-par security of the IoT.

[IoT] security implications have been dominating the headlines lately. WikiLeaks' leak of NSA documents revealed that internet-connected televisions can be used to secretly record conversations. Documents revealed that microwave ovens can spy on you - maybe if you personally don't sit sequences of the sub-par security of the IoT.

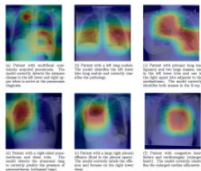
Music composition

The Doutlace (v2)

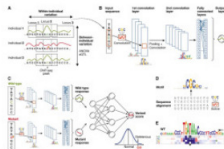


Applications of ML/DL

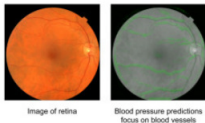
Pneumonia Detection on Chest X-Rays



Computational biology



Predict heart disease risk from eye scans



Diagnosis of Skin Cancer

