AI4D-Lab Tanzania - The University of Dodoma, CIVE

Artificial Intelligence Short Course

Introduction to Machine Learning

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Problem

"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."

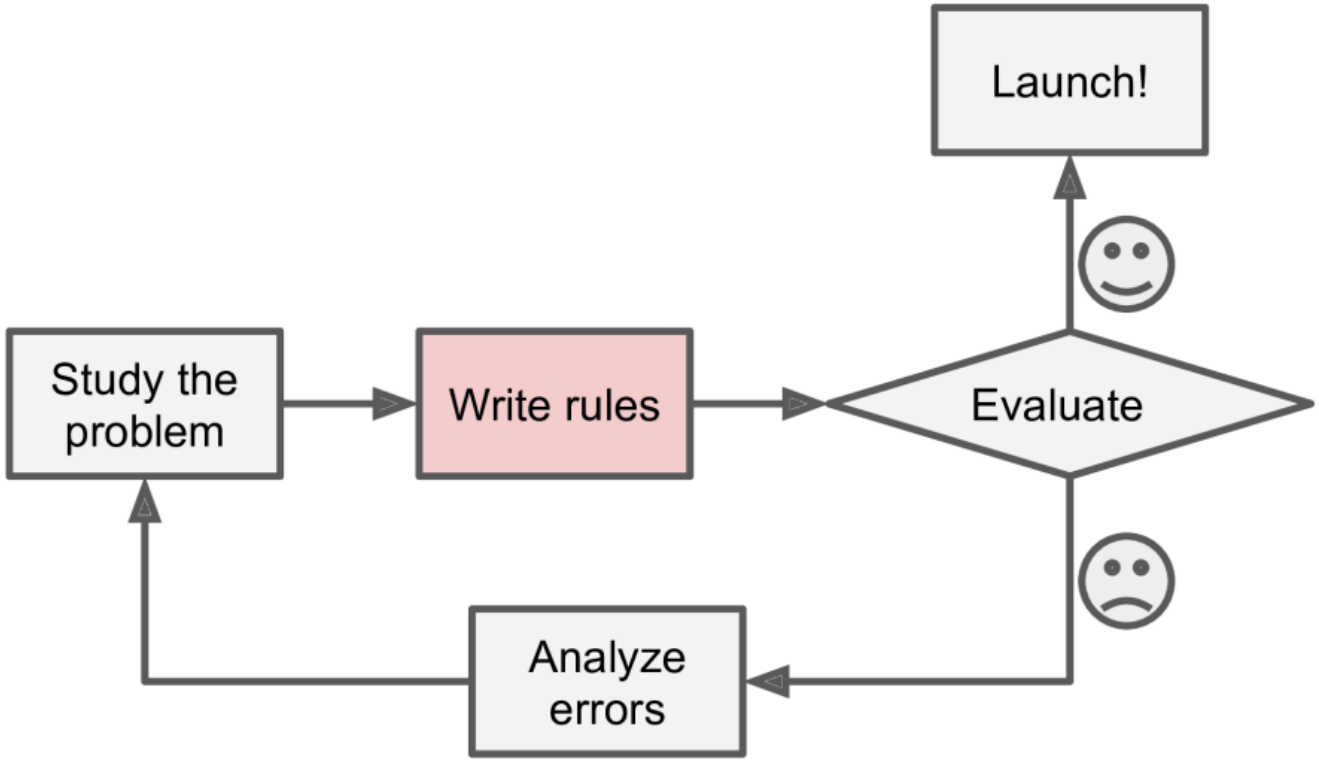
Ways to solve

- Traditional Methods
- Machine Learning

Traditional Methods

- Complex rules
- Hard to maintain

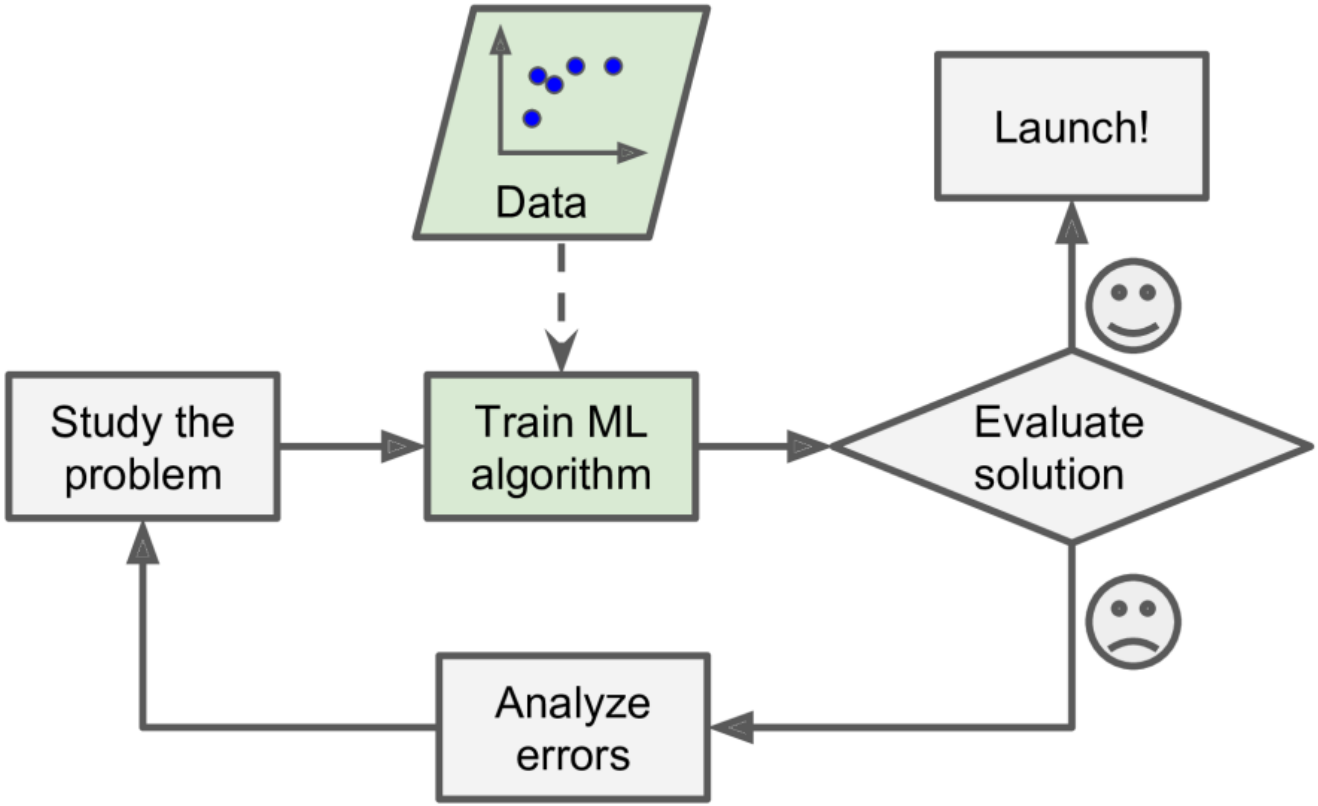
Traditional Methods



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

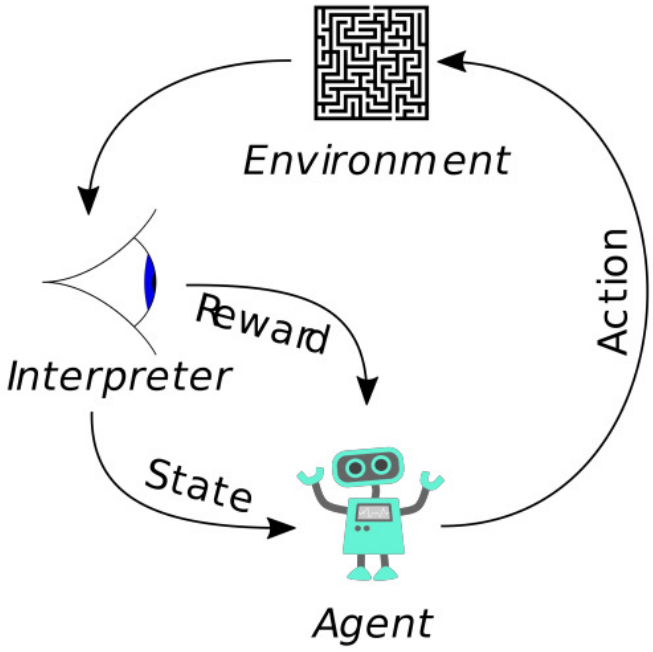
- They only extracts pattern from the provided data during learning.

Machine Learning Algorithms

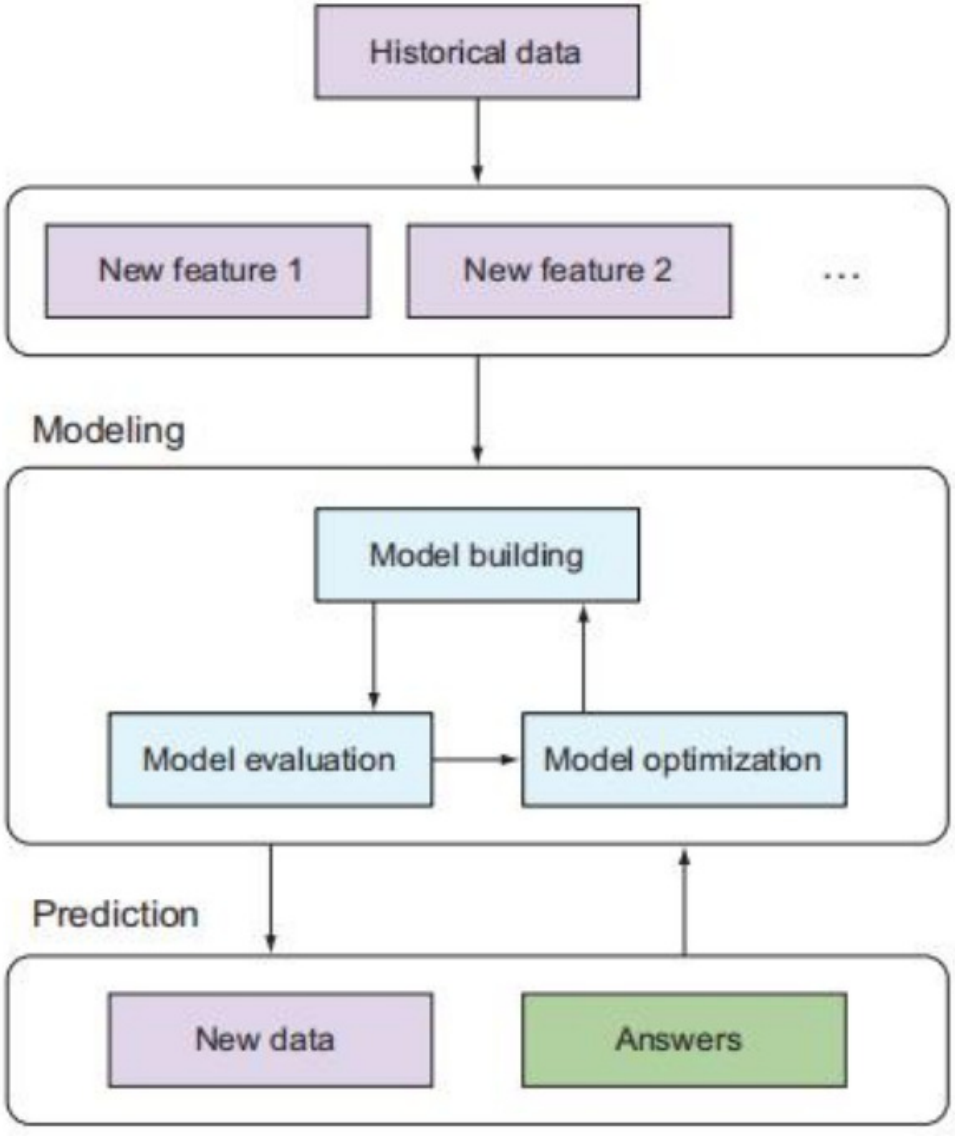
Some Unsupervised Machine Learning Algorithms

- Clustering
- Anomaly Detection
- Dimensionality Reduction

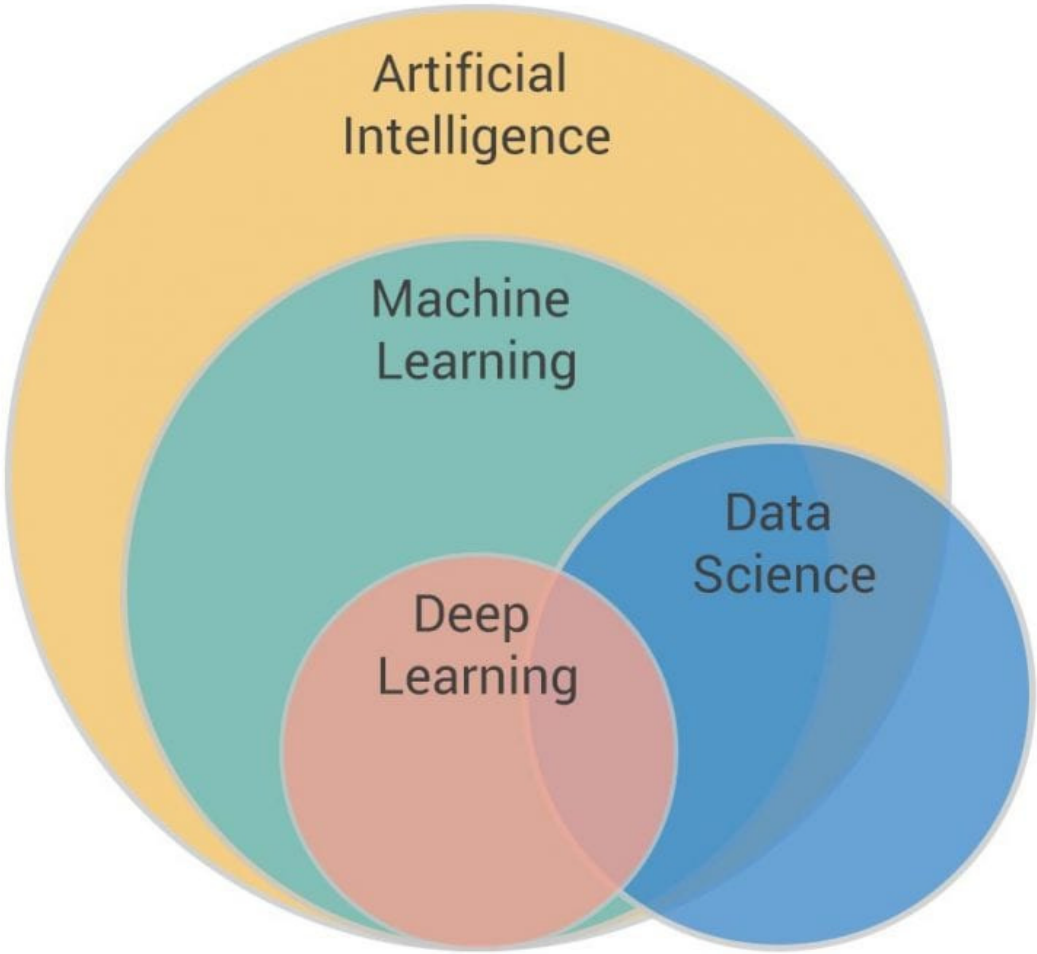
Reinforcement Learning Algorithm



Machine Learning WorkFlow



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



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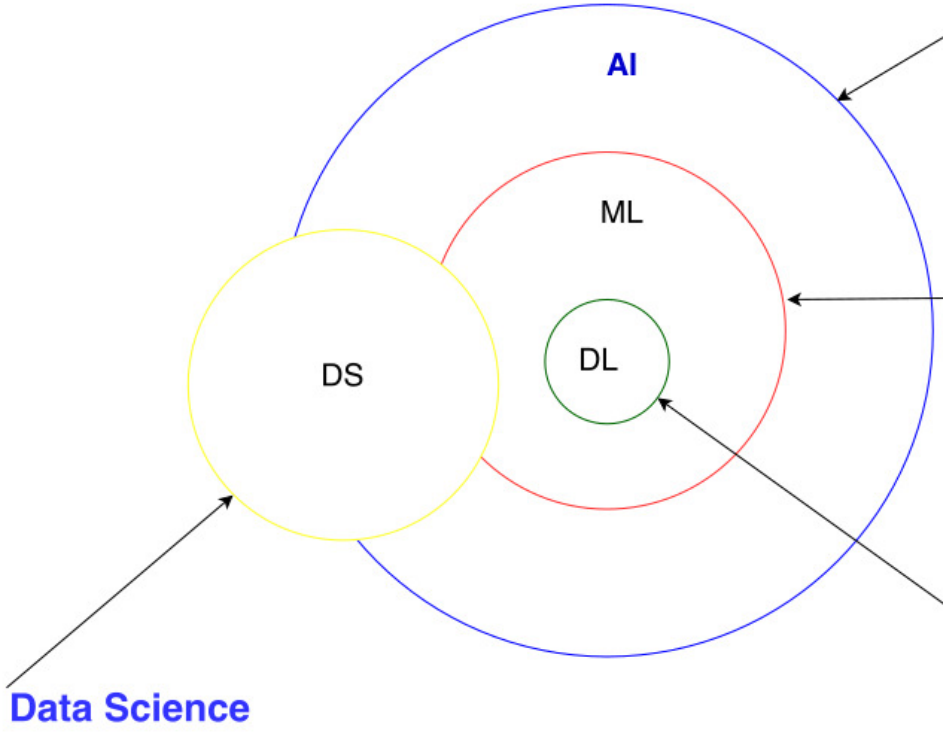


Artificial Intelligence

- Enable computer to do think
- Old school AI (Simple rule systems) not used.

Machine learning

- Subset of AI that enable computer to learn from data.

Deep learning

- Subset of ML that use a cascade of multiple layers of nonlinear processing for pattern recognition and for feature learning.

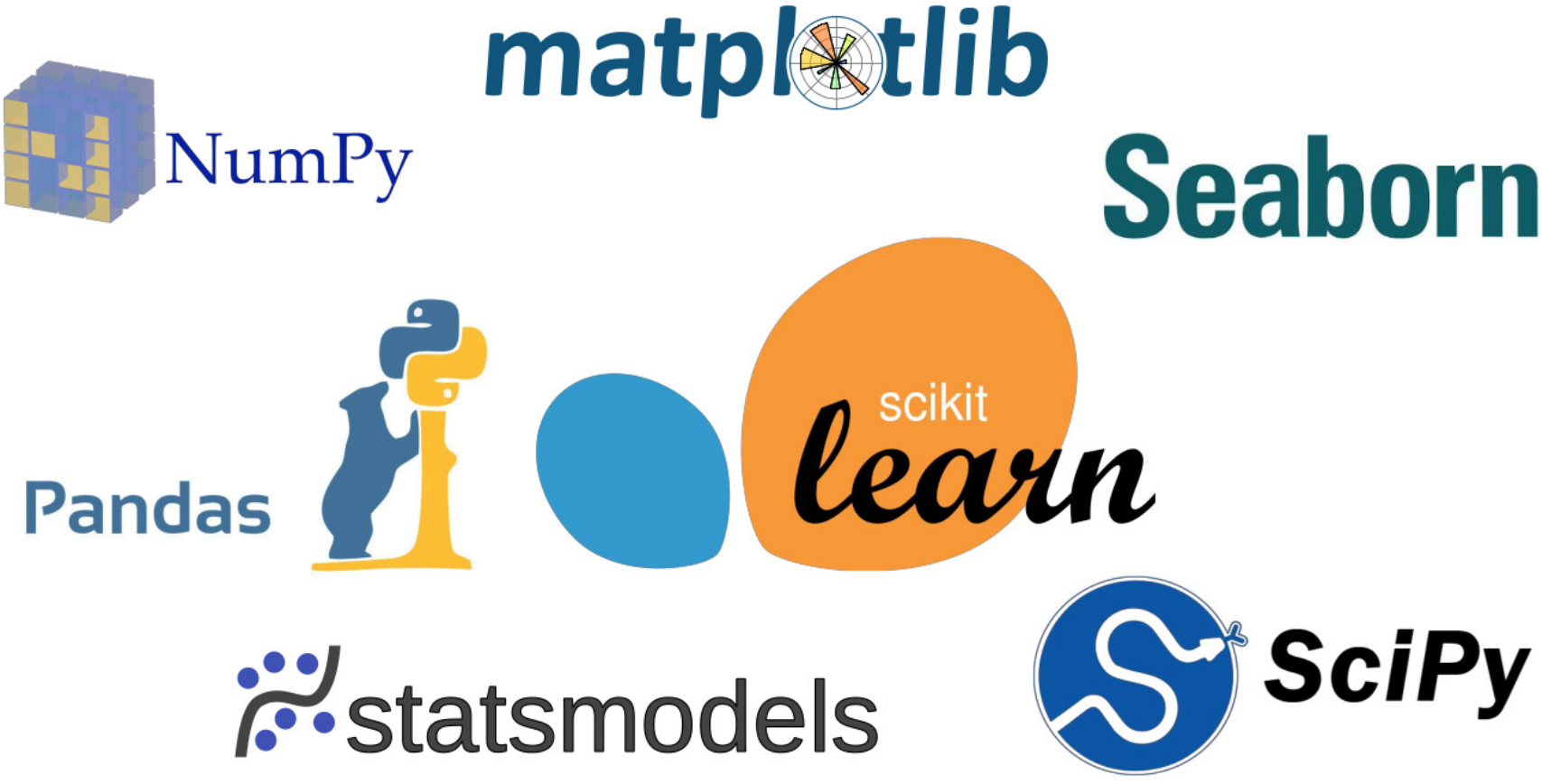
Data Science

- Understating or making sense of data
- Visualisation, Data ingineering, Data products etc

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

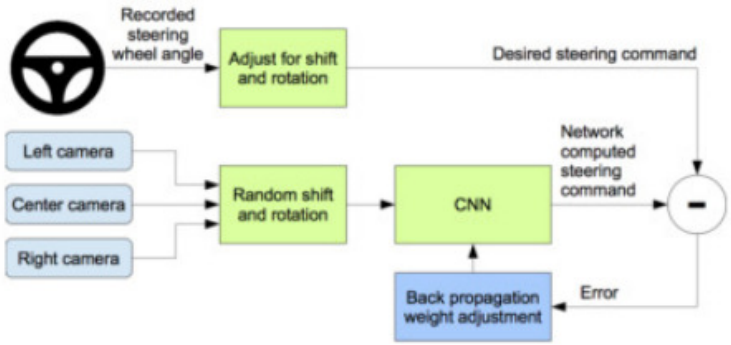
Python Libraries for DS and ML



Python Libraries for DL

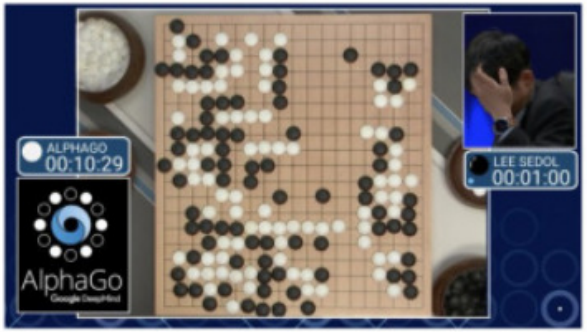
Applications of ML/DL

Self driving car

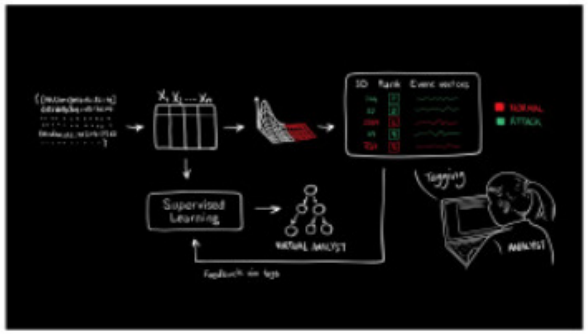


Drones

Game



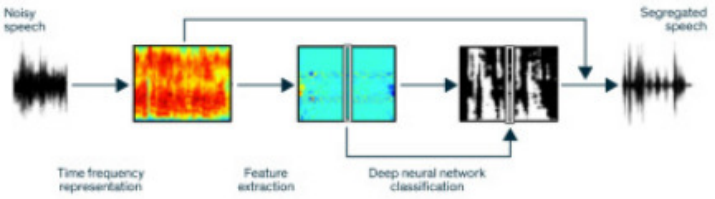
Cyber attack prediction



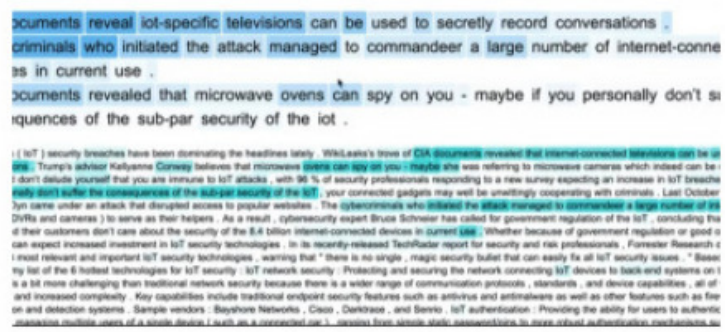
Applications of ML/DL

Machine translation

Speach Processing

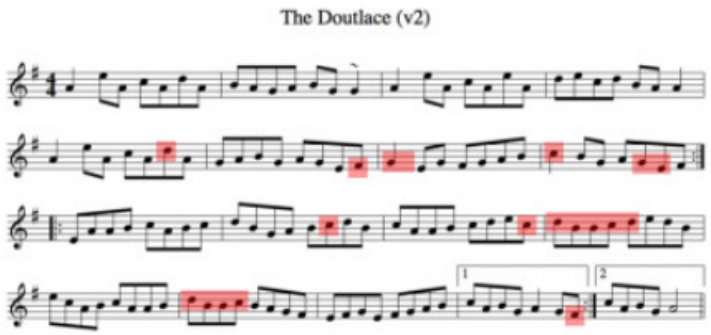


Automatic Text Generation



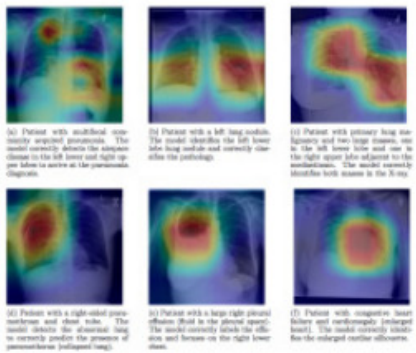
documents reveal iot-specific televisions can be used to secretly record conversations .
criminals who initiated the attack managed to commandeer a large number of internet-conne
es in current use .
documents revealed that microwave ovens can spy on you - maybe if you personally don't s
quences of the sub-par security of the iot .

Music composition

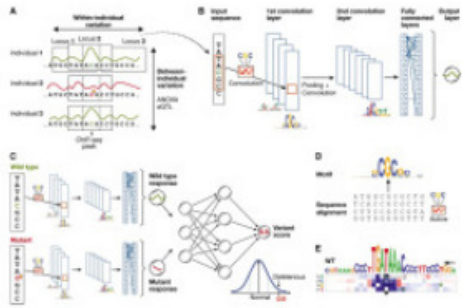


Applications of ML/DL

Pneumonia Detection on Chest X-Rays



Computational biology



Pedict heart disease risk from eye scans

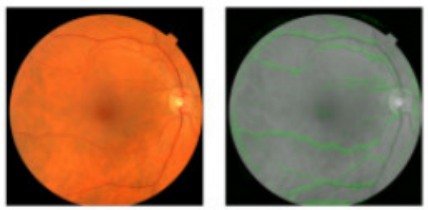
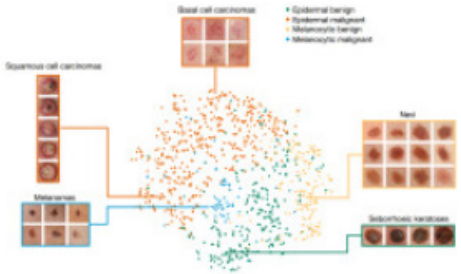


Image of retina

Blood pressure predictions focus on blood vessels

Diagnosis of Skin Cancer

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