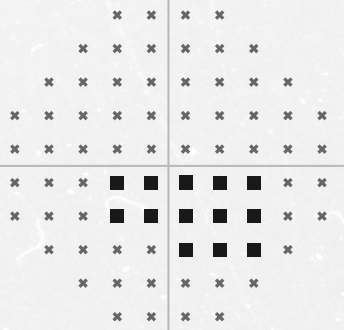
Introduction to Machine Learning



01

About IEEE

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HR Policy

There are **3 warnings** throughout the year.

2 verbal warnings = 1 warning

➢ **Verbal warnings** will be given if:

- A member missed a meeting **with** an excuse.
- A member entered a meeting late **without** an excuse.
- A member submitted a task within **2 days after the deadline** without a valid excuse.

➢ **Warnings** will be given if:

- A member missed a meeting **without** an excuse.
- A member didn't submit a task.
- A member submitted a task **2 days after the deadline**.

02

ML Committee

Topics for Semester 1

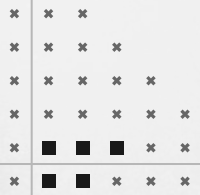
Week 1: Introduction to Data Science and machine learning

Week 2: K Nearest Neighbours

Week 3: Linear Regression

Week 4: Logistic Regression

Week 5: Going through a complete use case where we will use all of the algorithms discussed and compare their effectiveness.



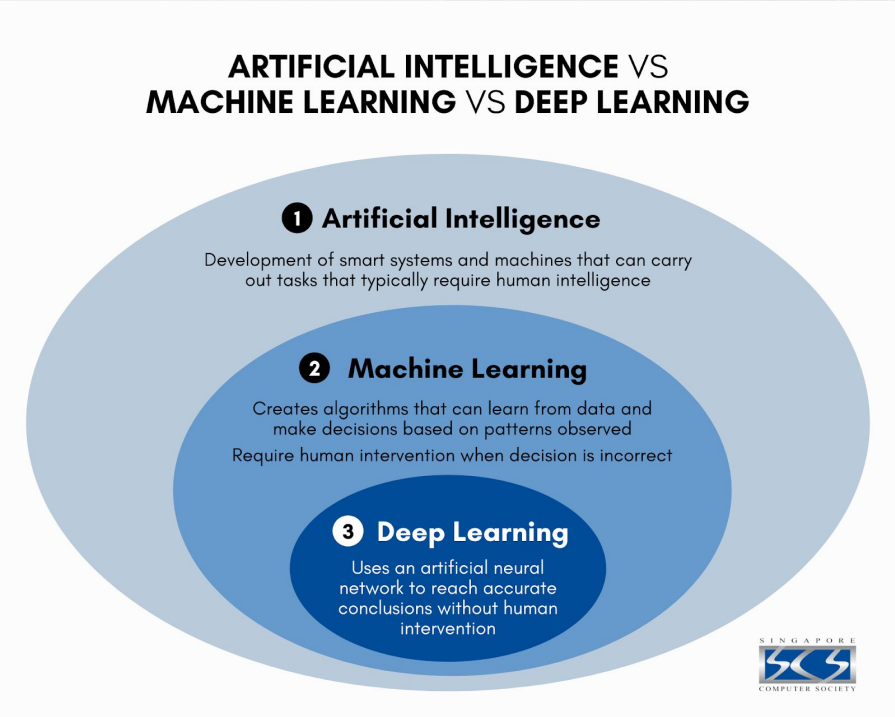
Tasks

Kaggle Competitions

03

Introduction

AI vs Machine Learning vs Deep Learning



Artificial Intelligence(AI)

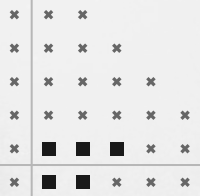
- AI is a broad field of computer science
- Its aim to create tasks that require human intelligence like
  - Reasoning
  - Problem solving
  - Perception
  - Language understanding
- Rule based expert systems “if statements” are considered a form of AI

Machine Learning & Deep Learning

- It is a subset of AI. It involves the use of statistical techniques to enable machines to improve at tasks with experience
- ML systems learn from data to make decision or predictions without being programmed to do so
- Can be divided into classical machine learning and deep learning
  - Classical Machine Learning:
    - KNNs
    - Linear Models
    - SVMs
  - Deep Learning
    - Neural Networks
    - Recurrent Neural Networks
    - Convolutional Neural Networks

Why machine learning?

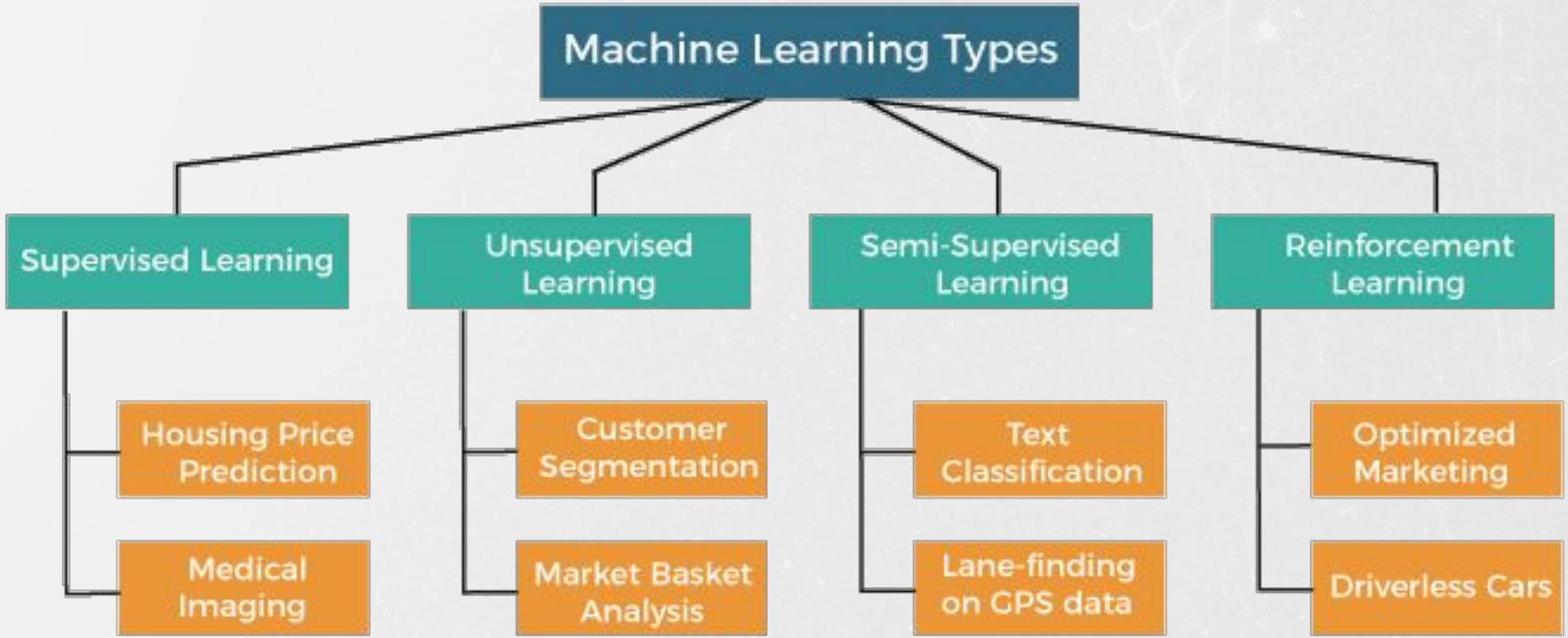
- Machine Learning is used across various fields. Why?
  - Some tasks cannot be effectively made by rule based programming like:
    - Speech Recognition
    - Image Classification
    - How will we specify the rules for those tasks??
  - Can get better with time as new data comes
  - Can be tailored for each user
    - Think about youtube recommendation system



	Machine Learning	Deep Learning
Data Structure	Structured data	Unstructured and structured data
Size of Data Set	Small — Medium	Big
Hardware	Functions with the use of simple hardware	Needs high performance computers (with GPUs). Neural networks multiply matrices that require very much computing time — GPUs accelerate the process.
Feature Extraction	As a rule, they must understand the features.	They do not have to understand the features.
Run Time	From a couple of minutes to hours	Weeks and months. Artificial neural networks must compute extremely big data.
Interpretability	Some algorithms are very easy to interpret (logistic regression, simple decision trees), while others are almost impossible in this regard (SVM, XGBoost).	Difficult to interpret and often impossible.

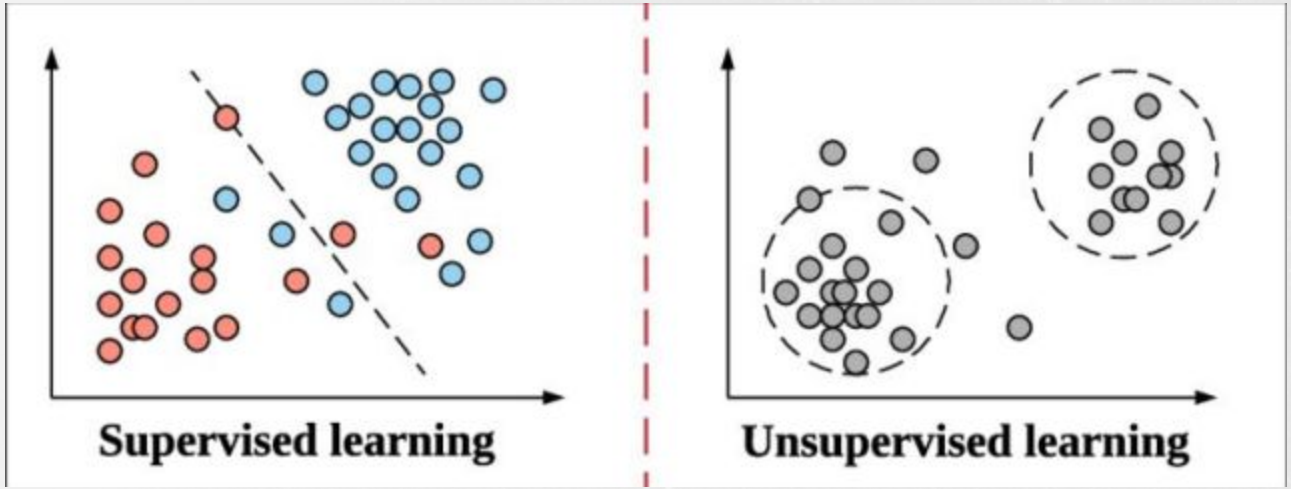
04

Types of Machine Learning


Machine Learning Types
Supervised Learning
Unsupervised Learning
Semi-Supervised Learning
Reinforcement Learning
Housing Price Prediction
Medical Imaging
Customer Segmentation
Market Basket Analysis
Text Classification
Lane-finding on GPS data
Optimized Marketing
Driverless Cars

Types of Machine Learning

- Supervised Learning:
  - Data Type: Labeled data. This means each example in the training dataset is tagged with the correct answer or outcome.
- Unsupervised Learning:
  - Data Type: Unlabeled data. The algorithm tries to learn the underlying patterns without any guidance about the right outcome.
- Semi-Supervised Learning:
  - Data Type: A mix of labeled and unlabeled data. This is useful when labeling data is costly or time-consuming, and only a small portion of the data can be labeled.
- Reinforcement Learning:
  - Data Type: Data obtained through interaction with an environment. The algorithm learns by making decisions and observing the outcomes or rewards.

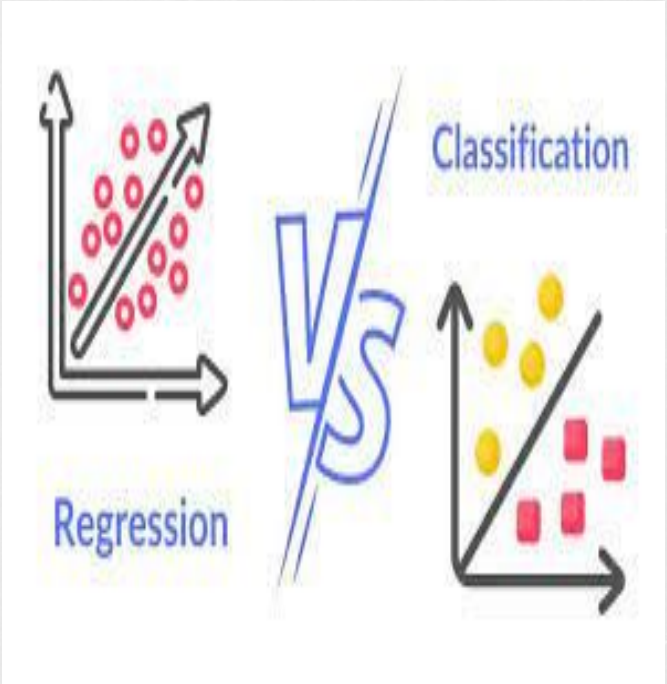

Supervised learning
Unsupervised learning

05

Classification & Regression

Types of Machine Learning

- Classification:
  - The goal is to predict a discrete label or category for a prediction
  - Examples
    - Dog or cat
    - Mail spam or not spam
    - Blood types
- Regression
  - The goal is to predict a continuous quantity. Unlike classification, the output here is quantitative.
    - House price prediction
    - Weather forecasting



Quick Game

- Is this a classification or a regression problem?

Diabetic or non Diabetic **Classification**

Stock Price prediction **Regression**

Sentiment Analysis for twitter posts **Classification**

Object Detection ?

06

Tools

Tools

Python Libraries

Machine Learning in python

Deep Learning Frameworks

Competitions

THANK YOU!