Lecture 1

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https://www.kaggle.com/datasets/vjchoudhary7/customer-segmentation-tutorial-in-python

L1_Worksheet.ipynb

- What is ML?
  - ML is a branch of study where machine analyses the data using algorithms, learns patterns and make decisions or predictions without being explicitly programmed for every task.
  - *Machine Learning finds the hidden mathematical equation that best fits the data.*
  - Supervised Learning
    - Supervised learning uses labeled data (input-output pairs) to train models for specific predictions (like classification or regression)
  - Unsupervised Learning

        - Unsupervised learning uses unlabeled data to discover hidden patterns, structures, or groupings (like clustering or association) without predefined answers.
- What is Classification?
    - Classification is a supervised learning technique which categorises the input data into predefined, discrete classes or labels, using a model trained on the labeled data to predict the outcomes of the new input data
    - Predicting discrete categories
        - Examples: PASS/FAIL, Spam/Not Spam, Cat/Dog
- What is Regression?
    - Rregression is a supervised learning technique used to model the relationship between a dependent (target) variable and one or more independent (predictor) variables to predict continuous numerical outcomes
    - Predicting continuous numbers
        - Examples: Marks, Price, Temperature
- Semi-supervised Learning
    - Semi-supervised learning is a machine learning approach that trains models using a small amount of labeled data combined with a large amount of unlabeled data, bridging
- What is Reinforcement Learning?
    - Reinforcement Learning (RL) is a machine learning type where an "**agent**" learns optimal behavior in an **environment** through trial-and-error, maximizing cumulative rewards by taking **actions** and receiving positive (**rewards**) or negative (**penalties**) feedback.
    - The system generates its **own data**
    - The system learns continuosly even after the deployment by feedback loops
- What is Deep Learning?

    - Neural networks with many layers
    - Learns features automatically
    - Deep learning is a subset of machine learning using multi-layered artificial neural networks (inspired by the human brain) to learn complex patterns from vast amounts of data
- What is AI?
    - Artificial Intelligence (AI) is the development of computer systems that can perform tasks requiring human intelligence, such as learning, reasoning, problem-solving, perception, and language understanding, by analyzing vast amounts of data to recognize patterns and make decisions.