What is Machine Learning

→ Q) What is Machine Learning?

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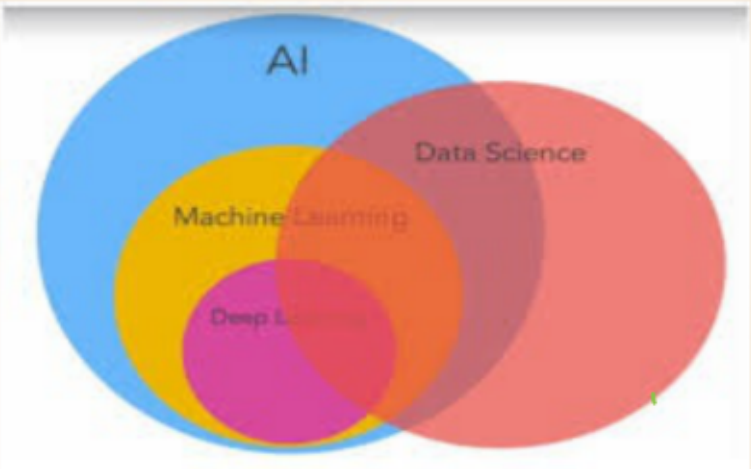
Machine learning is a branch of artificial intelligence (AI) that involves training computer algorithms to learn from and make predictions or decisions based on data. Instead of being explicitly programmed to perform a task, a machine learning model uses patterns and insights from data to improve its performance over time. This process involves feeding data into algorithms and allowing them to learn from it, identify trends, and make predictions or decisions without human intervention. Examples include recommendation systems, image recognition, and natural language processing.

→ Note ML is a subset of AI

Q) What is AI?

Artificial intelligence (AI) is a field of computer science focused on creating systems or machines that can perform tasks typically requiring human intelligence. These tasks include learning, reasoning, problem-solving, understanding natural language, and perception. AI can be categorized into two types:

→ Lets have a look at ML Venn diagram



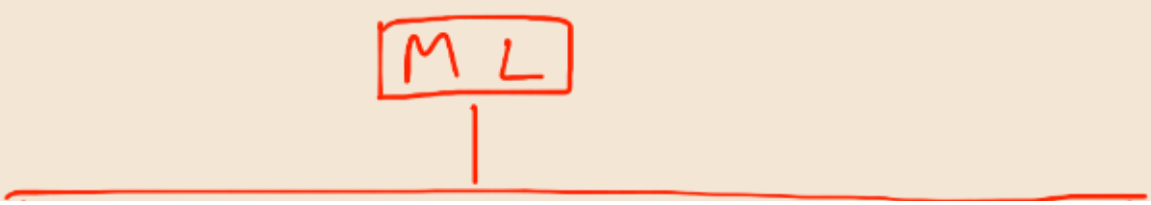
→ Now lets, look at key concepts

Key Concepts in Machine Learning:

1. **Data:** The raw material for machine learning. Data can be structured (like tables in a database) or unstructured (like text or images).
2. **Model:** A mathematical representation of a process. In machine learning, models are algorithms that make predictions or decisions based on data.
3. **Training:** The process of feeding data into a machine learning model so that it can learn patterns from the data. This is typically done using a training dataset.
4. **Features:** The individual measurable properties or characteristics of the data. For example, in a dataset of houses, features might include the number of rooms, square footage, or location.
5. **Labels:** The output or target variable that the model is trying to predict. For example, in a house pricing model, the label might be the price of the house.
6. **Supervised Learning:** A type of machine learning where the model is trained on labeled data, meaning that each training example is paired with an output label. Common tasks include classification (e.g., spam detection) and regression (e.g., predicting house prices).
7. **Unsupervised Learning:** A type of machine learning where the model is trained on data without labeled responses. The model tries to find hidden patterns or intrinsic structures in the data. Examples include clustering and dimensionality reduction.
8. **Overfitting:** A situation where the model learns the training data too well, including noise and details, making it perform poorly on new, unseen data.
9. **Evaluation:** The process of testing the model on a separate dataset to assess its performance. Common evaluation metrics include accuracy, precision, recall, and F1 score.

Machine learning is applied in various fields, including finance, healthcare, marketing, and technology, to automate tasks, make predictions, and extract insights from large datasets.

→ Subdivision of ML



Supervised

→ When we have labeled data i.e, when we have outcome var./ feature/ column

It includes
- Regression
- Classification

Unsupervised

→ When we have unlabeled data i.e we don't have outcome column

It includes
- Clustering
- Dimension reduction