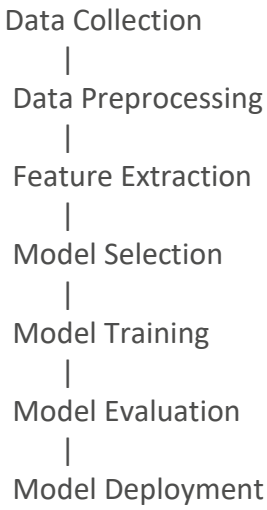
- **Data-Driven**: Machine learning algorithms learn directly from data, improving their performance as more data becomes available. The quality and quantity of data are crucial for the success of a machine learning model.
- **Predictive Capabilities**: One of the key features of machine learning is its ability to make predictions based on historical data. For example, it can forecast customer behavior, stock prices, or medical diagnoses.
- **Learning Ability**: Machine learning models have the ability to improve over time. This feature allows systems to continuously learn from new information and enhance their accuracy.
- **Automation**: Machine learning enables automation of tasks that traditionally required human intelligence, such as detecting anomalies, recognizing speech or images, and providing personalized recommendations.
- **Scalability**: Machine learning models are highly scalable and can handle increasing amounts of data and complexity. This makes them suitable for large-scale applications across industries.
- **Adaptiveness**: Machine learning systems can adjust to new data without being explicitly programmed, making them adaptive to changing environments and inputs.
- **Pattern Recognition**: Machine learning excels at identifying patterns and relationships within large datasets, which can be used to classify data, detect trends, and uncover insights that may not be apparent to humans.
- **Non-linear Relationships**: Machine learning models can capture complex, non-linear relationships in data, which is useful for tasks like image recognition, where simple linear models would fail.

Block Diagram of Machine Learning Life cycle

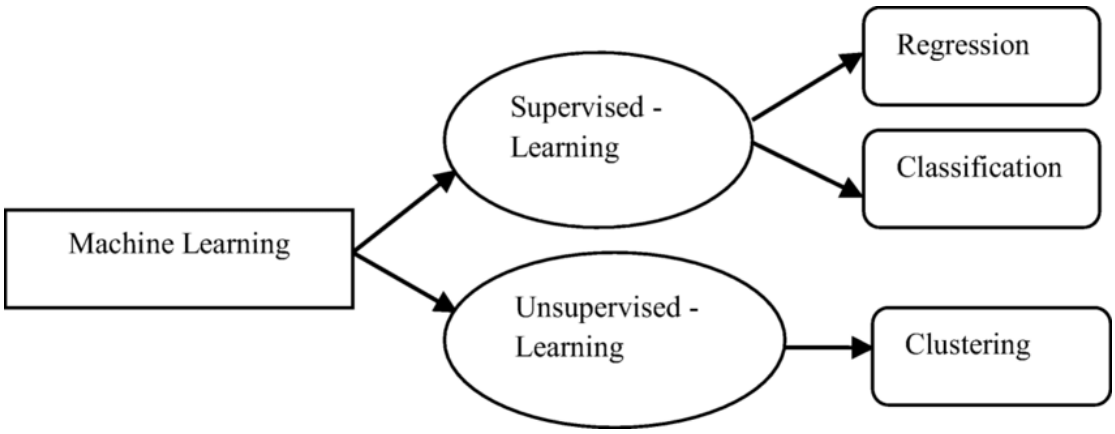


Explanation of Each Block

1. **Data Collection**: This is the initial step where relevant data is gathered from various sources, such as databases, APIs, or web scraping.

2. **Data Preprocessing**: In this stage, the collected data is cleaned and transformed to ensure it is suitable for analysis. This may involve handling missing values, normalizing data, and splitting the dataset into training and testing sets.
3. **Feature Extraction**: This step involves selecting important features or attributes from the data that will be used for model training. Techniques like encoding and dimensionality reduction may be applied here.
4. **Model Selection**: Based on the problem at hand (e.g., classification, regression), an appropriate machine learning algorithm is chosen. Common algorithms include decision trees, support vector machines, and neural networks.
5. **Model Training**: The selected model is trained using the preprocessed data. During this phase, the algorithm learns patterns and relationships in the data by adjusting its parameters.
6. **Model Evaluation**: After training, the model's performance is assessed using a separate test dataset. Various metrics such as accuracy, precision, and recall are used to evaluate its effectiveness.
7. **Model Deployment**: Once satisfied with the model's performance, it is deployed in a production environment where it can make predictions on new data.

Classification of Machine Learning:



Supervised learning:

Supervised learning is a type of machine learning where a model is trained on labeled data. This means that each training example consists of an input and the corresponding correct output (label). The goal is for the model to learn the relationship between the inputs and outputs so it can make accurate predictions on new, unseen data.

Key Features of Supervised Learning: