Types of Machine Learning - Notes

1. Supervised Learning

- Definition: Learning from labeled data.
- Types:
  - Regression: Predicting continuous values (e.g., price, temperature).
  - Classification: Predicting discrete categories (e.g., spam or not spam).
- Data Types:
  - Numerical
  - Categorical

2. Unsupervised Learning

- Definition: Learning from unlabeled data.
- Techniques:
  - Clustering: Grouping similar data points together.
  - Dimensionality Reduction: Reducing input features while retaining essential information.
    - Goal: Simplify data without losing critical patterns.
  - Anomaly Detection: Identifying unusual data points that do not conform to expected behavior.
    - Example: A spike in network traffic might indicate a security breach.
  - Association Rule Learning: Discovering relationships between variables (e.g., Market Basket Analysis).

3. Semi-Supervised Learning

- Definition: A mix of labeled and unlabeled data.
- Use Case: When labeling data is expensive or time-consuming.

4. Reinforcement Learning

Types of Machine Learning - Notes

- Definition: Learning by interacting with an environment to maximize a reward.

- Key Concepts:

  1. Agent observes the environment.

  2. Selects an action based on a policy.

  3. Takes action and interacts with the environment.

  4. Receives feedback (reward or penalty).

  5. Updates policy to improve future decisions.

  6. Repeats the cycle.