Introduction to Machine Learning - Lecture Notes

Chapter 1: Fundamentals of Machine Learning

Machine Learning is a subset of artificial intelligence that focuses on the development of algorithms and

Key Concepts:

1. Supervised Learning
Supervised learning is a type of machine learning where the algorithm learns from labeled training data

Examples of supervised learning include:
- Classification: Predicting discrete categories (e.g., spam vs. not spam)
- Regression: Predicting continuous values (e.g., house prices)

2. Unsupervised Learning
Unsupervised learning involves finding patterns in data without labeled examples. The algorithm tries to

Examples include:
- Clustering: Grouping similar data points together
- Dimensionality reduction: Reducing the number of features while preserving important information

3. Reinforcement Learning
Reinforcement learning is about learning through interaction with an environment. The agent learns to m

Key Terms:
- Agent: The learner or decision maker
- Environment: The world in which the agent operates
- Reward: Feedback signal that indicates how good an action was

Chapter 2: Data Preprocessing

Before applying machine learning algorithms, it's crucial to preprocess the data:

1. Data Cleaning
- Handle missing values
- Remove outliers
- Fix inconsistent data

2. Feature Engineering
- Create new features from existing ones
- Select relevant features
- Transform features to appropriate scales

3. Data Splitting
- Training set: Used to train the model
- Validation set: Used to tune hyperparameters
- Test set: Used to evaluate final performance