Chapter 0

Course Outline

1. Introduction to Statistics
    - Measures of Spread
    - Measures of Dispersion
    - Hypothesis Testing
    - Type1 Error, Type2 Error
    - Sampling
    - Probability Distributions
2. Math for Machine Learning
    - Method of Least Squares
    - Basic Linear Algebra
    - Introduction to optimization
3. Introduction to Machine Learning

    What is machine learning?
    Types of machine learning: -supervised, unsupervised, reinforcement

    - Supervised learning: regression and classification
    - Unsupervised learning: Clustering
    - Bias-variance tradeoff
    - Machine learning pipeline
    - Exploratory Data Analysis EDA
4. Feature Engineering and Selection
    - Feature Types
    - Feature scaling and normalization
    - Feature Selection methods
    - Dimensionality reduction
5. Model Evaluation and Selection
    - Training and Testing Sets
    - Overfitting and underfitting

- Performance metrics: accuracy, precision, recall, F1-Score
- Cross-Validation

6. Supervised Learning: Regression
    - Linear regression: simple and multiple
    - Regularization: L1 and L2
    - Gradient descent
    - Logistic regression
7. Supervised Learning: Classification
    - K-nearest neighbors
    - Decision trees and random forests
    - Ensemble methods
    - Support vector machines
8. Project - 1
    - Regression Dataset: Source(s):
9. Project -2
    - Classification Dataset: Source(s):
10. Advanced Topics in Machine Learning (Optional)
    - Deep learning: Overview of neural networks
    - Unsupervised Learning: clustering and dimensionality redduction
    - Reinforcement Learning: -Introduction and key concepts