

ML (Machine Learning)

- Introduction to Machine Learning
 - What is Machine Learning?
 - Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning.
 - Common terminologies: Features, Labels, Training Data, Testing Data, Overfitting, Underfitting.
- Supervised Learning
 - Linear Regression:
 - Overview and use cases.
 - How it predicts continuous values.
 - Logistic Regression:
 - Overview and use cases.
 - Binary classification and sigmoid function.
 - Decision Trees:
 - Overview and use cases.
 - How they split data based on features.
- Unsupervised Learning
 - Clustering:
 - Overview of K-Means Clustering.
 - Applications in customer segmentation.
 - Dimensionality Reduction:
 - Introduction to Principal Component Analysis (PCA).
 - Visualizing high-dimensional data in 2D.
- Exercises
 - Supervised Learning:
 - Use a pre-trained Linear Regression model to predict housing prices using the Boston Housing Dataset.
 - Load the dataset using Scikit-Learn.
 - Split the data into training and testing sets.
 - Use the provided Linear Regression model from Scikit-Learn.
 - Evaluate performance using Mean Squared Error (MSE).
 - Use a pre-trained Logistic Regression model to classify whether an email is spam or not using the SMS Spam Dataset
 - Load the dataset and preprocess text using libraries like NLTK.
 - Fit the provided Logistic Regression model and evaluate using accuracy and confusion matrix.
 - Unsupervised Learning
 - Perform K-Means Clustering on the Iris Dataset to group flowers based on features.
 - Load the Iris dataset from Scikit-Learn.
 - Use the provided K-Means implementation.
 - Visualize clusters using scatter plots.
 - Use PCA to reduce dimensions of the MNIST Dataset and visualize it in 2D.
 - Load the MNIST dataset.
 - Apply PCA from Scikit-Learn.
 - Visualize the first two principal components.
- Projects
 - Predict Loan Approval (Supervised Learning):
 - Dataset: Bank loan data from Kaggle.
 - Goal: Predict if a loan will be approved based on customer details.
 - Steps:
 - Preprocess the dataset (handle missing values and encode categorical variables).
 - Use the pre-built Decision Tree model from Scikit-Learn.

- Evaluate metrics like accuracy and F1-score.
- Customer Segmentation (Unsupervised Learning):
 - Dataset: E-commerce transaction data.
 - Goal: Group customers into segments using clustering.
 - Steps:
 - Preprocess data (normalize numerical features).
 - Use the pre-configured K-Means clustering model.
 - Visualize clusters using PCA and interpret segments.
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