**Wine Quality Prediction**

**Overview**

This project focuses on predicting the quality of red wine based on its physicochemical properties using Machine Learning techniques.

The model applies classification algorithms to determine wine quality on a scale from 3 to 8, providing valuable insights into which chemical properties influence wine taste and quality.

**Dataset**

- Source: [UCI Machine Learning Repository – Wine Quality

Dataset] ( <https://archive.ics.uci.edu/ml/datasets/Wine+Quality> )

**- Samples:** 1,599

**Features:**

- Fixed Acidity

- Volatile Acidity

- Citric Acid

- Residual Sugar

- Chlorides

- Free Sulfur Dioxide

- Total Sulfur Dioxide

- Density

- pH

- Sulphates

- Alcohol

- Target: Quality (Score 0–10)

**Tech Stack**

- Programming Language: Python

- Libraries: Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn

**Approach**

**1. Data Preprocessing**

- Fixed CSV parsing issues

- Converted features into numeric values

- Checked for and handled missing values

**2. Model Training**

- Used train-test split (80/20)

- Applied Random Forest Classifier

**3. Evaluation**

- Accuracy Achieved: ~67%

- Feature Importance Analysis shows:

- Alcohol, Sulphates, and Volatile Acidity are the most impactful predictors

**Note:** pip install pandas numpy scikit-learn matplotlib seaborn