A Red Wine Quality Prediction Model

By: Harsh Bhardwaj (E23CSEU0427)
Supervisor: Dr. Susmita Das (Assistant Professor)
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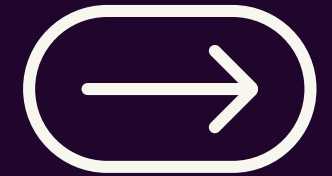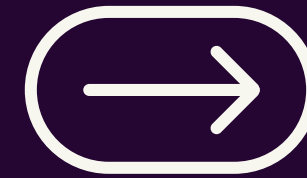
GitHub Repositor Link

To Predict The Quality Of Red Wine Based On Physico-Chemical Properties Using Machine Learning Techniques.

Dataset Contains Features Like Acidity, Residual Sugar, Chlorides, And Alcohol Content, Which Are Used As Predictors.

Approach: Pre-Process Data, Train Multiple Models, And Identify The Best Model.

INTRODUCTION

Background & Motivation

Wine Quality Prediction: A Crucial Task In The Wine Industry For Quality Control.

Motivation: Automate Quality Prediction For Efficiency, Reduced Costs, And Consistency.

Challenges: Requires Understanding The Complex Relationship Between Chemical Properties And Taste.

Machine Learning In Food And Beverage: Brief Overview Of ML Models Used For Product Quality Prediction.

Comparison: Logistic Regression, SVM, And Random Forest Applied In Previous Studies On Wine Quality.

Related Work

METHODOLOGY

Data Collection: Red Wine Quality Dataset
With 11 Features And A Quality Score.

Preprocessing: Handled Class Imbalance
With SMOTE, Applied Feature Scaling.

Model Selection: Built Pipelines For Logistic
Regression, SVM, And Random Forest.

Tuning: Used Grid Search For Hyper-
Parameter Tuning On SVM And Random
Forest Models.

System Requirements

Hardware

Basic Computing Device
(Laptop/Desktop).

Software

Flask For Web App
Development

Jupyter Notebook For
Model Development

Python Libraries

Python Libraries: Pandas, NumPy,
SKLearn, JobLib, SeaBorn

Experimental Results

Model Evaluation: Display Cross-Validation Scores, Accuracy, And Classification Report.
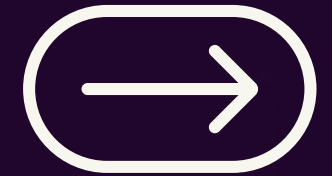
Best Model: Support Vector Classifier (SVC) Achieved The Highest Accuracy.

Confusion Matrix: Visual Representation Of Classification Performance.

Random Forest Feature Importances: Chart Showing The Most Influential Features In The Dataset (e.g., Alcohol, pH).

Insights: Brief Explanation Of How Each Feature Impacts Wine Quality.

FEATURE IMPORTANCE

Overview: Web Interface To Input Wine Characteristics And Predict Quality.

Features:
User-Friendly Form To Enter Wine Properties.
Dark/Light Mode Toggle.
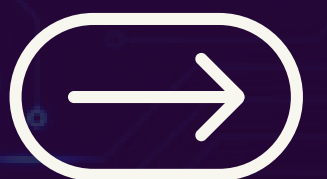Back-End Model Integration With Real-Time Predictions.

FLASK APPLICATION

CONCLUSION

Key Findings: Model Predicts Quality With Acceptable Accuracy, SVC Performs Best.

Limitations: Dataset Limited To Red Wine; Results May Vary With Different Datasets Or Feature Engineering.

FUTURE WORK

Expand To White Wine

Extend The Model To Work
On Other Types Of Wine.

Enhance Model

Try Ensemble Learning
Or Neural Networks For
Potentially Higher
Accuracy.

Deploy To Cloud

Host The Application For Broader
Accessibility.

Thank You!

🔍 [GitHub Repository]() 🎙