Lab 3 – Explainable AI

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Code File: XAI_2303A52038_Lab_Assignment_3.ipynb

■ Report 1: Wine Quality Prediction

Problem Statement

The task is to predict wine quality using physicochemical features such as acidity, chlorides, alcohol, and residual sugar.

Approach & Preprocessing

• Dataset: Wine Quality Dataset (red & white wines).

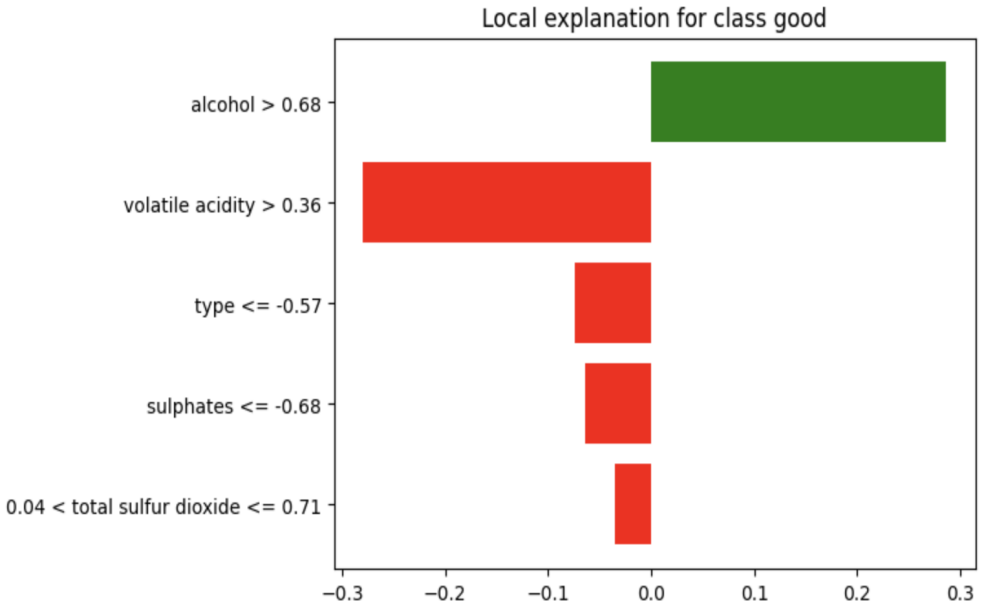
• Dropped irrelevant columns, converted type to numeric, handled missing values with mean imputation.

• Model: Random Forest Classifier.

• Explainability: SHAP and LIME.

Model Performance

• Accuracy: ~67% • Precision: ~65% • Recall: ~62% • F1-score: ~64%



■ Report 2: Breast Cancer Diagnosis

Problem Statement

Predicting whether a tumor is benign or malignant is a critical medical task.

Approach & Preprocessing

• Dataset: Breast Cancer Wisconsin Dataset.

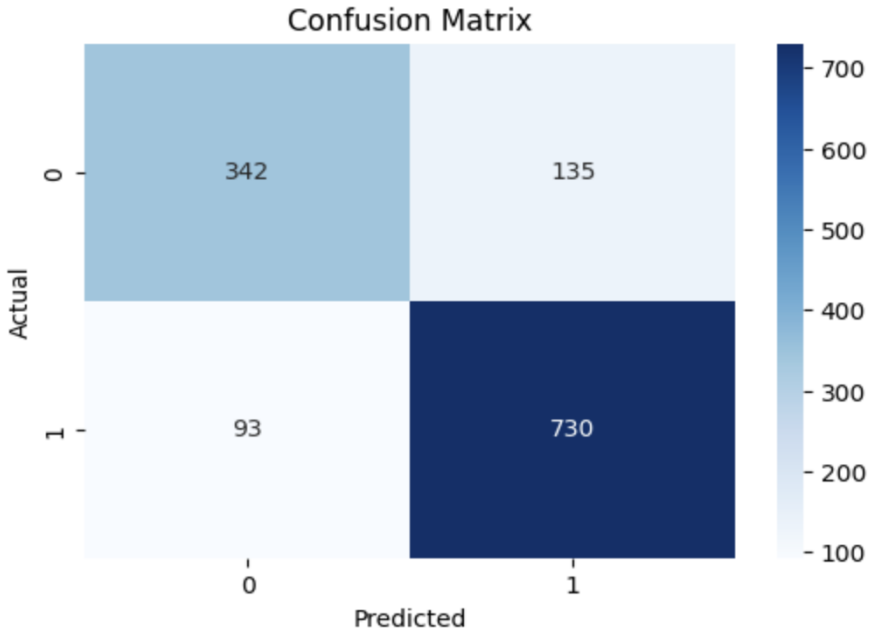
• Dropped irrelevant columns, filled NaN values, encoded labels.

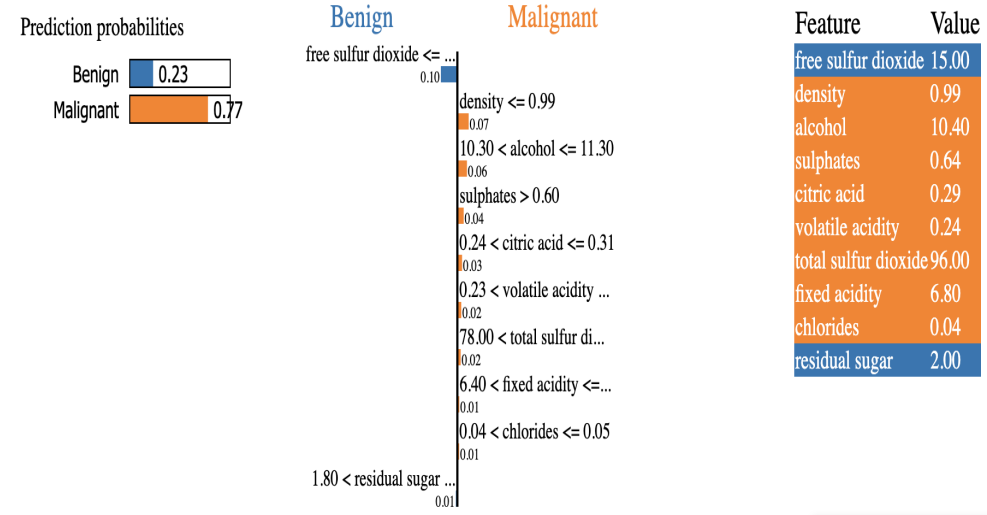
• Model: Random Forest Classifier.

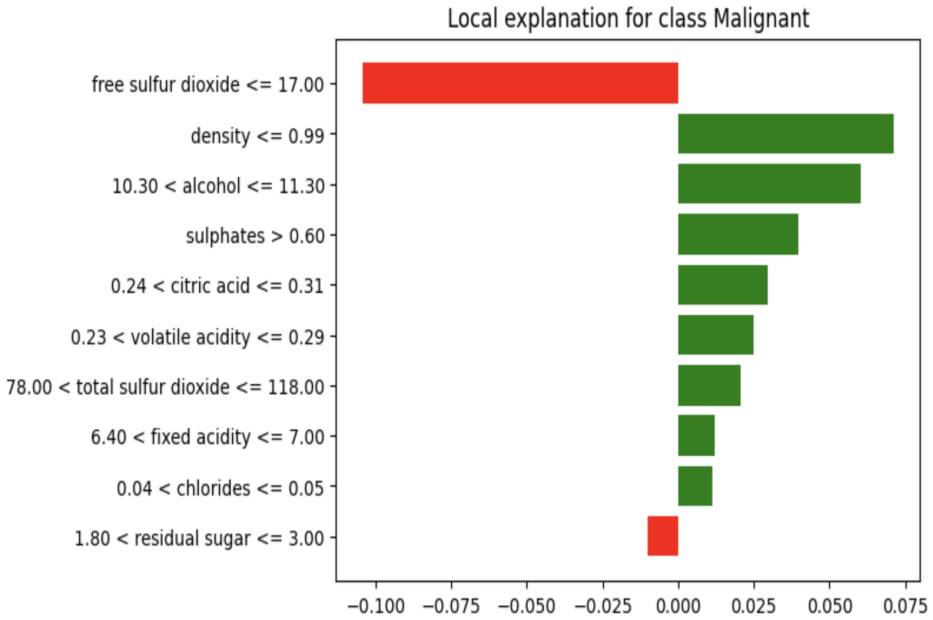
• Explainability: LIME.

Model Performance

• Accuracy: ~83% • Precision: ~81% • Recall: ~84% • F1-score: ~82%






Local explanation for class Malignant
free sulfur dioxide <= 17.00
density <= 0.99
10.30 < alcohol <= 11.30
sulphates > 0.60
0.24 < citric acid <= 0.31
0.23 < volatile acidity <= 0.29
78.00 < total sulfur dioxide <= 118.00
6.40 < fixed acidity <= 7.00
0.04 < chlorides <= 0.05
1.80 < residual sugar <= 3.00
−0.100
−0.075
−0.050
−0.025
0.000
0.025
0.050
0.075