WINE QUALITY ANALYSIS

LOW LEVEL DESIGN DOCUMENT
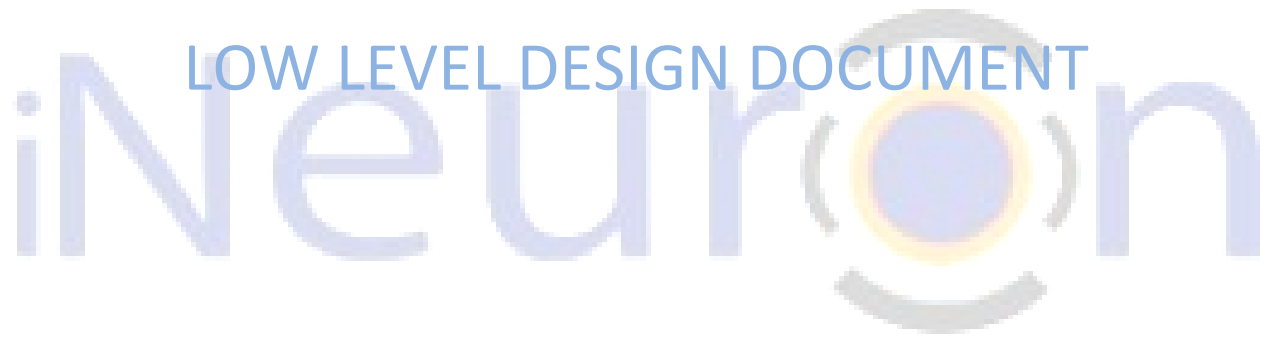
DOCUMENT VERSION CONTROL

Date Issue	Version	Description	Author
07/04/2023	1	Initial LLD – V 1.0	SHRUTI
14/04/2023	2	Final LLD – V 2.0	SHRUTI

CONTENT

ABSTRACT

Wine is an alcoholic beverage made from fermented grapes or other fruits. The process of making wine involves crushing and fermenting the fruit, usually grapes, to produce a liquid that contains alcohol.

Wine is classified based on several factors, including the type of grape used, the region where the grapes were grown, and the production methods used. Some common types of wine include red wine, white wine, rosé wine, and sparkling wine. Wine can also be classified as dry, semi-dry, or sweet, depending on the residual sugar content.

The objective of the project is to build a predictor that will help to understand the wine quality and its data pattern. The goal is to model wine quality based on physicochemical tests.

INTRODUCTION

What is a Low Level Design Document?

The goal of LLD or a low-level design document (LLDD) is to give the internal logical design of the actual program code for Credit Card Default Prediction. LLD describes the class diagrams with the methods and relations between classes and program specs. It

describes the modules so that the programmer can directly code the program from the document. Low-level design is a detailed description of every module of software. It describes every module in detail by incorporating the logic behind every component in the system. It delves deep into every specification of every system, providing a micro-level design.

Scope

Low Level Design (LLD) is a component level design process that follows a step by step refinement process. This process can be used to design data structure, required software architecture, source code and ultimately performance algorithm. Overall, the data organization may be defined during requirement analysis and then refined during data design work.

About the Project

There are Red and White Vinho Verde wine samples, from the north of Portugal. The goal is to model wine quality based on physicochemical tests.

This dataset contains details of the alcohol, residual sugar, acidity, density etc. and about having quality of wine. Using the attributes in the dataset we can predict quality of wine and identify the factors that affect the quality of wine.

Dataset Information

The two datasets are related to red and white variants of the Portuguese "Vinho Verde" wine. Due to privacy and logistic issues, only physicochemical (inputs) and sensory (the output) variables are available (e.g. there is no data about grape types, wine brand, wine selling price, etc.).

These datasets can be viewed as classification or regression tasks. The classes are ordered and not balanced (e.g. there are many more normal wines than excellent or poor ones). Outlier detection algorithms could be used to detect the few excellent or poor wines. Also, we are not sure if all input variables are relevant. So, it could be interesting to test feature selection methods.

Attribute Information

Input variables (based on physicochemical tests):

- fixed acidity

- volatile acidity

- citric acid

- residual sugar

- chlorides

Attribute Information

- free sulfur dioxide

- total sulfur dioxide

- density

- pH

- sulphates

- alcohol

- Output variable (based on sensory data):

- quality (score between 0 and 10)

Dataset Information

1.   Fixed acidity: The concentration of non-volatile acids in wine, including tartaric, malic, and lactic acids. These acids affect the pH levels of the wine, which in turn can impact its taste and mouthfeel. For example, high levels of fixed acidity can make wine taste sour or tart, while low levels can make it taste flat.

2.   Volatile Acidity: The concentration of acids, such as acetic acid, that can evaporate easily from wine and contribute to off-flavors and aromas. High levels of volatile acidity can give wine a vinegar-like taste and smell, while low levels can contribute to fruitiness and complexity.

3.   Citric acid is a weak organic acid found naturally in citrus fruits. In winemaking, it can be added to adjust the acidity of the wine and enhance its flavor and aroma. Citric acid can also act as an antioxidant, helping to preserve the wine's color and freshness.

4.   Residual sugar refers to the amount of sugar that remains in wine after fermentation. This can affect the wine's perceived sweetness, with higher levels of residual sugar making the wine taste sweeter.

5.   Chlorides are salts, primarily sodium chloride, that can be found in wine. These salts can impact the taste and mouthfeel of the wine, with high levels of chlorides contributing to a salty or briny taste.

6.   Free sulfur dioxide is a preservative commonly used in winemaking to prevent spoilage and oxidation. It can also act as an antioxidant, helping to maintain the wine's color and freshness.

7.   Total sulfur dioxide refers to the total concentration of sulfur dioxide in wine, both free and bound. This measurement is important for assessing the wine's stability and safety, as high levels of sulfur dioxide can be harmful to human health.

8.   Density is a measure of the mass per unit volume of wine. This measurement can provide information about the wine's alcohol and sugar content, as well as its overall viscosity and mouthfeel.

9.   pH is a measure of the acidity or basicity of a solution, with a pH of 7 being neutral, lower values indicating acidity, and higher values indicating basicity. In winemaking, pH is an important factor that can affect the wine's taste, stability, and ability to age.

10.   Sulphates are compounds that contain sulfur and oxygen. In winemaking, they can be added as a preservative or clarifying agent. While sulfates can help to prevent spoilage and improve the clarity of the wine, some people are sensitive to them and may experience adverse reactions.

11.   Alcohol refers to the percentage of ethanol in wine, which affects its taste and mouthfeel. Higher levels of alcohol can contribute to a fuller body and a warm, burning sensation, while lower levels can make the wine taste lighter and more refreshing.
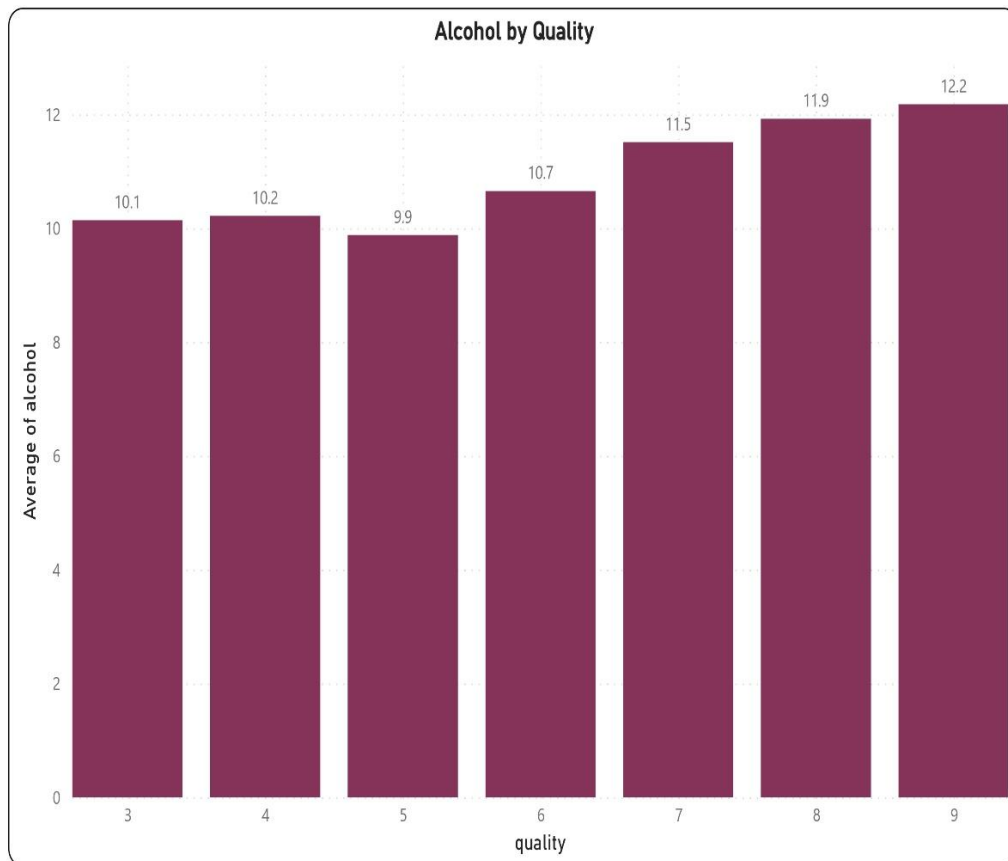
12.   Quality refers to a score between 0 and 10 that is based on sensory evaluations of the wine's appearance, aroma, flavor, and overall appeal. The quality of wine can be influenced by a range of factors, including the grape variety, the winemaking process, and the environmental conditions in which the grapes were grown.
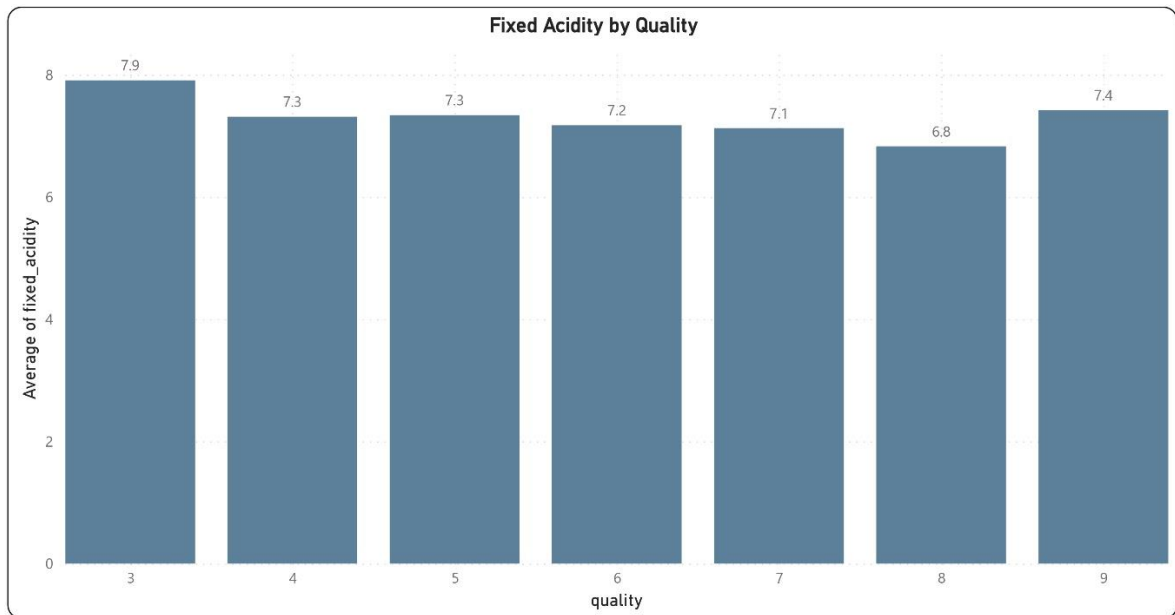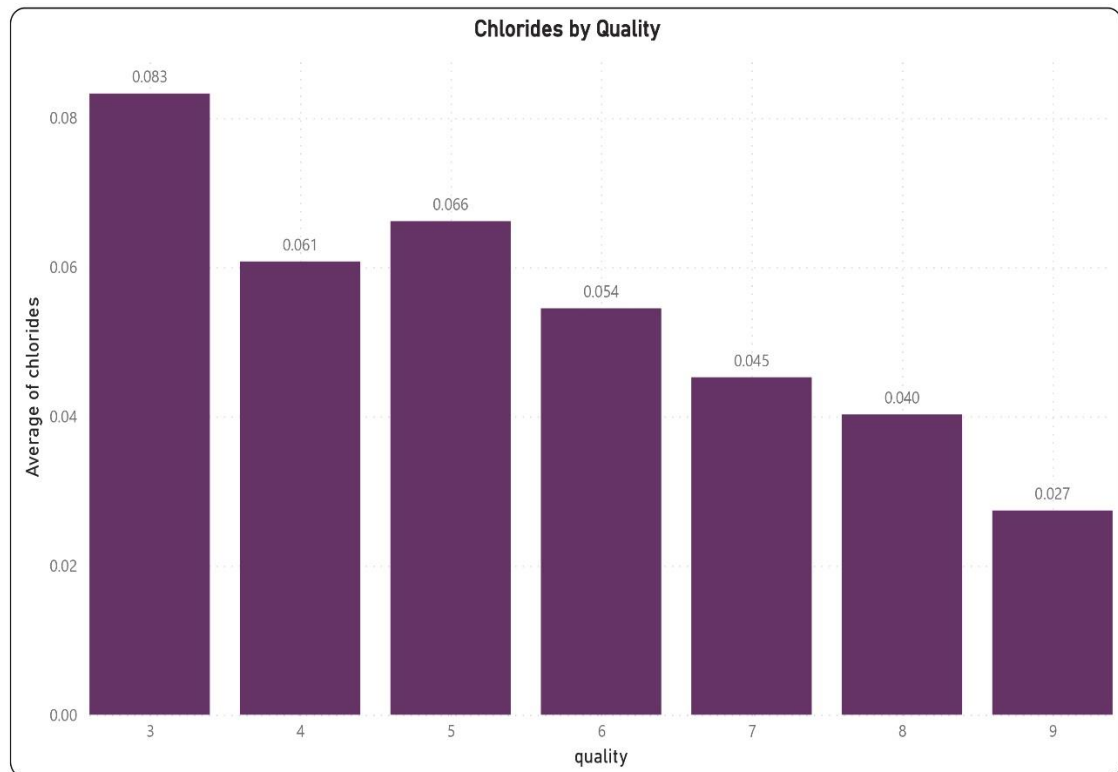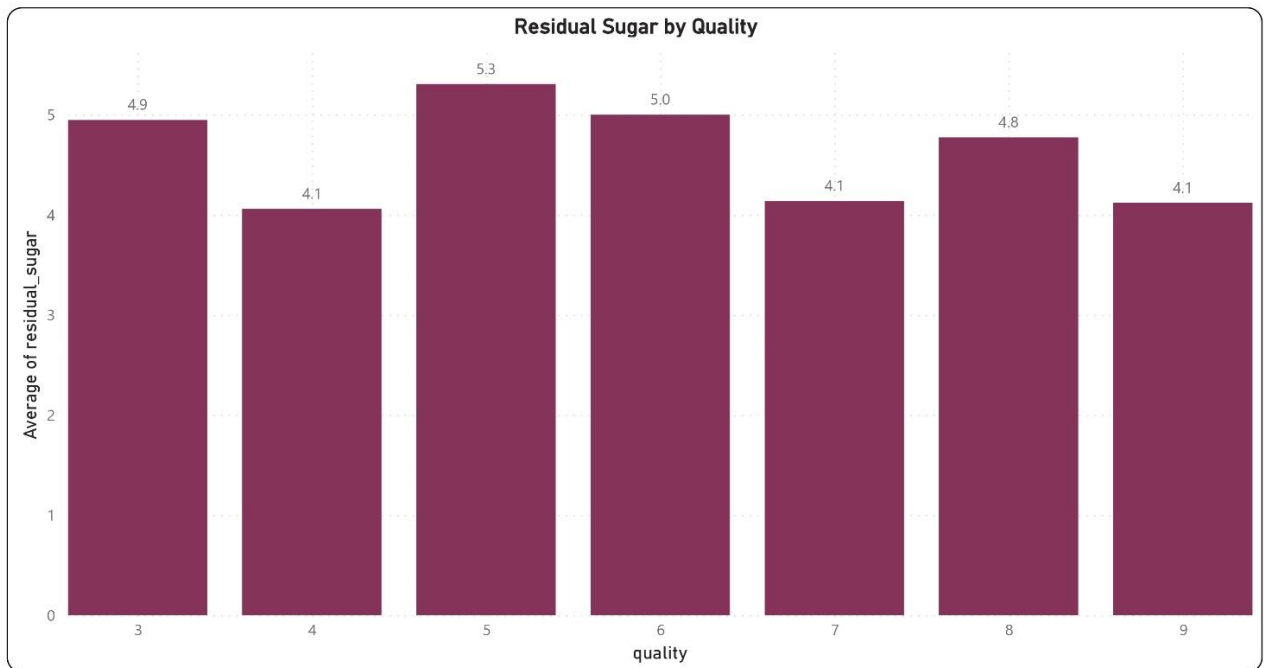
Types of Wine:
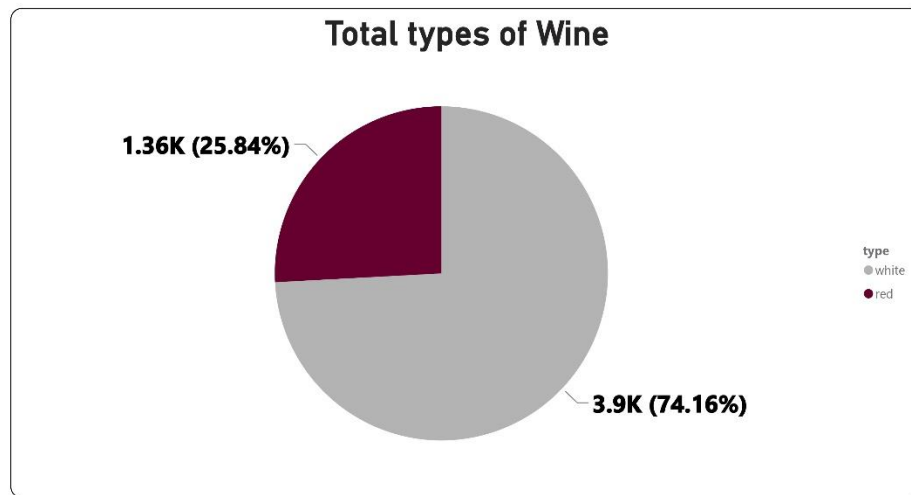
Alcohol by Quality:
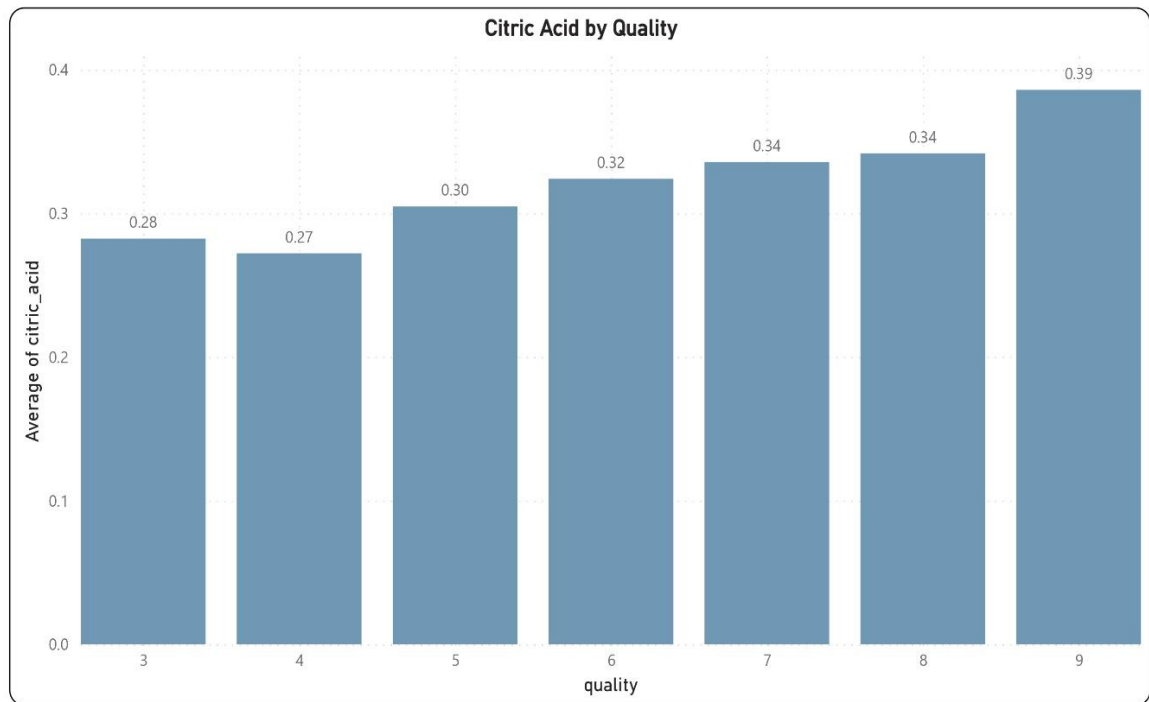
Fixed Acidity by Quality:

Chlorides by Quality:

Residual Sugar by Quality:

Citric Acid by Quality:

Dashboard:
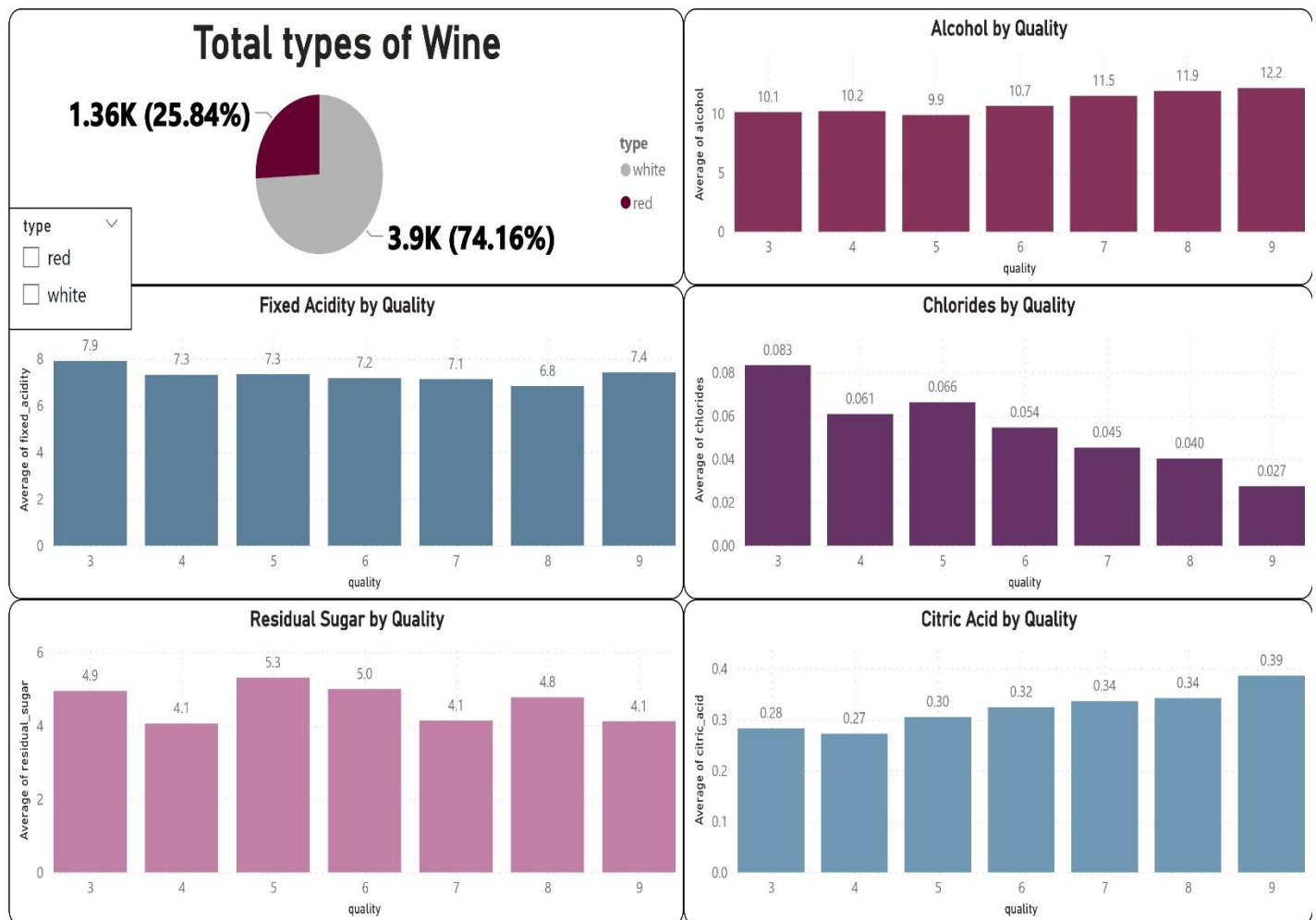
Predictor:

Wine Quality Prediction Web App

By SHRUTI KHANDELWAL

Quantity of Fixed Acidity

1.00

1.00   20.00

Quantity of Volatile Acidity

0.00

0.00   2.00

Quantity of Citric Acid

0.00

0.00   5.00

Quantity of Residual Sugar

0.00

0.00   20.00

Quantity of Chlorides

0.00

0.00   2.00

Quantity of Free Sulfur Dioxide

0.00

0.00   100.00

Quantity of Total Sulfur Dioxide

0.00

Quantity of Free Sulfur Dioxide

0.00

0.00   100.00

Quantity of Total Sulfur Dioxide

0.00

0.00   200.00

Density

0.00

0.00   1.00

Value of pH

0.00

0.00   14.00

Quantity of Sulphates

0.00

0.00   10.00

Quantity of alcohol

0.00

0.00   20.00

Wine Quality Results

Wine Quality is Bad