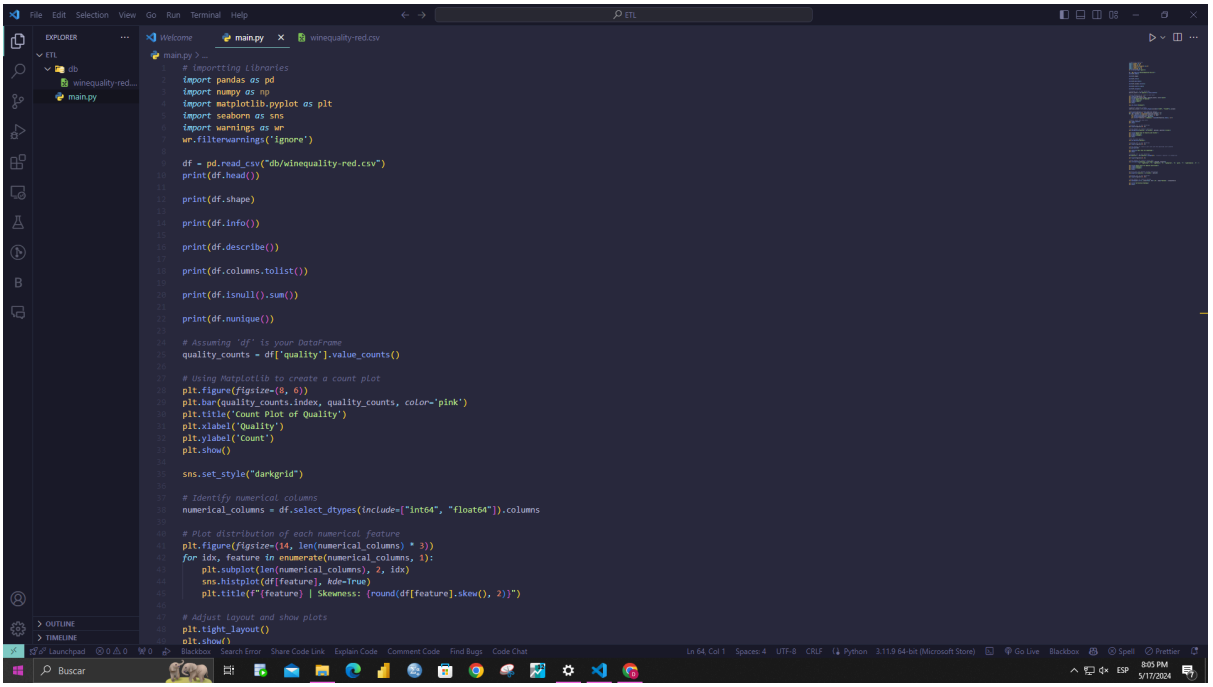
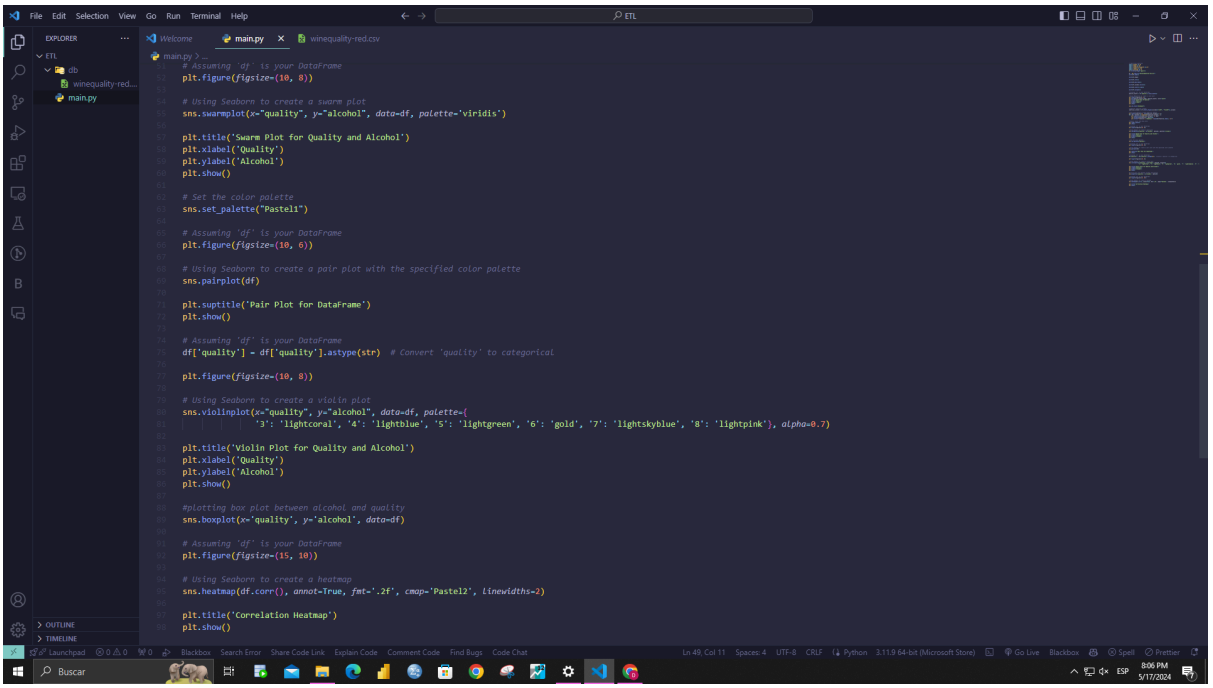


```python
# Importting libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings as wr
wr.filterwarnings('ignore')

df = pd.read_csv("db/winequality-red.csv")
print(df.head())

print(df.shape)

print(df.info())

print(df.describe())

print(df.columns.tolist())

print(df.isnull().sum())

print(df.nunique())

# Assuming 'df' is your DataFrame
quality_counts = df['quality'].value_counts()

# Using Matplotlib to create a count plot
plt.figure(figsize=(8, 6))
plt.bar(quality_counts.index, quality_counts, color='pink')
plt.title('Count Plot of Quality')
plt.xlabel('Quality')
plt.ylabel('Count')
plt.show()

sns.set_style("darkgrid")

# Identify numerical columns
numerical_columns = df.select_dtypes(include=["int64", "float64"]).columns

# Plot distribution of each numerical feature
plt.figure(figsize=(14, len(numerical_columns) * 3))
for idx, feature in enumerate(numerical_columns, 1):
    plt.subplot(len(numerical_columns), 2, idx)
    sns.histplot(df[feature], kde=True)
    plt.title(f"{feature} | Skewness: {round(df[feature].skew(), 2)}")

# Adjust layout and show plots
plt.tight_layout()
plt.show()
```



```python
# Assuming 'df' is your DataFrame
plt.figure(figsize=(10, 8))

# Using Seaborn to create a swarm plot
sns.swarmplot(x="quality", y="alcohol", data=df, palette='viridis')

plt.title('Swarm Plot for Quality and Alcohol')
plt.xlabel('Quality')
plt.ylabel('Alcohol')
plt.show()

# Set the color palette
sns.set_palette("Pastel1")

# Assuming 'df' is your DataFrame
plt.figure(figsize=(10, 6))

# Using Seaborn to create a pair plot with the specified color palette
sns.pairplot(df)

plt.suptitle('Pair Plot for DataFrame')
plt.show()

# Assuming 'df' is your DataFrame
df['quality'] = df['quality'].astype(str)  # Convert 'quality' to categorical

plt.figure(figsize=(10, 8))

# Using Seaborn to create a violin plot
sns.violinplot(x="quality", y="alcohol", data=df, palette={
               '3': 'lightcoral', '4': 'lightblue', '5': 'lightgreen', '6': 'gold', '7': 'lightskyblue', '8': 'lightpink'}, alpha=0.7)

plt.title('Violin Plot for Quality and Alcohol')
plt.xlabel('Quality')
plt.ylabel('Alcohol')
plt.show()

#plotting box plot between alcohol and quality
sns.boxplot(x='quality', y='alcohol', data=df)

# Assuming 'df' is your DataFrame
plt.figure(figsize=(15, 10))

# Using Seaborn to create a heatmap
sns.heatmap(df.corr(), annot=True, fmt='.2f', cmap='Pastel2', linewidths=2)

plt.title('Correlation Heatmap')
plt.show()
```

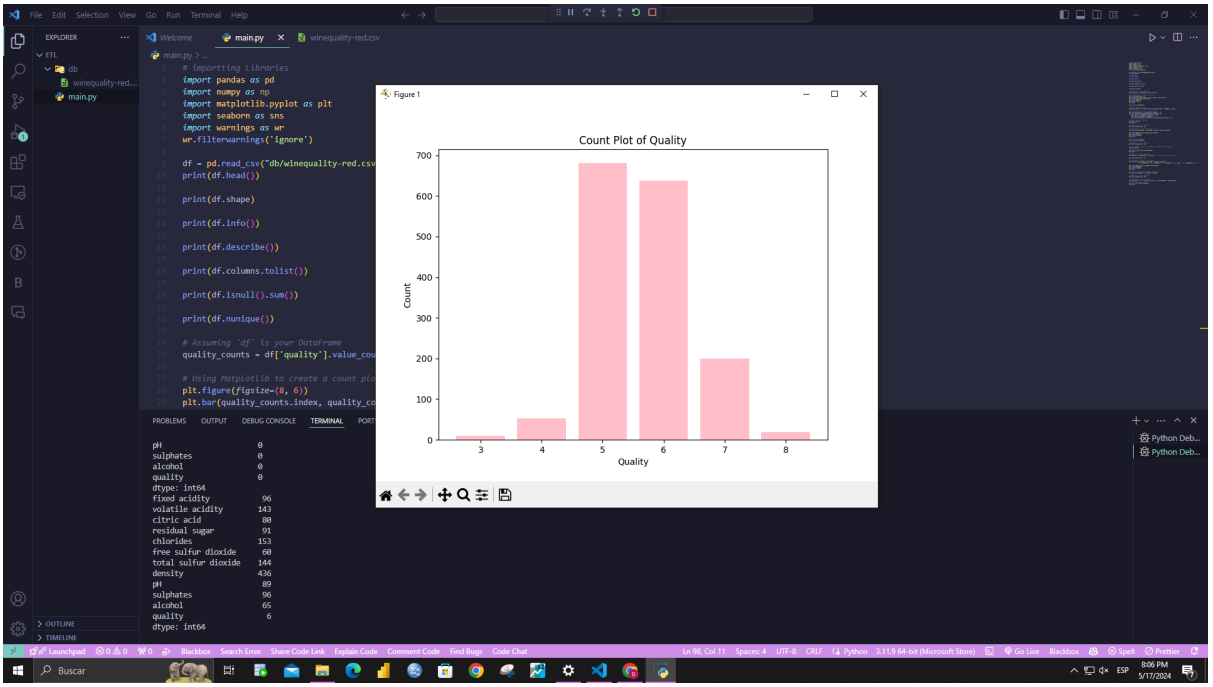


Figure 1
Count Plot of Quality
Count
Quality
0
100
200
300
400
500
600
700
3
4
5
6
7
8

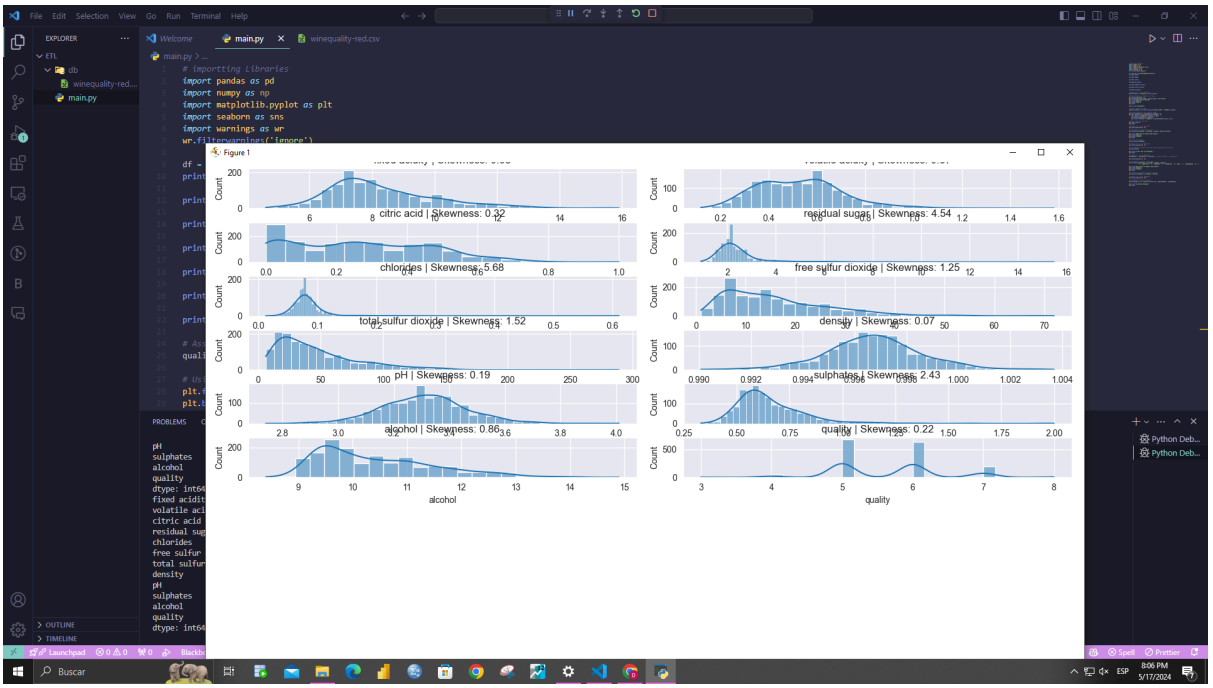


Figure 1
citric acid | Skewness: 0.32
residual sugar | Skewness: 4.54
chlorides | Skewness: 5.68
free sulfur dioxide | Skewness: 1.25
total sulfur dioxide | Skewness: 1.52
density | Skewness: 0.07
pH | Skewness: 0.19
sulphates | Skewness: 2.43
alcohol | Skewness: 0.86
quality | Skewness: 0.22
Count
alcohol
quality

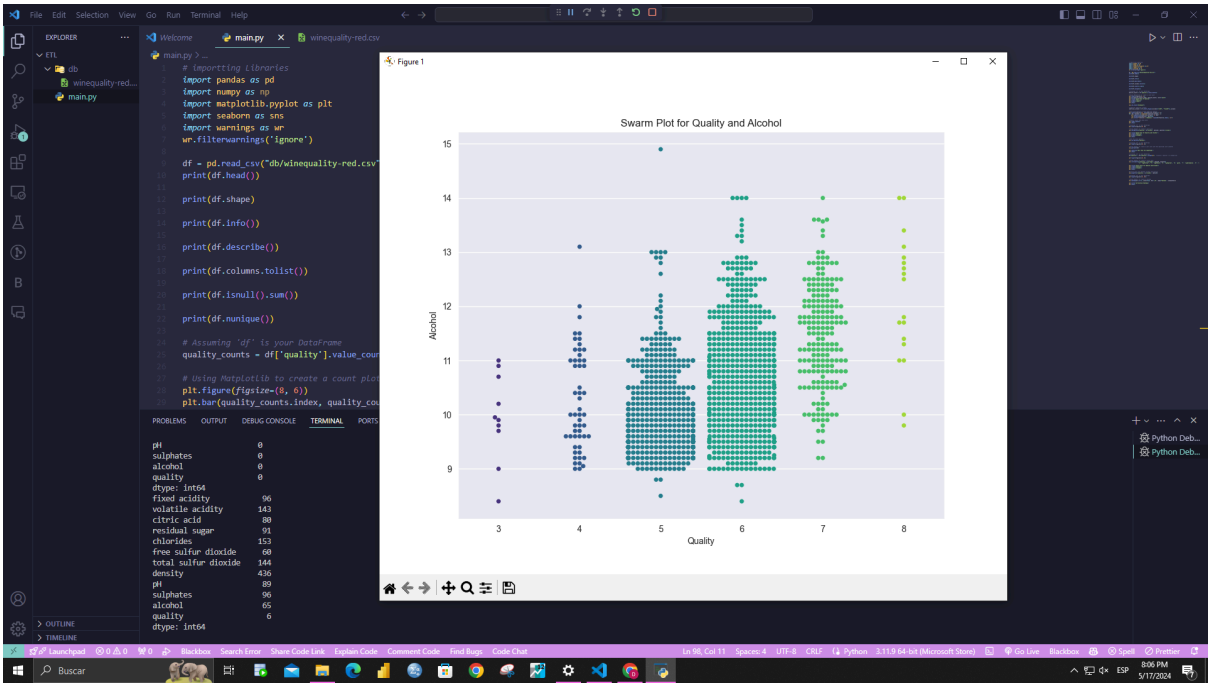


Figure 1
Swarm Plot for Quality and Alcohol
Alcohol
Quality
15
14
13
12
11
10
9
3
4
5
6
7
8

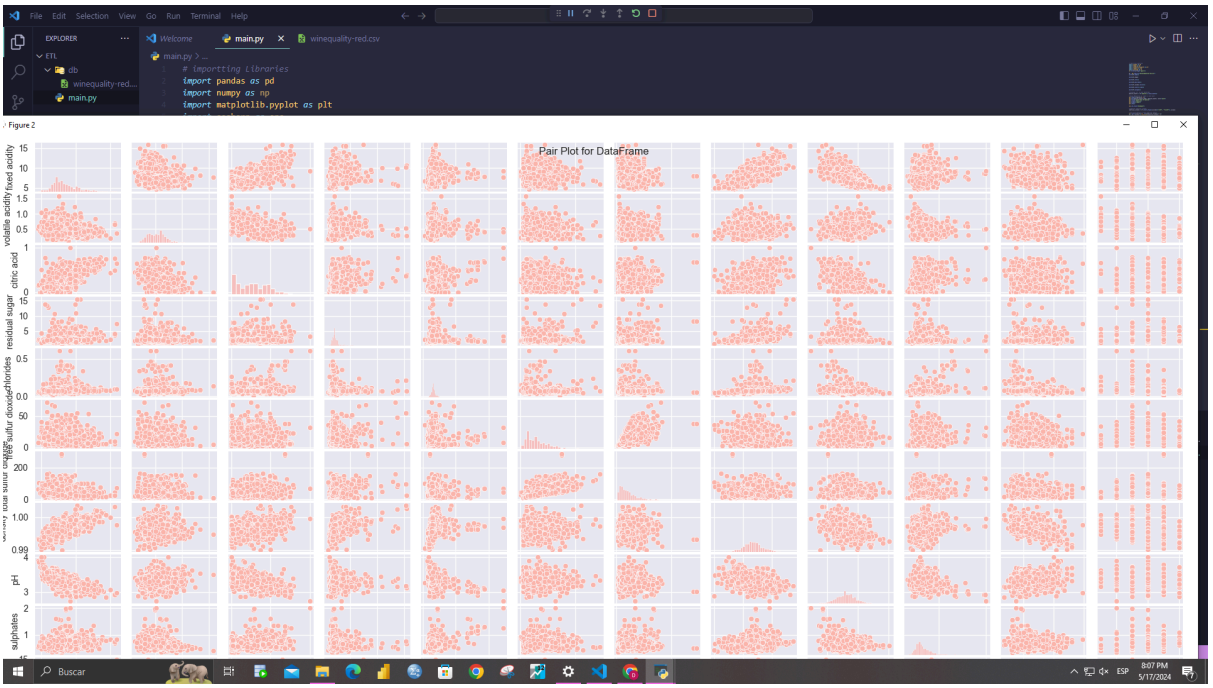


Figure 2
Pair Plot for DataFrame
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates

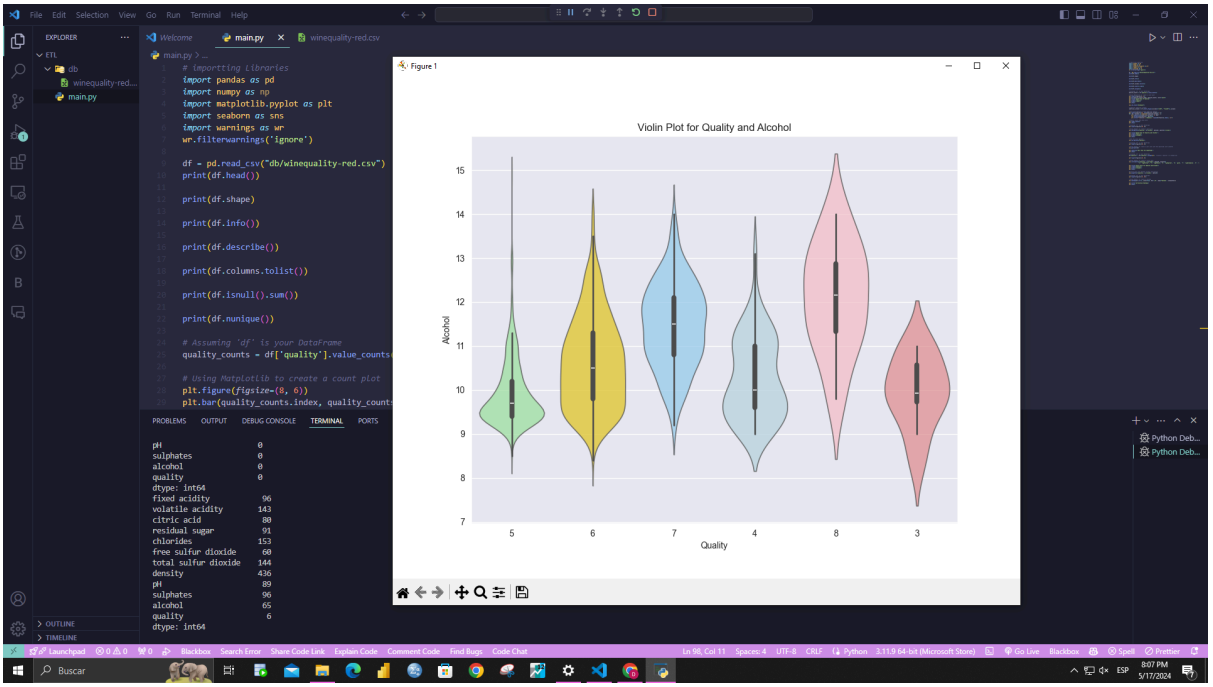


Figure 1
Violin Plot for Quality and Alcohol
Alcohol
Quality
15
14
13
12
11
10
9
8
7
5
6
7
4
8
3

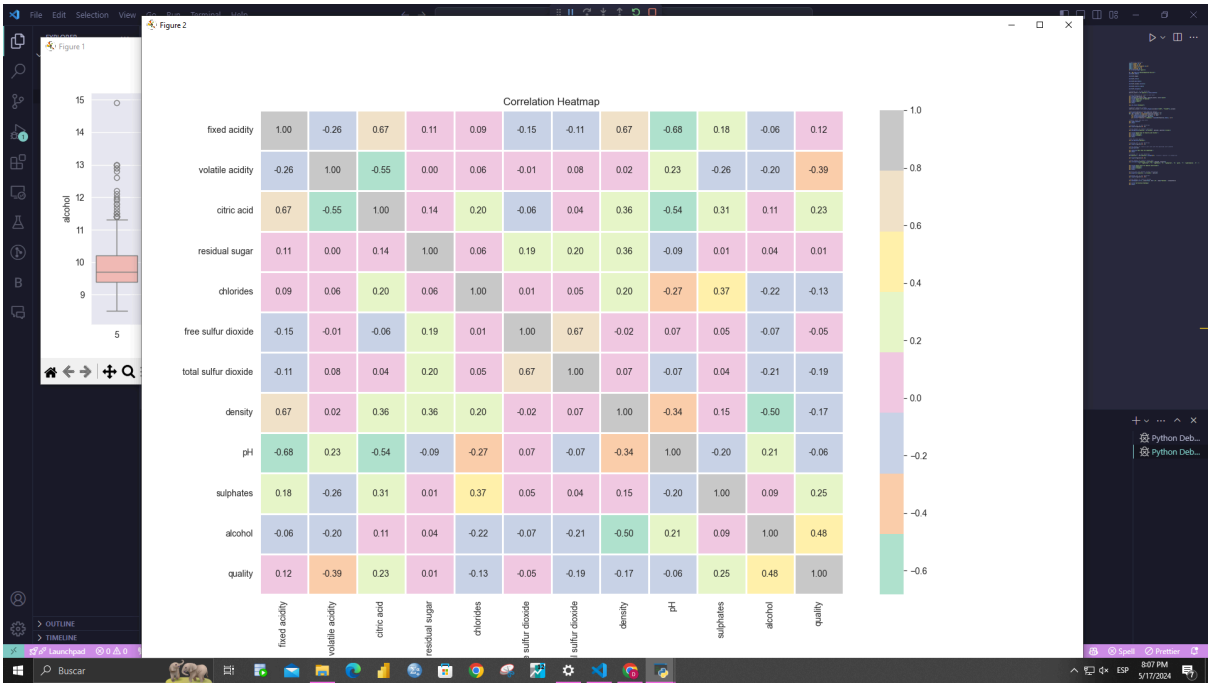


Figure 2
Correlation Heatmap
fixed acidity 1.00 -0.26 0.67 0.11 0.09 -0.15 -0.11 0.67 -0.68 0.18 -0.06 0.12
volatile acidity -0.26 1.00 -0.55 0.00 0.06 -0.01 0.08 0.02 0.23 -0.26 -0.20 -0.39
citric acid 0.67 -0.55 1.00 0.14 0.20 -0.06 0.04 0.36 -0.54 0.31 0.11 0.23
residual sugar 0.11 0.00 0.14 1.00 0.06 0.19 0.20 0.36 -0.09 0.01 0.04 0.01
chlorides 0.09 0.06 0.20 0.06 1.00 0.01 0.05 0.20 -0.27 0.37 -0.22 -0.13
free sulfur dioxide -0.15 -0.01 -0.06 0.19 0.01 1.00 0.67 -0.02 0.07 0.05 -0.07 -0.05
total sulfur dioxide -0.11 0.08 0.04 0.20 0.05 0.67 1.00 0.07 -0.07 0.04 -0.21 -0.19
density 0.67 0.02 0.36 0.36 0.20 -0.02 0.07 1.00 -0.34 0.15 -0.50 -0.17
pH -0.68 0.23 -0.54 -0.09 -0.27 0.07 -0.07 -0.34 1.00 -0.20 0.21 -0.06
sulphates 0.18 -0.26 0.31 0.01 0.37 0.05 0.04 0.15 -0.20 1.00 0.09 0.25
alcohol -0.06 -0.20 0.11 0.04 -0.22 -0.07 -0.21 -0.50 0.21 0.09 1.00 0.48
quality 0.12 -0.39 0.23 0.01 -0.13 -0.05 -0.19 -0.17 -0.06 0.25 0.48 1.00
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6

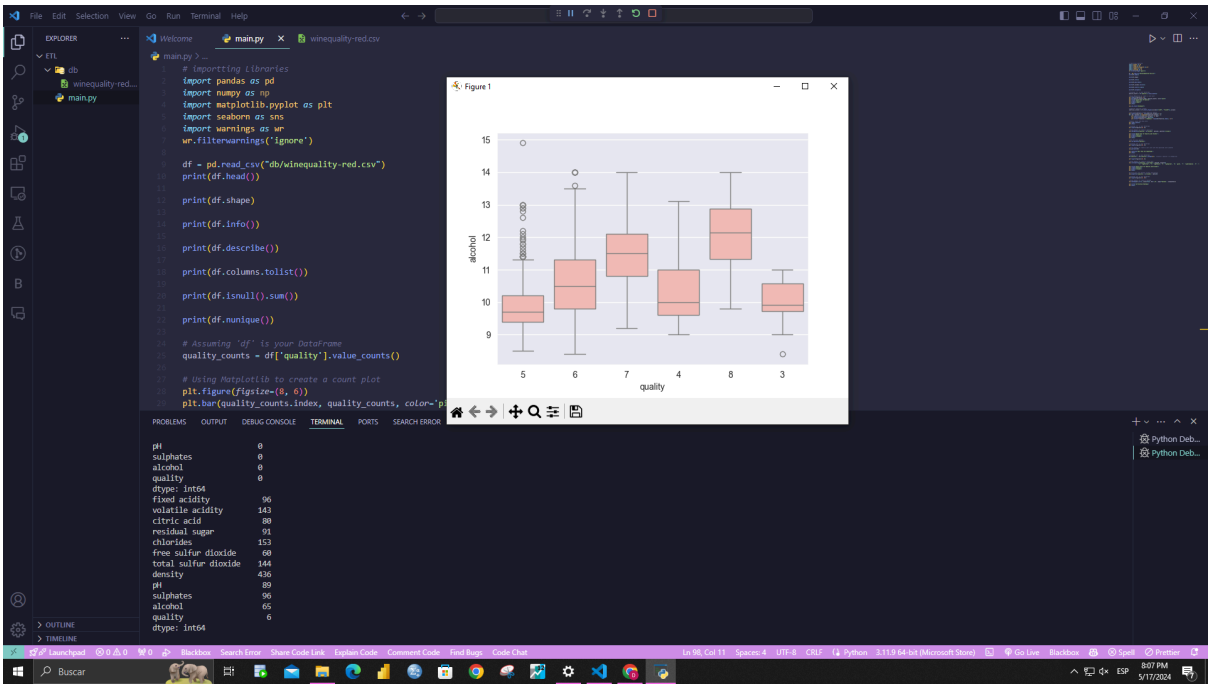


Figure 1
alcohol
quality
5
6
7
4
8
3
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
SEARCH ERROR
pH 0
sulphates 0
alcohol 0
quality 0
dtype: int64
fixed acidity 96
volatile acidity 143
citric acid 80
residual sugar 91
chlorides 153
free sulfur dioxide 60
total sulfur dioxide 144
density 436
pH 89
sulphates 96
alcohol 65
quality 6
dtype: int64