```
import pandas as pd

df = pd.read_csv('/content/survey lung cancer.csv')

print("First 5 rows of the dataset:")
display(df.head())

print("\nColumn names and their data types:")
display(df.info())
```

```
First 5 rows of the dataset:
```

	GENDER	AGE	SMOKING	YELLOW_FINGERS	ANXIETY	PEER_PRESSURE	CHRONIC DISEASE	FATIGUE	ALLERGY	WHEEZING	ALCOHOL CONSUMING	COUGHING	SHORTNESS OF BREATH
0	M	69	1	2	2	1	1	2	1	2	2	2	2
1	M	74	2	1	1	1	2	2	2	1	1	1	2
2	F	59	1	1	1	2	1	2	1	2	1	2	2
3	M	63	2	2	2	1	1	1	1	1	2	1	1
4	F	63	1	2	1	1	1	1	1	2	1	2	2

```
Column names and their data types:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 309 entries, 0 to 308
Data columns (total 16 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   GENDER                 309 non-null    object
 1   AGE                    309 non-null    int64
 2   SMOKING                309 non-null    int64
 3   YELLOW_FINGERS         309 non-null    int64
 4   ANXIETY                309 non-null    int64
 5   PEER_PRESSURE          309 non-null    int64
 6   CHRONIC DISEASE        309 non-null    int64
 7   FATIGUE                309 non-null    int64
 8   ALLERGY                309 non-null    int64
 9   WHEEZING               309 non-null    int64
 10  ALCOHOL CONSUMING      309 non-null    int64
 11  COUGHING               309 non-null    int64
 12  SHORTNESS OF BREATH    309 non-null    int64
 13  SWALLOWING DIFFICULTY  309 non-null    int64
 14  CHEST PAIN             309 non-null    int64
 15  LUNG_CANCER            309 non-null    object
dtypes: int64(14), object(2)
memory usage: 38.8+ KB
None
```

```
from sklearn.model_selection import train_test_split

X = df.drop('LUNG_CANCER', axis=1)
y = df['LUNG_CANCER']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

print("Shape of X_train:", X_train.shape)
print("Shape of X_test:", X_test.shape)
print("Shape of y_train:", y_train.shape)
print("Shape of y_test:", y_test.shape)
```

```
Shape of X_train: (247, 15)
Shape of X_test: (62, 15)
Shape of y_train: (247,)
Shape of y_test: (62,)
```

```
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)

print("Shape of X_train_scaled:", X_train_scaled.shape)
print("Shape of X_test_scaled:", X_test_scaled.shape)
```

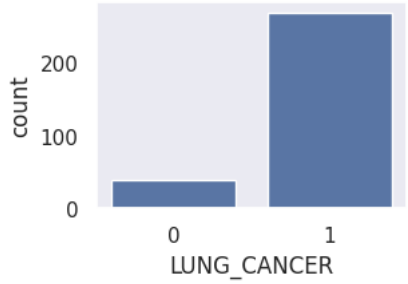
```
Shape of X_train_scaled: (247, 15)
Shape of X_test_scaled: (62, 15)
```

```
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score

model = LogisticRegression()
model.fit(X_train_scaled, y_train)

y_pred = model.predict(X_test_scaled)

accuracy = accuracy_score(y_test, y_pred)
precision = precision_score(y_test, y_pred)
recall = recall_score(y_test, y_pred)
f1 = f1_score(y_test, y_pred)

print(f"Accuracy: {accuracy:.4f}")
print(f"Precision: {precision:.4f}")
print(f"Recall: {recall:.4f}")
print(f"F1-score: {f1:.4f}")
```

```
Accuracy: 0.9677
Precision: 0.9833
Recall: 0.9833
F1-score: 0.9833
```

```
import matplotlib.pyplot as plt
import seaborn as sns

plt.figure(figsize=(3, 2))
sns.countplot(data=df, x='LUNG_CANCER')
```

```
<Axes: xlabel='LUNG_CANCER', ylabel='count'>
```



encoding

x and y me break

train test split

standard scaler

model *train*

```
from sklearn.preprocessing import LabelEncoder

label_encoder = LabelEncoder()
df['LUNG_CANCER'] = label_encoder.fit_transform(df['LUNG_CANCER'])
df['GENDER'] = label_encoder.fit_transform(df['GENDER'])

print(df.head())
```

```
   GENDER  AGE  SMOKING  YELLOW_FINGERS  ANXIETY  PEER_PRESSURE  \
0       1   69        1               2        2              1
1       1   74        2               1        1              1
2       0   59        1               1        1              2
3       1   63        2               2        2              1
4       0   63        1               2        1              1

   CHRONIC DISEASE  FATIGUE   ALLERGY   WHEEZING  ALCOHOL CONSUMING  COUGHING  \
0                1         2         1         2                  2         2
1                2         2         2         1                  1         1
2                1         2         1         2                  1         2
3                1         1         1         1                  2         1
4                1         1         1         2                  1         2
```

```
   SHORTNESS OF BREATH  SWALLOWING DIFFICULTY  CHEST PAIN  LUNG_CANCER
0                    2                       2           2            1
1                    2                       2           2            1
2                    2                       1           2            0
3                    1                       2           2            0
4                    2                       1           1            0
```

```
from sklearn.svm import SVC

model=SVC()
model.fit(X_train,y_train)
```

```
▾ SVC
SVC()
```

```
model.score(X_test,y_test)*100,model.score(X_train,y_train)*100
```

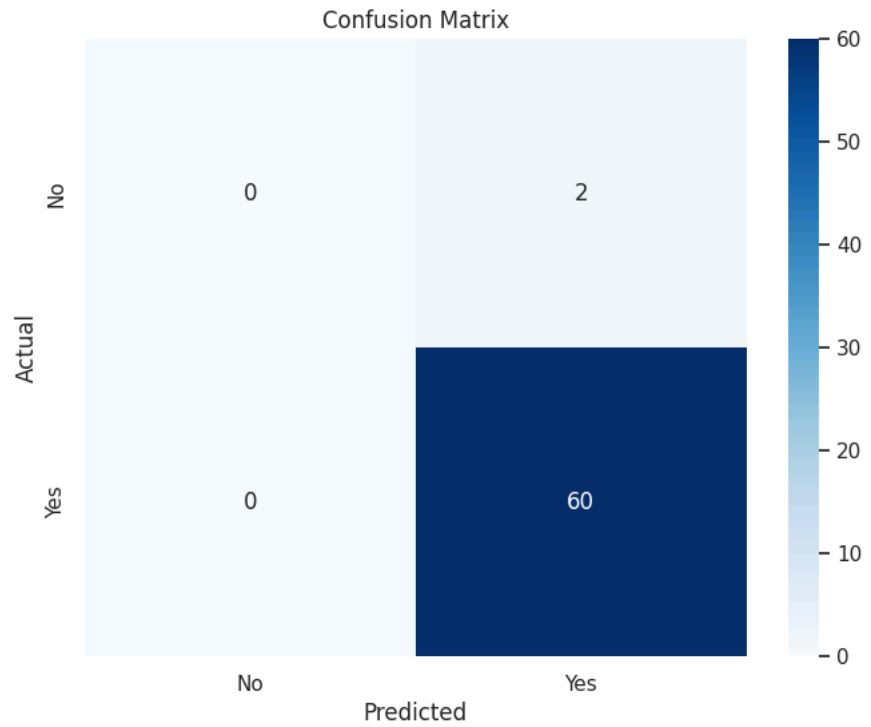
```
(96.7741935483871, 85.02024291497976)
```

```
y_pred=model.predict(X_test)
```

```
from sklearn.metrics import confusion_matrix
cm=confusion_matrix(y_test,y_pred)
cm
```

```
array([[ 0,  2],
       [ 0, 60]])
```

```
# Visualize the confusion matrix
plt.figure(figsize=(8, 6))
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=['No', 'Yes'], yticklabels=['No', 'Yes'])
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.title('Confusion Matrix')
plt.show()
```



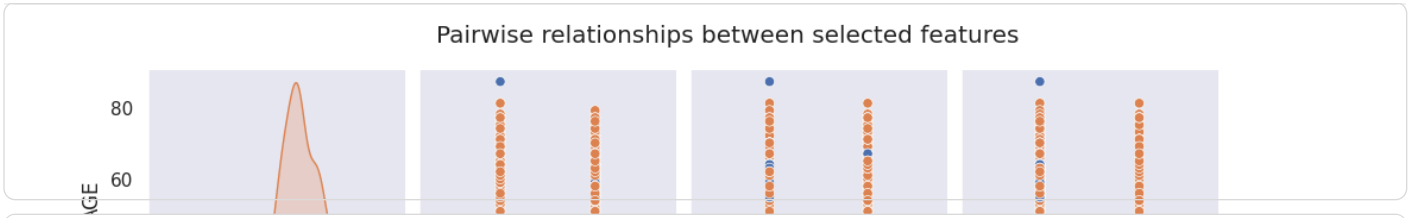

```
from sklearn.metrics import classification_report
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.00      0.00      0.00         2
```

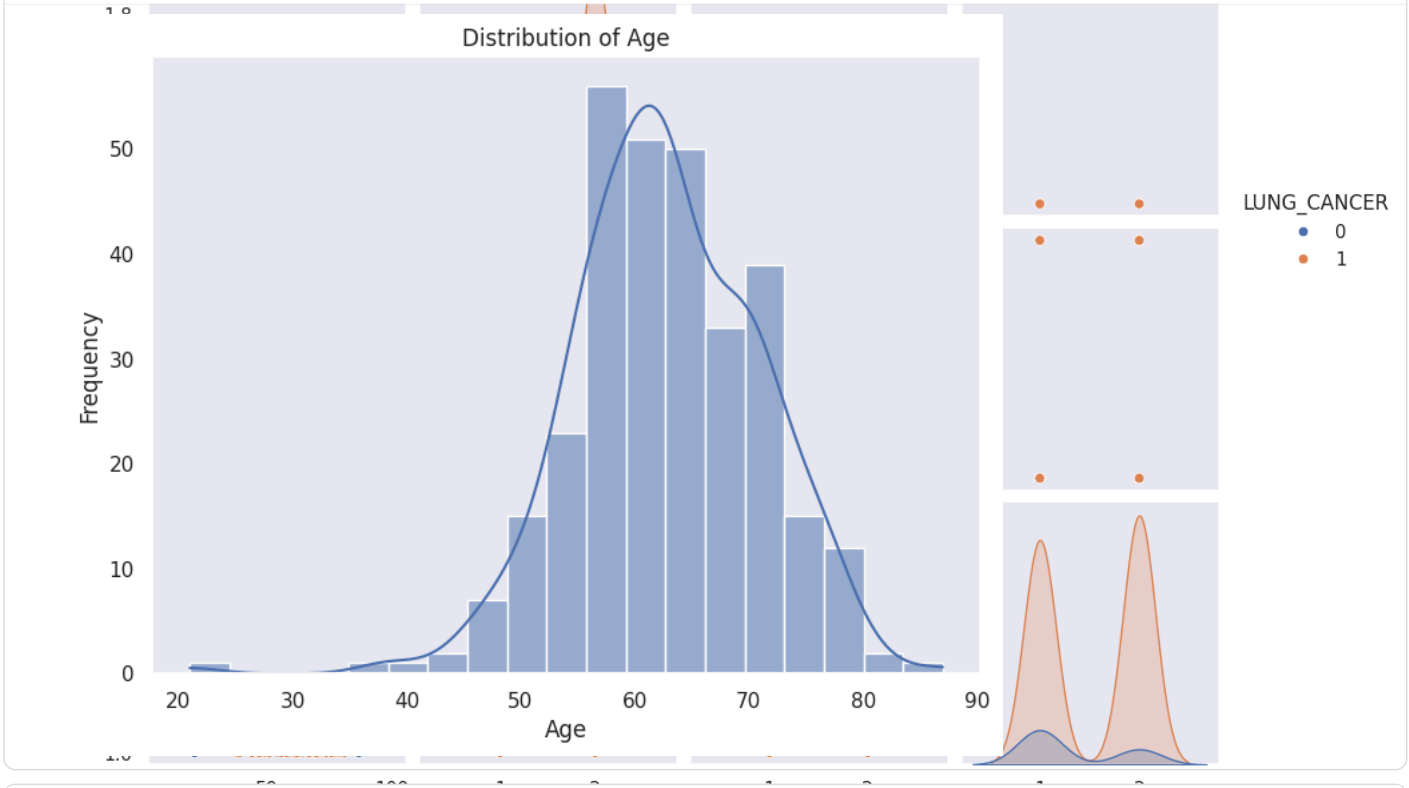
```
              1       0.97      1.00      0.98        60

    accuracy                           0.97        62
   macro avg       0.48      0.50      0.49        62
weighted avg       0.94      0.97      0.95        62

/usr/local/lib/python3.12/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Precision is ill-defined a
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
/usr/local/lib/python3.12/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Precision is ill-defined a
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
/usr/local/lib/python3.12/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Precision is ill-defined a
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
```

```
# Get categorical columns
categorical_cols = df.select_dtypes(include=['object', 'category']).columns

# Create bar plots for categorical features
for col in categorical_cols:
    print(f"\nAnalyzing column: {col}")
    plt.figure(figsize=(8, 4))
    sns.countplot(data=df, x=col, order=df[col].value_counts().index)
    plt.title(f'Count of {col}')
    plt.xlabel(col)
    plt.ylabel('Count')
    plt.show()
```

```
sns.pairplot(df[['AGE', 'SMOKING', 'YELLOW_FINGERS', 'ANXIETY', 'LUNG_CANCER']], hue='LUNG_CANCER')
plt.suptitle('Pairwise relationships between selected features', y=1.02)
plt.show()
```

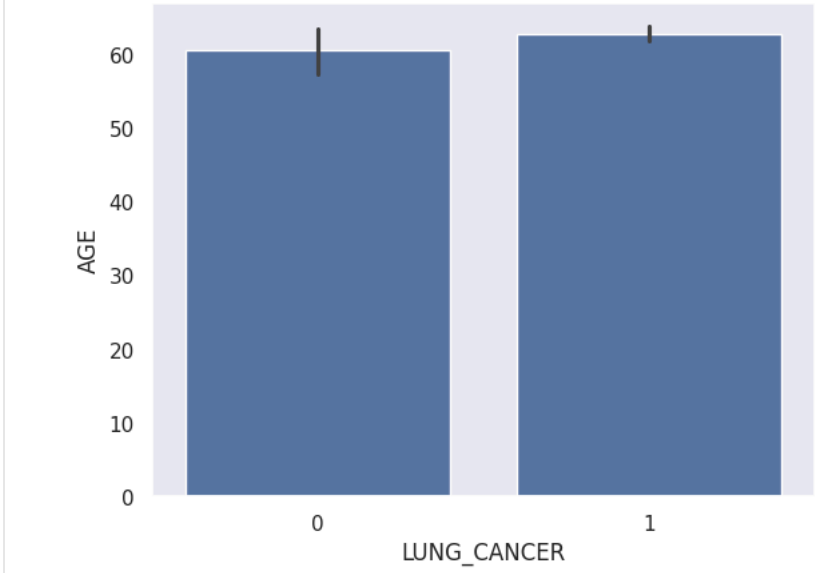



```
plt.figure(figsize=(8, 6))
sns.histplot(data=df, x='AGE', kde=True)
plt.title('Distribution of Age')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.show()
```



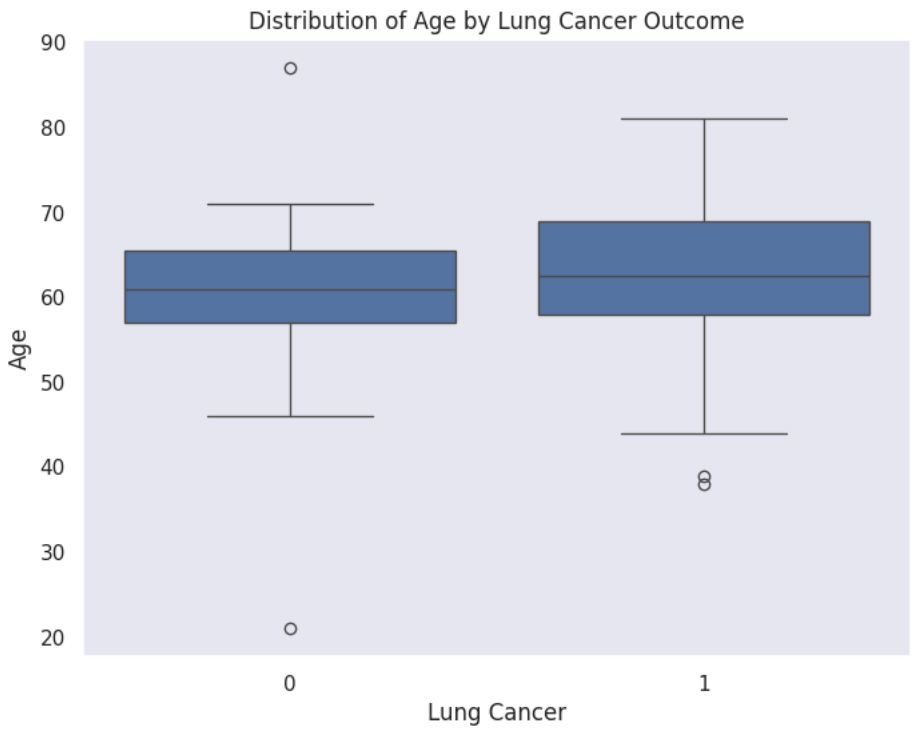

```
sns.barplot(x='LUNG_CANCER', y='AGE', data=df)
```

```
<Axes: xlabel='LUNG_CANCER', ylabel='AGE'>
```

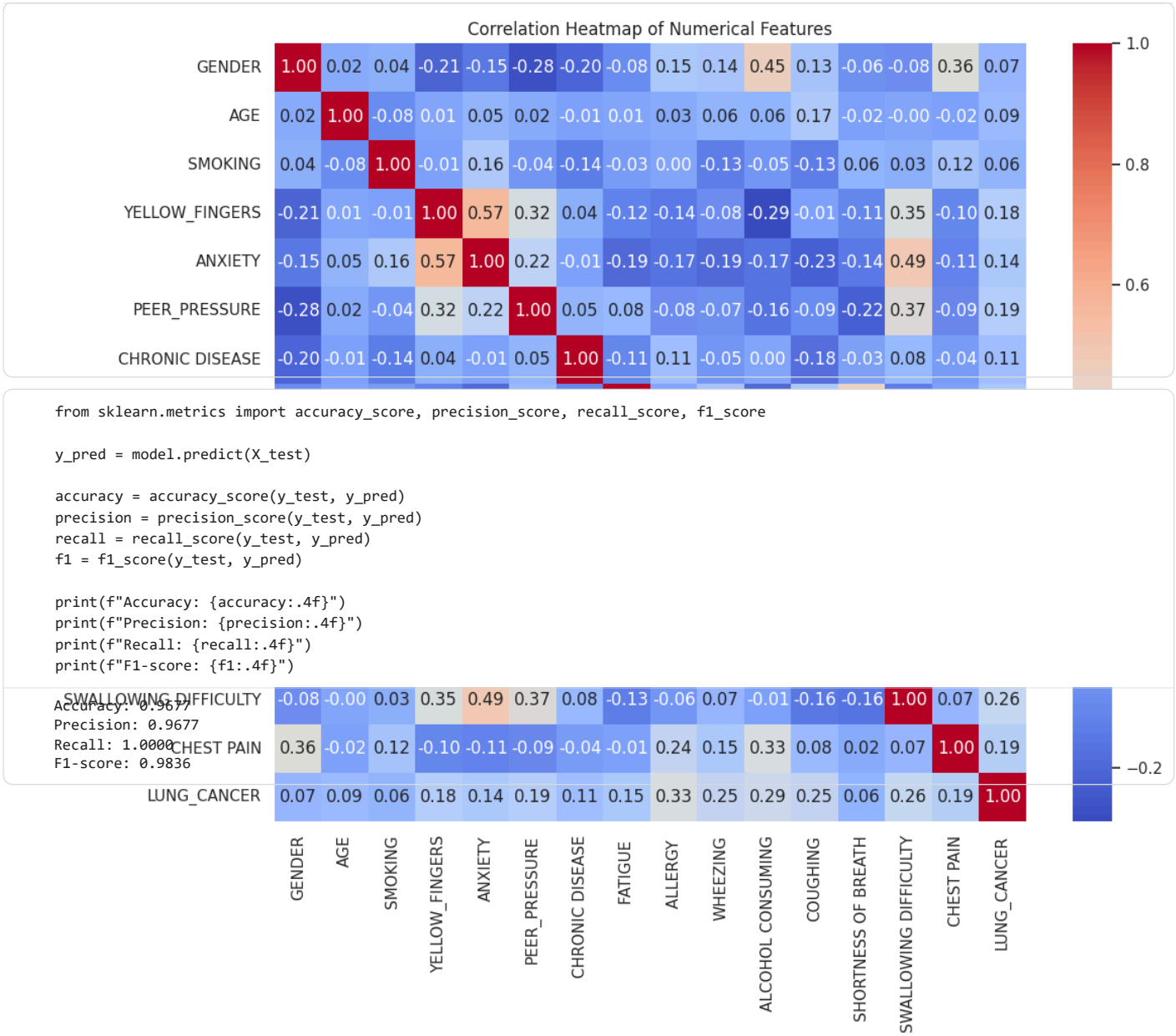



```
plt.figure(figsize=(8, 6))
sns.boxplot(data=df, x='LUNG_CANCER', y='AGE')
```

```
plt.title('Distribution of Age by Lung Cancer Outcome')
plt.xlabel('Lung Cancer')
plt.ylabel('Age')
plt.show()
```




```
plt.figure(figsize=(12, 10))
sns.heatmap(df.corr(), annot=True, cmap='coolwarm', fmt=".2f")
plt.title('Correlation Heatmap of Numerical Features')
plt.show()
```




```
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score

y_pred = model.predict(X_test)

accuracy = accuracy_score(y_test, y_pred)
precision = precision_score(y_test, y_pred)
recall = recall_score(y_test, y_pred)
f1 = f1_score(y_test, y_pred)

print(f"Accuracy: {accuracy:.4f}")
print(f"Precision: {precision:.4f}")
print(f"Recall: {recall:.4f}")
print(f"F1-score: {f1:.4f}")
```

```
Accuracy: 0.9677
Precision: 0.9677
Recall: 1.0000
F1-score: 0.9836
```