main

June 9, 2025

```
[ ]: import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sns
     from sklearn.model_selection import train_test_split
     from sklearn.preprocessing import StandardScaler, OneHotEncoder
     from sklearn.compose import ColumnTransformer
     from sklearn.ensemble import RandomForestClassifier
     from sklearn.metrics import classification_report, confusion_matrix,␣
       ↪accuracy_score
```

```
[ ]: df = pd.read_csv('/home/ajay/Documents/sleeping_dog_don/Heart_Disease/dataset.
       ↪csv')
     df.head()
```

```
[ ]:    age  sex  chest pain type  resting bp s  cholesterol  fasting blood sugar  \
     0   40    1                2           140          289                    0
     1   49    0                3           160          180                    0
     2   37    1                2           130          283                    0
     3   48    0                4           138          214                    0
     4   54    1                3           150          195                    0

        resting ecg  max heart rate  exercise angina  oldpeak  ST slope  target
     0            0             172                0      0.0         1       0
     1            0             156                0      1.0         2       1
     2            1              98                0      0.0         1       0
     3            0             108                1      1.5         2       1
     4            0             122                0      0.0         1       0
```

```
[ ]: X = df.drop('target', axis=1)
     y = df['target']
     print(X.columns)
```

```
Index(['age', 'sex', 'chest pain type', 'resting bp s', 'cholesterol',
       'fasting blood sugar', 'resting ecg', 'max heart rate',
       'exercise angina', 'oldpeak', 'ST slope'],
      dtype='object')
```

[ ]:
```python
numeric_features = ['age', 'resting bp s', 'cholesterol', 'max heart rate',␣
  ↪'oldpeak']
categorical_features = ['sex', 'chest pain type', 'fasting blood sugar',
                        'resting ecg', 'exercise angina', 'ST slope']

preprocessor = ColumnTransformer([
    ('num', StandardScaler(), numeric_features),
    ('cat', OneHotEncoder(handle_unknown='ignore'), categorical_features)
])
```

[ ]:
```python
X_train_raw, X_test_raw, y_train, y_test = train_test_split(X, y, test_size=0.
  ↪2, random_state=42)

X_train = preprocessor.fit_transform(X_train_raw)
X_test = preprocessor.transform(X_test_raw)
```

[ ]:
```python
rf = RandomForestClassifier(random_state=42)
rf.fit(X_train, y_train)
```

[ ]:
```
RandomForestClassifier(random_state=42)
```

[ ]:
```python
y_pred = rf.predict(X_test)

print("Accuracy:", accuracy_score(y_test, y_pred))


print(classification_report(y_test, y_pred))
```

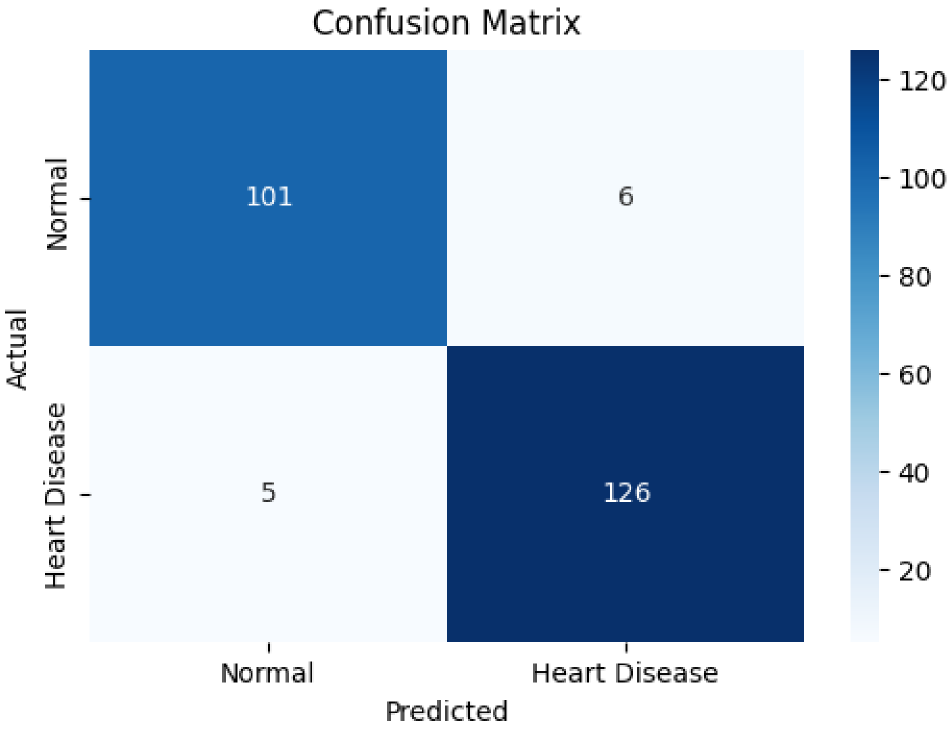
```
Accuracy: 0.9537815126050421
              precision    recall  f1-score   support

           0       0.95      0.94      0.95       107
           1       0.95      0.96      0.96       131

    accuracy                           0.95       238
   macro avg       0.95      0.95      0.95       238
weighted avg       0.95      0.95      0.95       238
```

[ ]:
```python
cm = confusion_matrix(y_test, y_pred)

plt.figure(figsize=(6,4))
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=['Normal',␣
  ↪'Heart Disease'], yticklabels=['Normal', 'Heart Disease'])
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.title('Confusion Matrix')
plt.show()
```

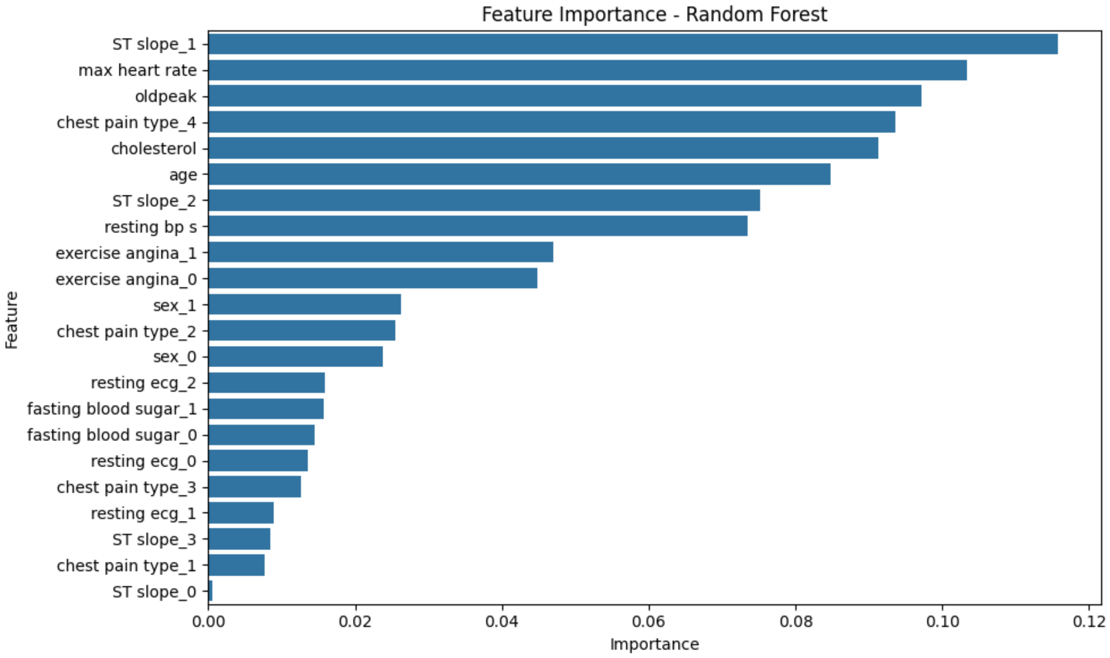


[ ]:

```
encoded_feature_names = preprocessor.named_transformers_['cat'].
  ↪get_feature_names_out(categorical_features)
all_features = np.concatenate([numeric_features, encoded_feature_names])

importances = rf.feature_importances_
feat_imp_df = pd.DataFrame({'Feature': all_features, 'Importance': importances})
feat_imp_df = feat_imp_df.sort_values('Importance', ascending=False)

plt.figure(figsize=(10,6))
sns.barplot(x='Importance', y='Feature', data=feat_imp_df)
plt.title("Feature Importance - Random Forest")
plt.tight_layout()
plt.show()
```


Feature Importance - Random Forest
ST slope_1
max heart rate
oldpeak
chest pain type_4
cholesterol
age
ST slope_2
resting bp s
exercise angina_1
exercise angina_0
sex_1
chest pain type_2
sex_0
resting ecg_2
fasting blood sugar_1
fasting blood sugar_0
resting ecg_0
chest pain type_3
resting ecg_1
ST slope_3
chest pain type_1
ST slope_0
Feature
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Importance