A

Assesment Report

on

"Predict Heart Disease"

submitted as partial fulfillment for the award of

BACHELOR OF TECHNOLOGY DEGREE

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in

CSE-AI

By

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Introduction

This project focuses on predicting the presence of **heart disease** in patients using **machine learning techniques**. By analyzing key medical attributes such as age, cholesterol, blood pressure, and other health indicators, the model aims to classify whether a patient is likely to have heart disease.

We used the **Logistic Regression algorithm**, a widely used classification method, to train the model on historical data. The dataset was processed, scaled, and split into training and testing sets. Model performance was evaluated using metrics like **accuracy, precision, recall**, and a **confusion matrix heatmap**.

The goal is to assist early diagnosis by building a reliable, data-driven prediction system.

Methodology

Step 1: Data Collection

- Loaded the dataset (CSV file) containing patient health records.
- Each row represents a patient and each column is a medical feature (like age, cholesterol, etc.).

Step 2: Data Preprocessing

- **Handled missing values** (if any).
- **Separated features (X) and target (y)**:
  - X = all input features (medical data)
  - y = output label (1 = heart disease, 0 = no heart disease)
- **Scaled the data** using StandardScaler to normalize feature values for better model performance.

Step 3: Splitting the Dataset

- Split the dataset into:
  - **Training set (80%)** — used to train the model
  - **Testing set (20%)** — used to evaluate performance
- Used train_test_split() from sklearn.model_selection.

Step 4: Model Selection

- Chose **Logistic Regression**, a supervised learning algorithm suitable for binary classification.
- Logistic regression calculates the **probability** that a patient has heart disease based on input features.

Step 5: Model Training

- Used model.fit(X_train, y_train) to train the logistic regression model on the training set.

Step 6: Model Prediction

- Used model.predict(X_test) to make predictions on the unseen test data.

Step 7: Model Evaluation

- Evaluated model performance using:
    - **Accuracy**: Overall correctness
    - **Precision**: How many predicted positives were actually positive
    - **Recall**: How many actual positives were correctly predicted

    - **Confusion Matrix**: Visual representation of true vs. predicted values
- Plotted a **heatmap** of the confusion matrix for clear visualization using seaborn.

Step 8: Interpretation of Results

- Analyzed evaluation metrics to understand how well the model performs.
- Discussed strengths and possible areas for improvement.

Code

```
import pandas as pd

from sklearn.model_selection import train_test_split

from sklearn.preprocessing import StandardScaler

from sklearn.linear_model import LogisticRegression

from sklearn.metrics import confusion_matrix, accuracy_score, precision_score,
recall_score

import seaborn as sns

import matplotlib.pyplot as plt

from google.colab import files

uploaded = files.upload()

df = pd.read_csv(next(iter(uploaded)))  # auto-detect uploaded file


#  Split and Scale

X = df.drop('target', axis=1)

y = df['target']


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


scaler = StandardScaler()

X_train_scaled = scaler.fit_transform(X_train)
```

```
X_test_scaled = scaler.transform(X_test)

#  Train Model
model = LogisticRegression()
model.fit(X_train_scaled, y_train)
y_pred = model.predict(X_test_scaled)

#  Evaluate
cm = confusion_matrix(y_test, y_pred)
acc = accuracy_score(y_test, y_pred)
prec = precision_score(y_test, y_pred)
rec = recall_score(y_test, y_pred)

print(f"Accuracy: {acc:.2f}")
print(f"Precision: {prec:.2f}")
print(f"Recall: {rec:.2f}")

#  Plot Heatmap++
plt.figure(figsize=(6,4))
sns.heatmap(cm, annot=True, fmt='d', cmap='YlGnBu',
            xticklabels=["No Disease", "Disease"],
            yticklabels=["No Disease", "Disease"])
```

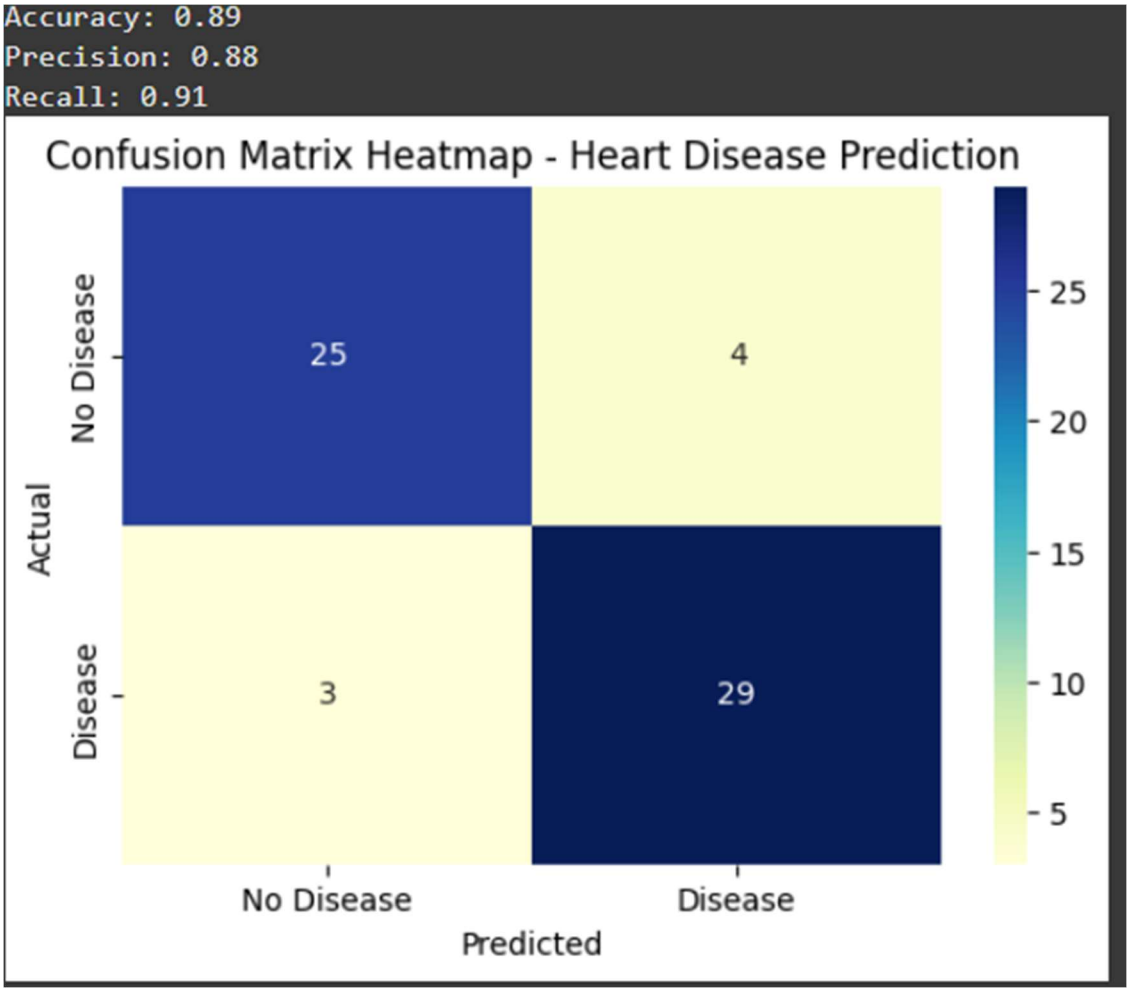
```
plt.xlabel("Predicted")

plt.ylabel("Actual")

plt.title("Confusion Matrix Heatmap - Heart Disease Prediction")

plt.sho
```

Output



References/Credits

- Dataset Source: UCI Machine Learning Repository - Heart Disease Dataset
- Python Libraries: pandas, seaborn, matplotlib, scikit-learn
- Developed using Jupyter Notebook and Python 3.x