Made by:

- Mohamed Ibrahim Hussein - 2305026

- Rahma Mohamed Mahmoud - 2305286

- Noreen Mohamed Mahmoud - 2305308

Heart Disease Detection - Project Report

Overview:

This project focuses on detecting heart disease using two approaches: Machine Learning models and a Rule-Based Expert System. It includes data preprocessing, model training, evaluation, and a user-friendly UI for making predictions.

Project Components:

1. Data:
   - raw_data.csv: Original dataset.
   - cleaned_data_with_age_sex.csv: Cleaned dataset with important features like age and sex.

2. Machine Learning:
   - train_model.py: Trains various ML models.
   - predict.py: Uses trained model (heart_disease_model.pkl) to make predictions.
   - heart_disease_model.pkl: Saved model for quick predictions.

3. Rule-Based System:
   - expert_system.py: Diagnoses heart disease based on predefined medical rules.
   - rules.py: Contains the diagnostic rules.

4. Notebooks:

- data_analysis.ipynb: Data exploration and visualization.

- model_training.ipynb: Model training and evaluation.

5. Reports:

- accuracy_comparison.ipynb / .md: Compares ML model accuracy.

- comparison_plot.png: Visual representation of model performance.

6. UI:

- app.py: Streamlit app for user interaction and predictions.

Usage Instructions:

1. Install dependencies:

pip install -r requirements.txt

2. Train Model:

python ml_model/train_model.py

3. Predict:

python ml_model/predict.py

4. Run Expert System:

python rule_based_system/expert_system.py

5. Launch UI:

streamlit run ui/app.py

Conclusion:

The Random Forest model showed the highest accuracy (88%) among all evaluated models. The project demonstrates effective heart disease detection using both AI and expert knowledge.