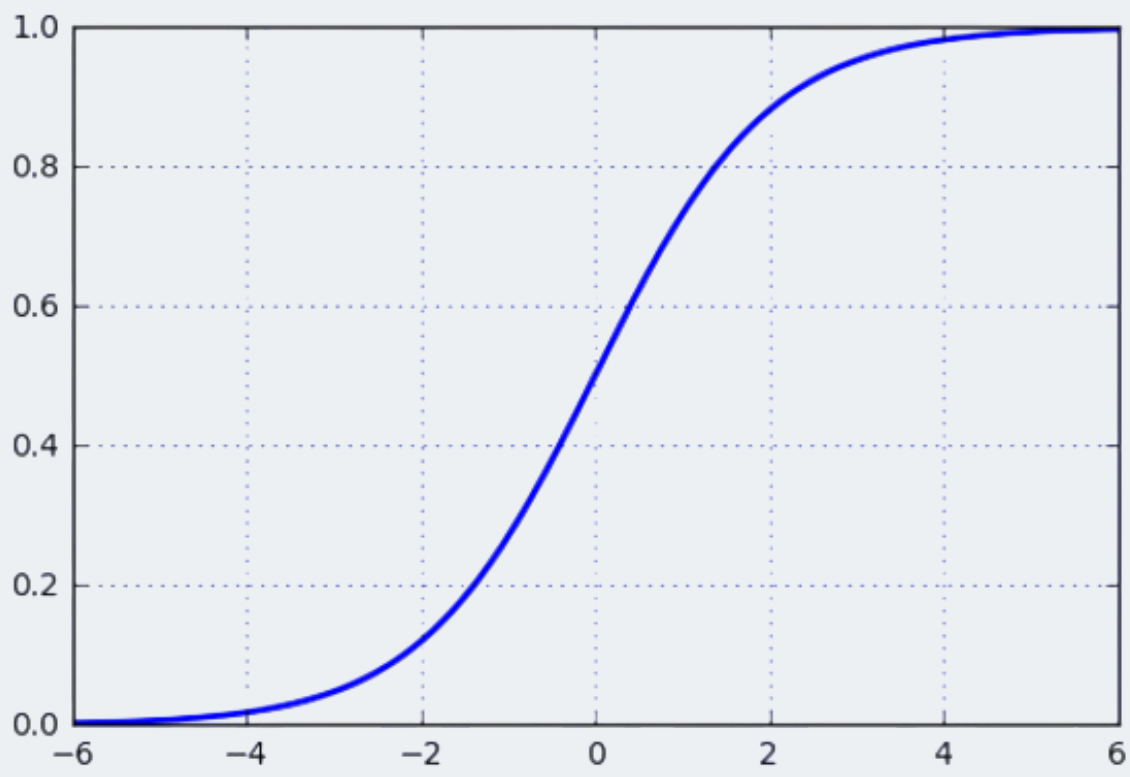
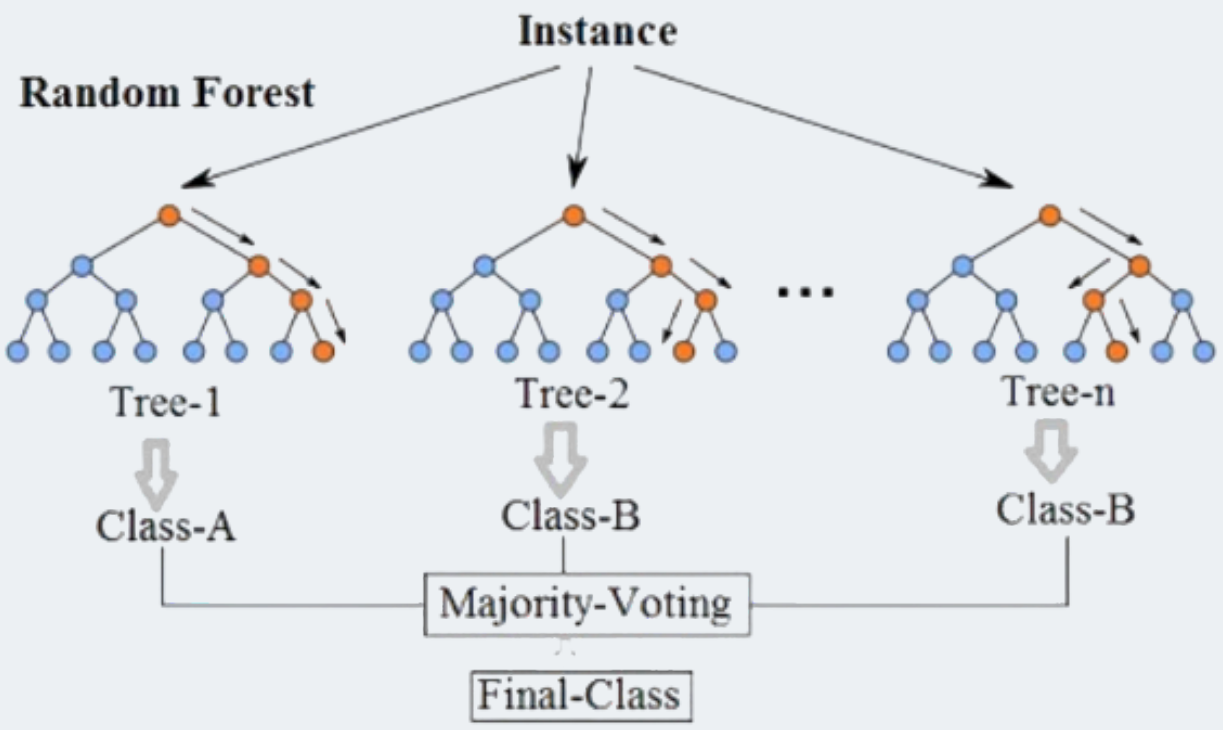
AI-Powered Heart Disease Risk Prediction





Problem Statement

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- Heart disease is one of the leading causes of death worldwide.

- Early detection can significantly reduce risk through timely medical intervention and lifestyle changes .

🎯 **Goal:** Predict heart disease risk using patient clinical data.

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Dataset Overview

- Structured medical dataset
- Features include:
    - ✦ Age, Sex
    - ✦ Chest Pain Type
    - ✦Blood Pressure, Cholesterol
    - ✦ ECG, FBS results
    - ✦ Exercise-induced angina
    - ✦ Major vessels, Thalassemia

- Target: Heart Disease (Yes / No)

	Age	Sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	52	1	0	125	212	0	1	168	0	1.0	2	2	3	0
1	53	1	0	140	203	1	0	155	1	3.1	0	0	3	0
2	70	1	0	145	174	0	1	125	1	2.6	0	0	3	0
3	61	1	0	148	203	0	1	161	0	0.0	2	1	3	0
4	62	0	0	138	294	1	1	106	0	1.9	1	3	2	0

Exploratory Data Analysis (EDA)

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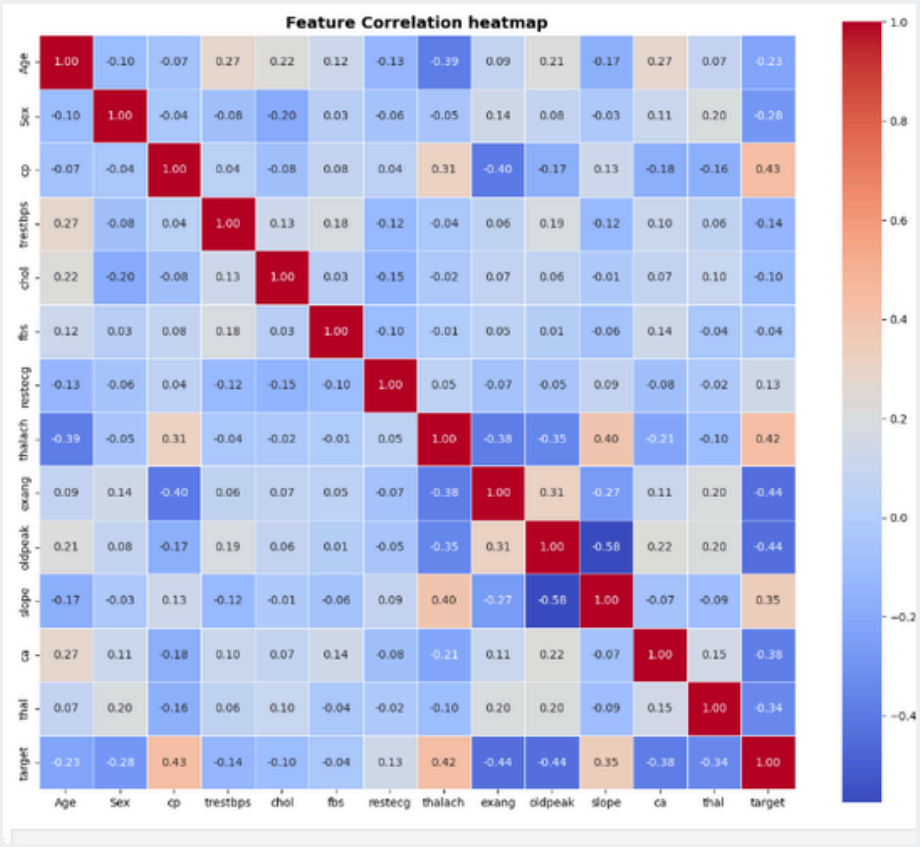
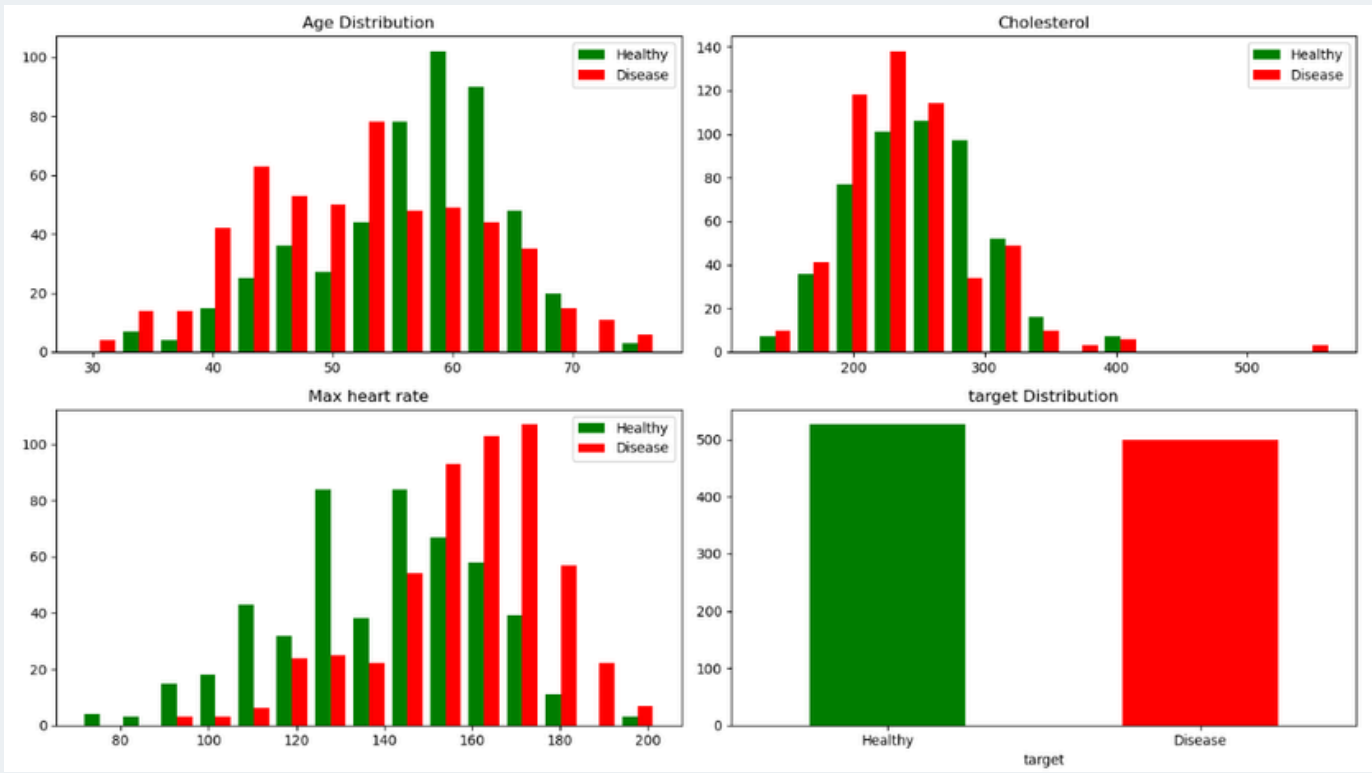
- Analyzed feature patterns and target distribution
- Checked balance between heart disease classes
- Identified important health indicators



- Feature distributions differ noticeably between healthy and diseased patients.



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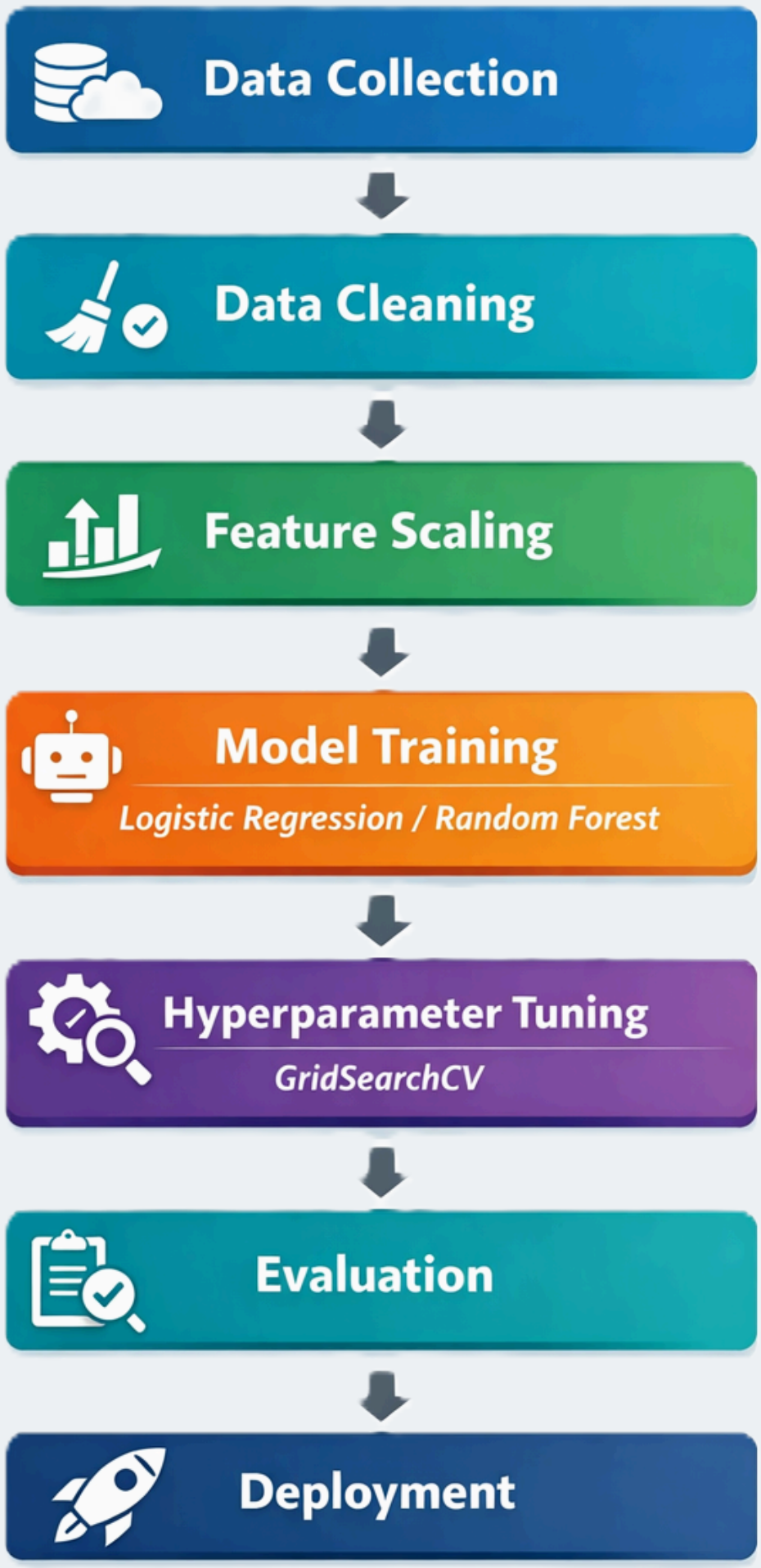
ML Pipeline



Models Used 05

Logistic Regression

- Baseline model
- Interpretable
- Recall-optimized using GridSearchCV

Random Forest Classifier

- Ensemble model
- Captures non-linear patterns
- Best overall performance

Accuracy, Recall & ROC-AUC used for Evaluation

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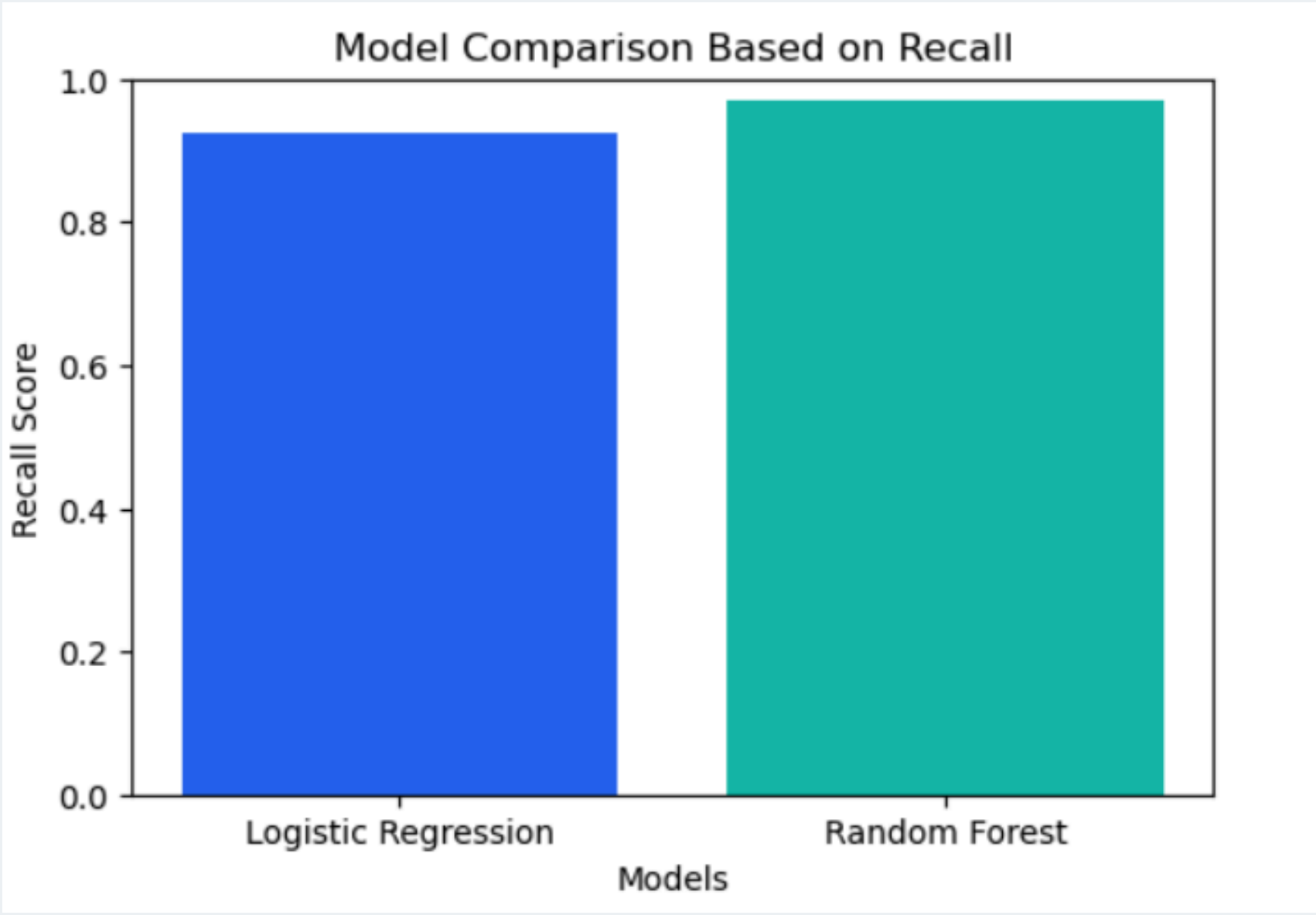
Model Performance

Recall comparison across models highlights effectiveness in identifying high-risk patients.

Model	Accuracy	Recall	ROC-AUC
Logistic Regression	~82%	~92%	~0.93
Random Forest	**~97%**	**~97%**	**~0.99**



ROC Curve Comparison

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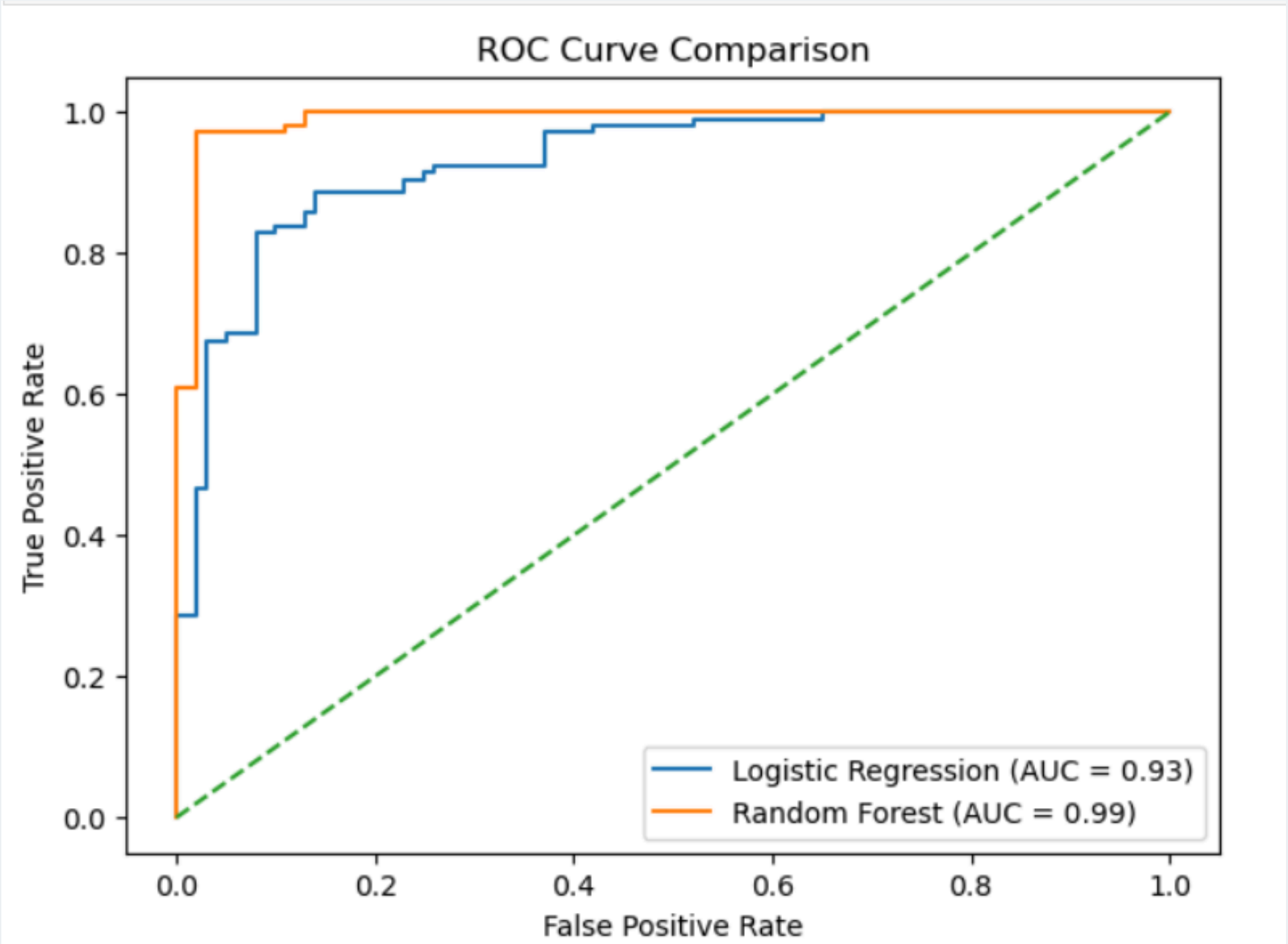
ROC curves demonstrate model performance across thresholds.



Random Forest significantly outperforms the baseline model in classification quality.

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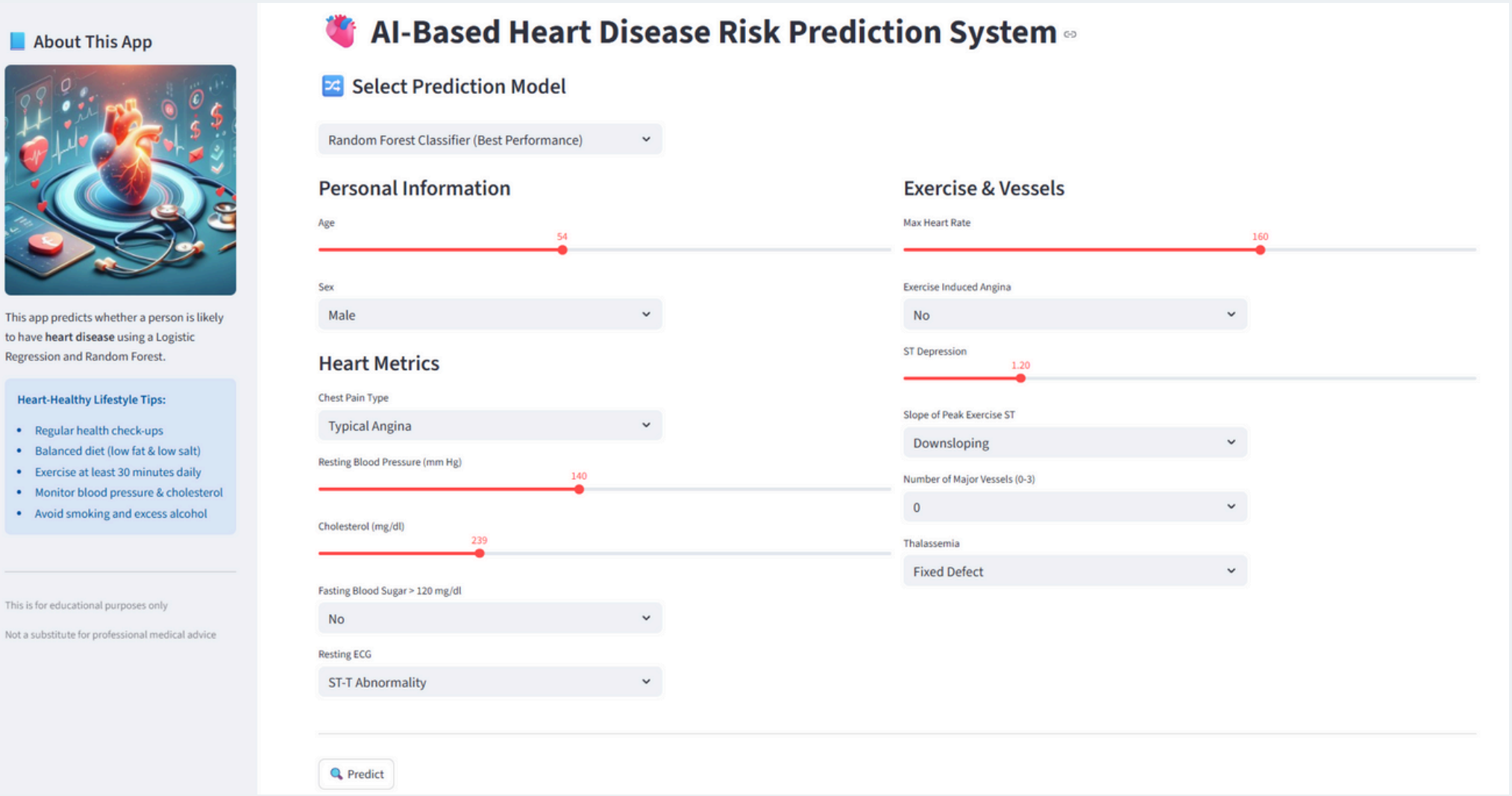
Streamlit Web App

- Real-time predictions
- Model selection (LR / RF)
- Interactive sliders & inputs
- Probability-based risk output



Risk Interpretation

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- Probability breakdown
- Risk-level gauge indicator
- Clear medical-style alerts