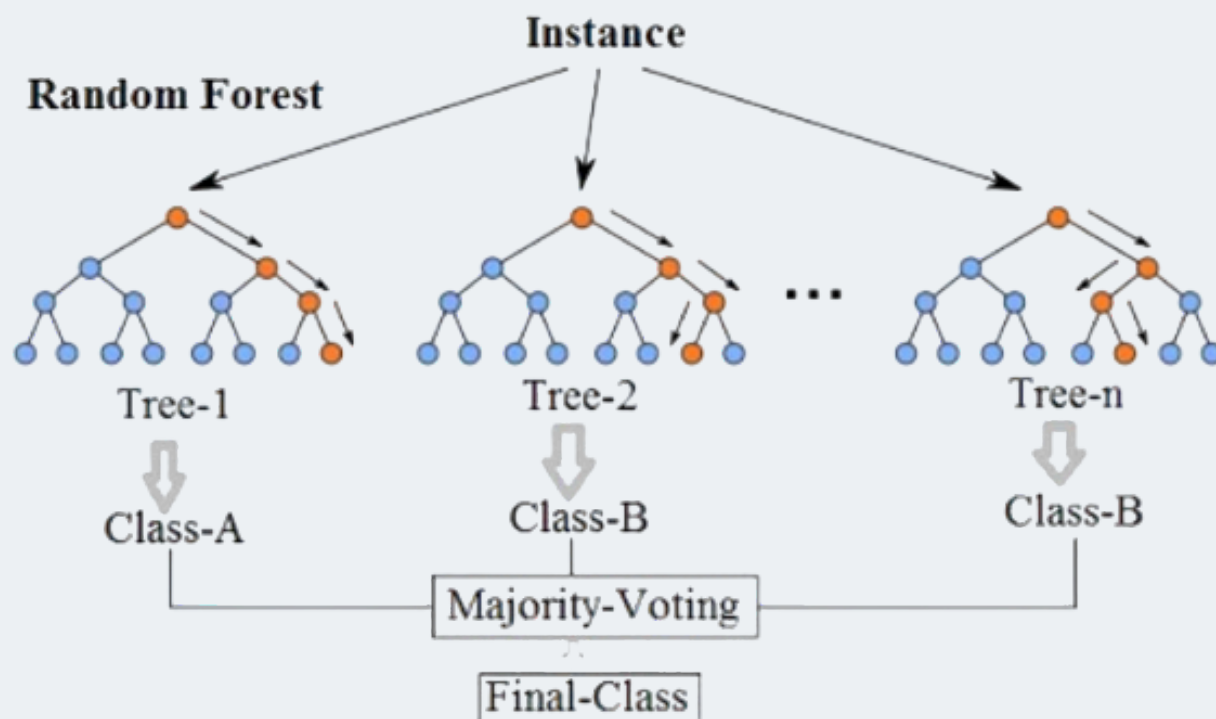
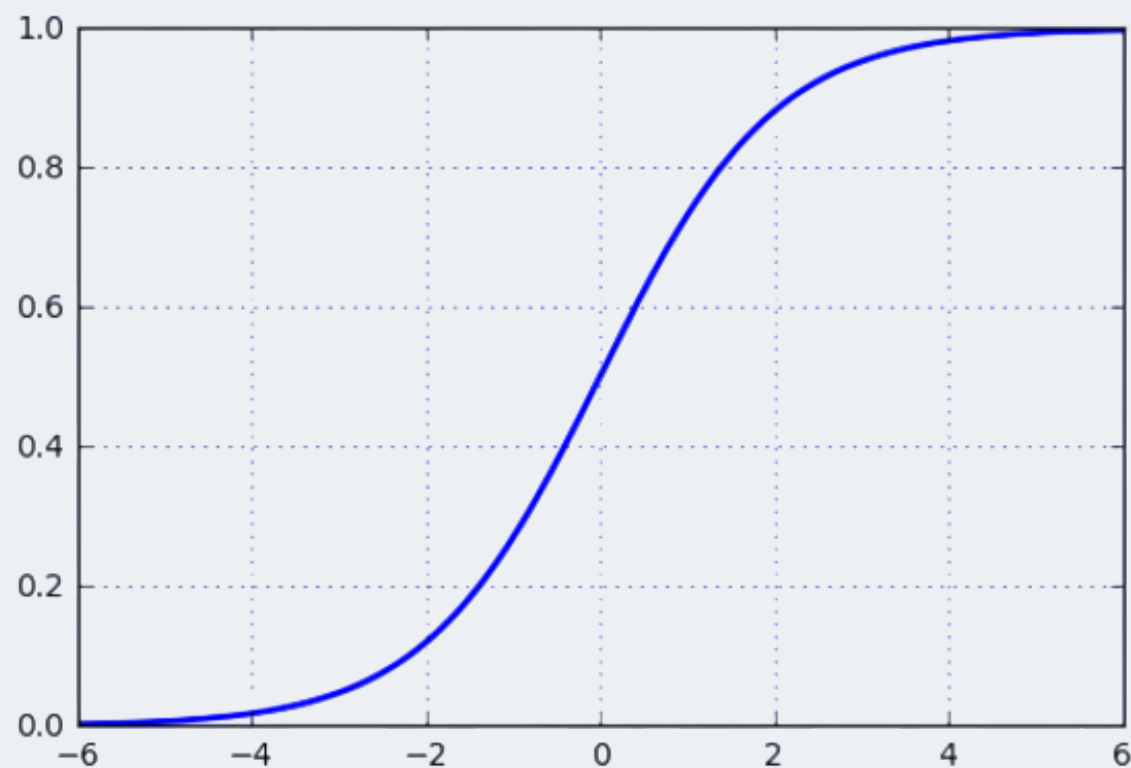



# AI-Powered Heart Disease Risk Prediction



# Problem Statement

01

- 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.





# Dataset Overview

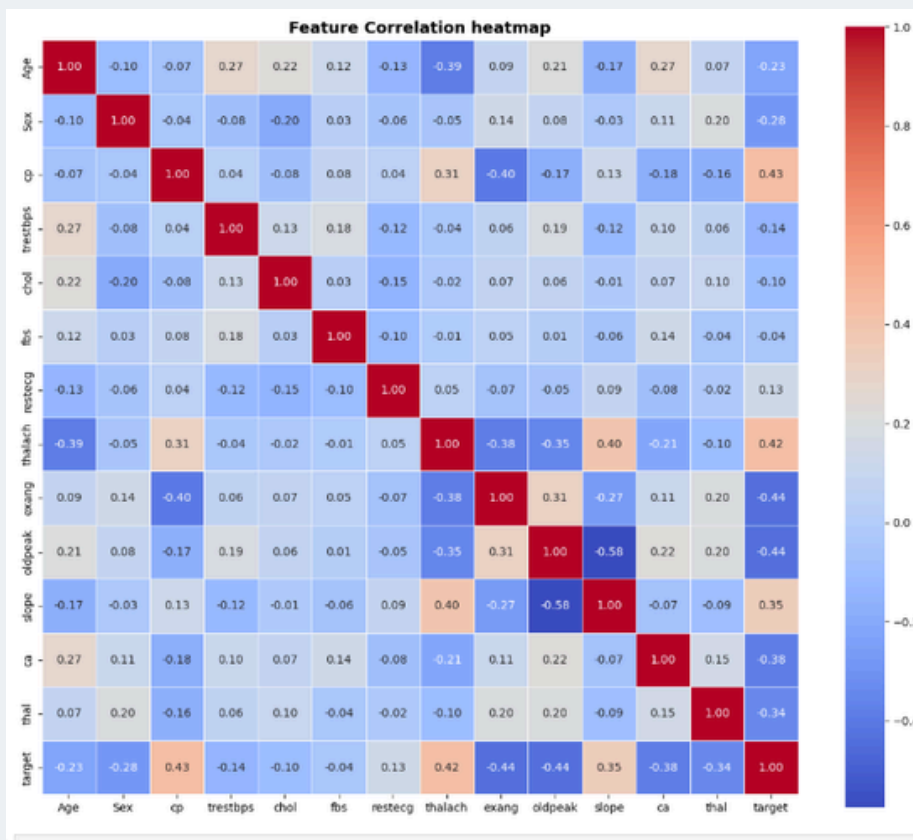
- Structured medical dataset
- Features include:
  - ◆ Age, Sex
  - ◆ Chest Pain Type
  - ◆ Blood Pressure, Cholesterol
  - ◆ ECG, FBS results
  - ◆ Exercise-induced angina
  - ◆ Major vessels, Thalassemia
- Target: Heart Disease (Yes / No)

	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

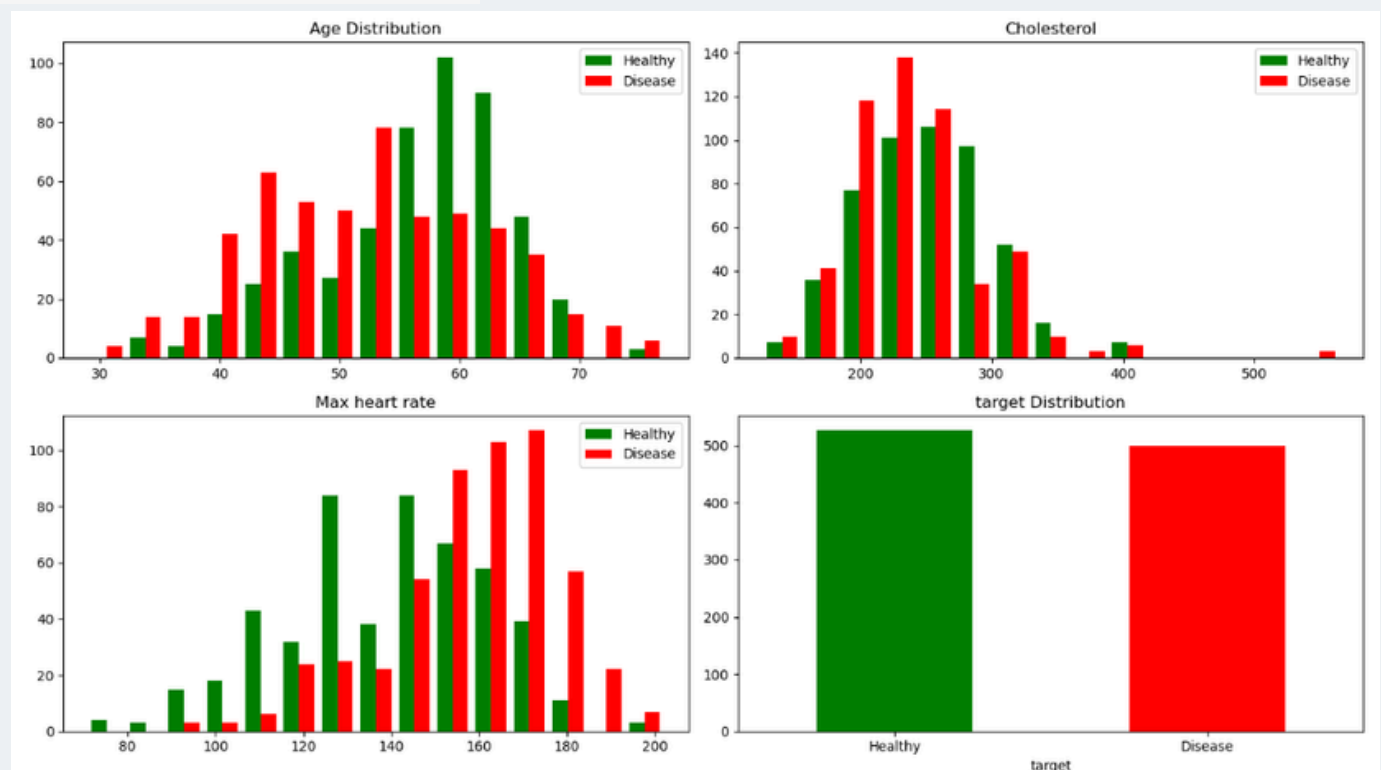
# Exploratory Data Analysis (EDA)

03

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

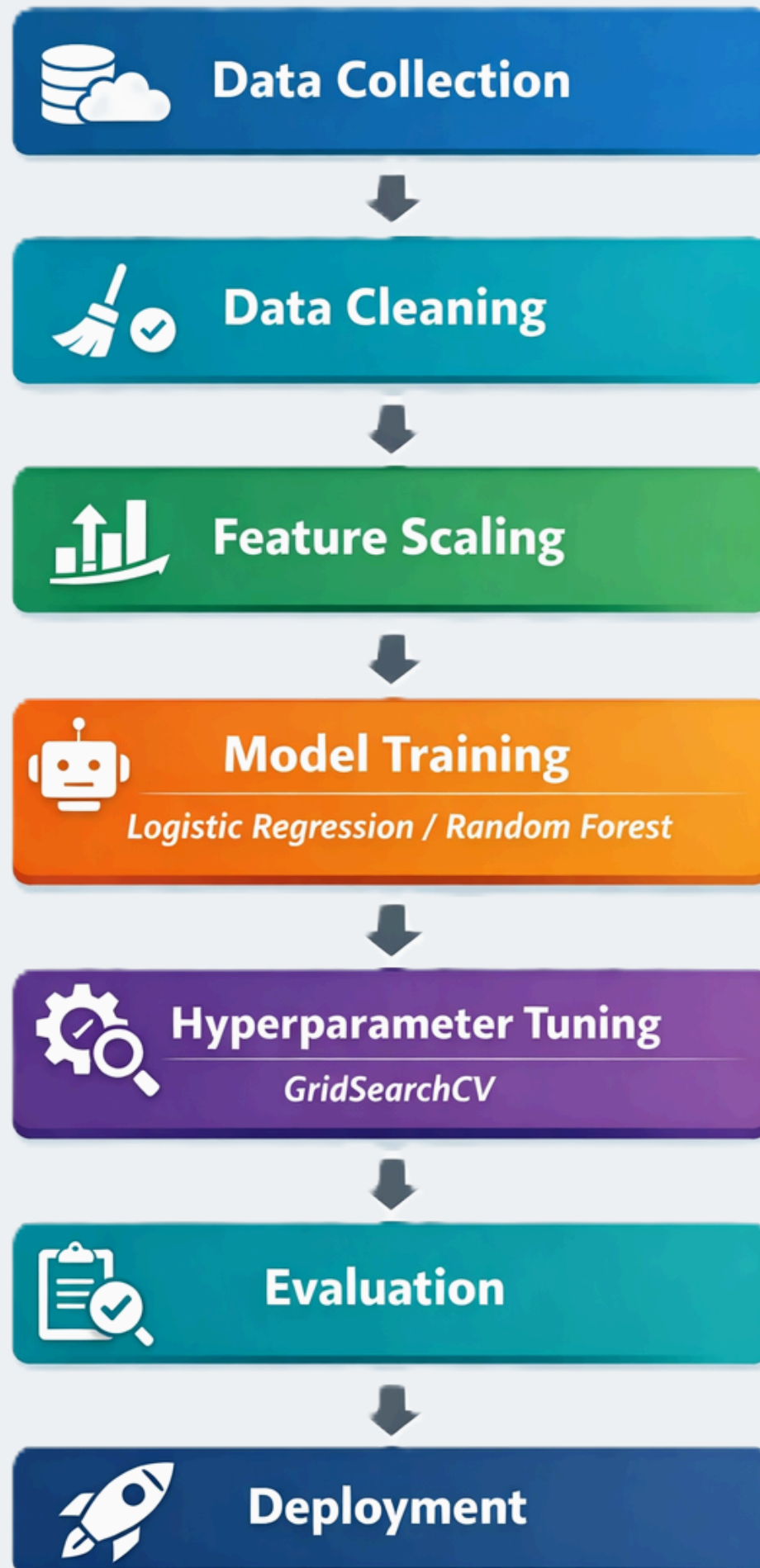


- Feature distributions differ noticeably between healthy and diseased patients.



04

# ML Pipeline



# Models Used

05

## Logistic Regression

- Baseline model
- Interpretable
- Recall-optimized using GridSearchCV

## Random Forest Classifier

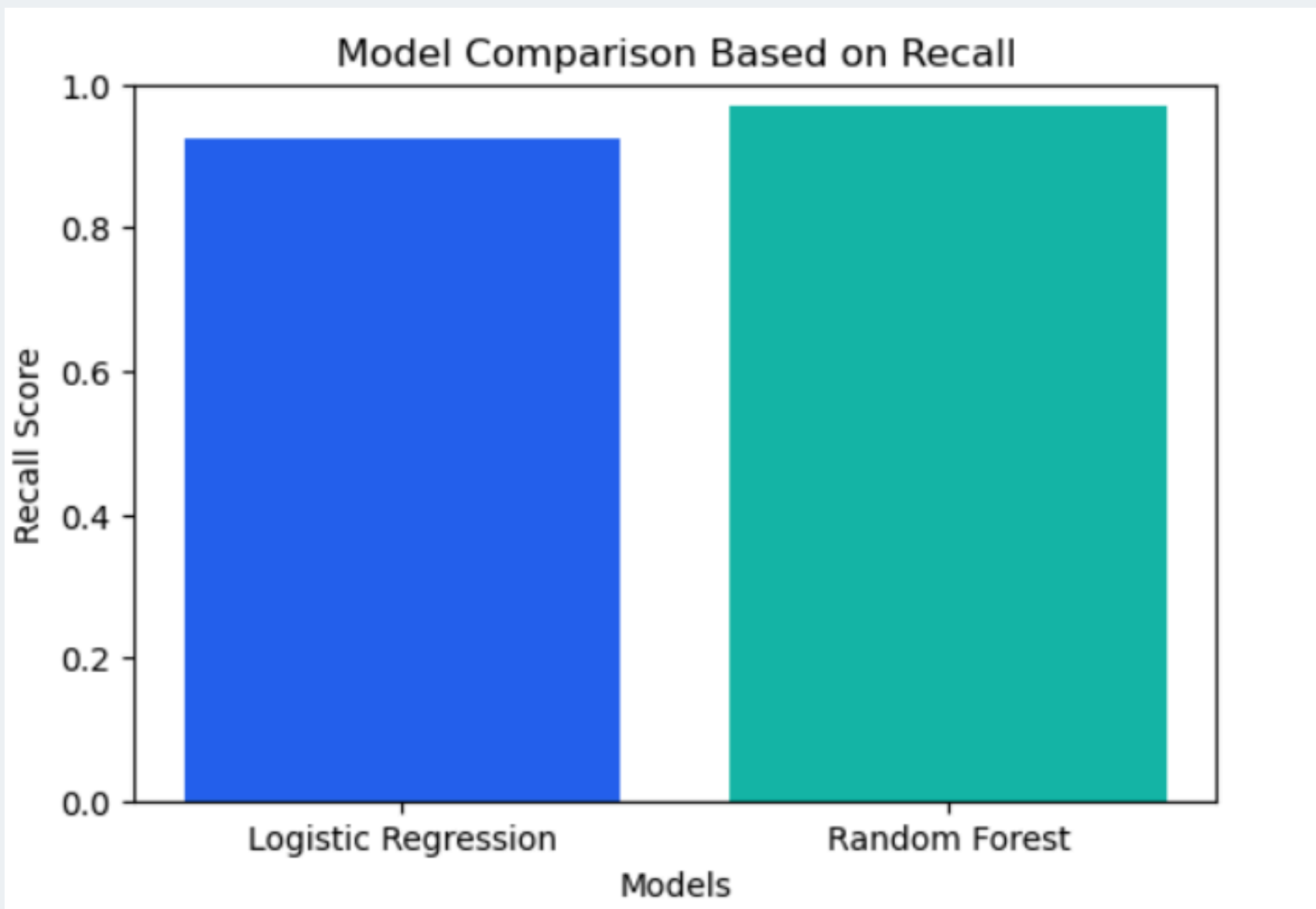
- Ensemble model
- Captures non-linear patterns
- Best overall performance

Accuracy, Recall & ROC-AUC used for Evaluation



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

Model	Accuracy	Recall	ROC-AUC
Logistic Regression	~82%	~92%	~0.93
Random Forest	<b>~97%</b>	<b>~97%</b>	<b>~0.99</b>

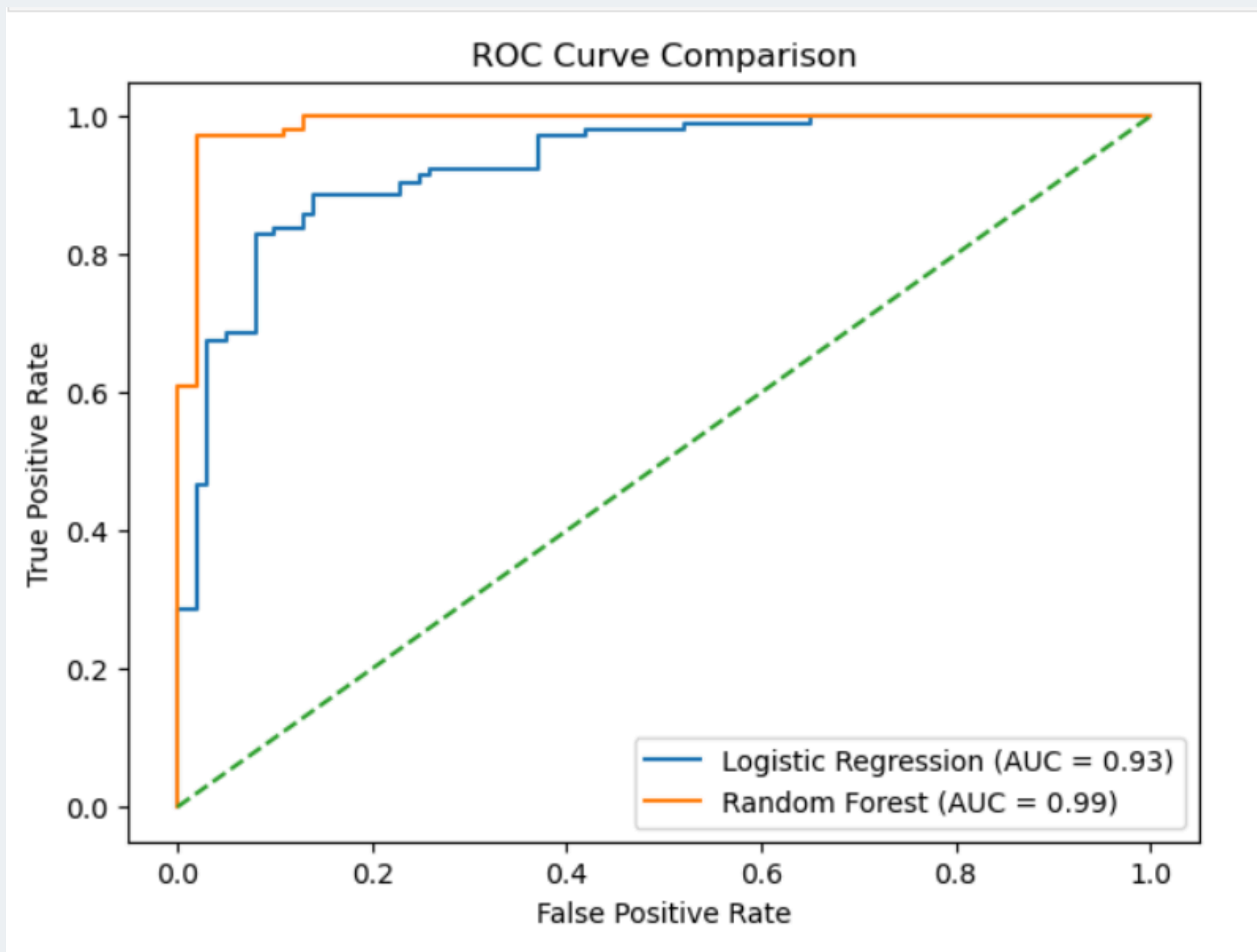




# ROC Curve Comparison

07

ROC curves demonstrate model performance across thresholds.



Random Forest significantly outperforms the baseline model in classification quality.



08

# Streamlit Web App

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

## About This App



This app predicts whether a person is likely to have **heart disease** using a Logistic Regression and Random Forest.

### Heart-Healthy Lifestyle Tips:

- Regular health check-ups
- Balanced diet (low fat & low salt)
- Exercise at least 30 minutes daily
- Monitor blood pressure & cholesterol
- Avoid smoking and excess alcohol

This is for educational purposes only

Not a substitute for professional medical advice



## AI-Based Heart Disease Risk Prediction System

### Select Prediction Model

Random Forest Classifier (Best Performance) ▼

### Personal Information

Age 54

Sex  
Male ▼

### Heart Metrics

Chest Pain Type  
Typical Angina ▼

Resting Blood Pressure (mm Hg) 140

Cholesterol (mg/dl) 239

Fasting Blood Sugar > 120 mg/dl  
No ▼

Resting ECG  
ST-T Abnormality ▼

### Exercise & Vessels

Max Heart Rate 160

Exercise Induced Angina  
No ▼

ST Depression 1.20

Slope of Peak Exercise ST  
Downsloping ▼

Number of Major Vessels (0-3)  
0 ▼

Thalassemia  
Fixed Defect ▼

Predict

# Risk Interpretation

09

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

## Prediction Results

 ELEVATED CARDIAC RISK

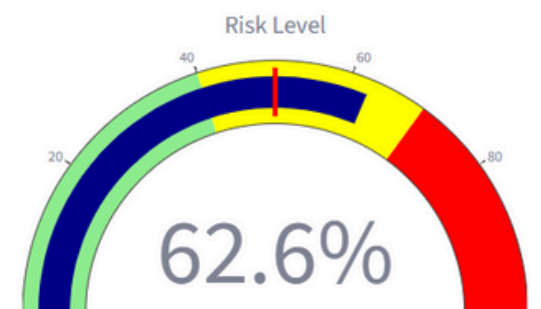
## Probability Breakdown

Lower Risk

37.4%

Higher Risk

62.6%



## Recommendations

High Risk – Take Action:

- Consult a cardiologist or healthcare professional
- Schedule a heart health screening (ECG, lipid profile, BP)
- Track blood pressure and heart rate
- Reduce saturated fats, sugar, and sodium
- Avoid smoking and limit alcohol