Advancing Cardiac Health: Predictive Modeling for Heart Disease Classification

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October 24, 2024

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Why HHI Needs a Risk Prediction Solution?

Overview
HHI aims to predict heart health risks using patient data for timely, targeted interventions.

Problem
General interventions aren't effective for all patients, leading to missed opportunities for proactive care.

Business Goal
Maximize patient health outcomes while controlling intervention costs through risk-based predictions.

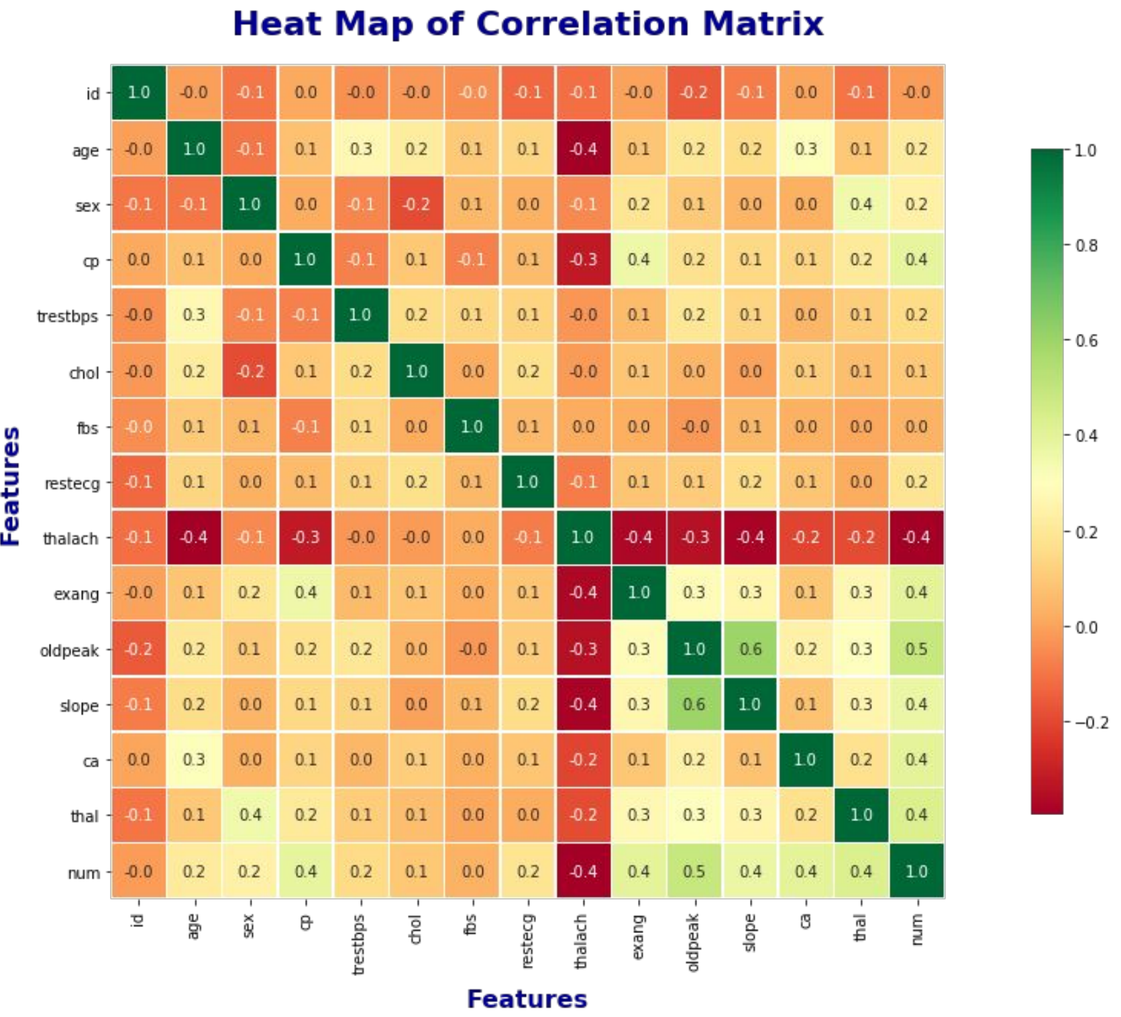
Why Solving This Issue Matters?

Overall Impact
As the leading global cause of death, timely intervention can prevent severe cases and save lives.

Proactive Approach
Early detection helps HHI reduce expensive treatments and enhance patient outcomes.

Business Value
Accurate risk prediction lowers healthcare costs and strengthens HHI’s reputation for quality care.

The Analysis & Solution



Dataset

Analyzed "**Cleveland Data**" which contains patient data (age, sex, cholesterol, etc.) and their classified heart health risks (0: No Risk, 4: Extreme Risk).

Model Performance

Three models were trained: K-Nearest Neighbor, Random Forest and Logistic Regression.

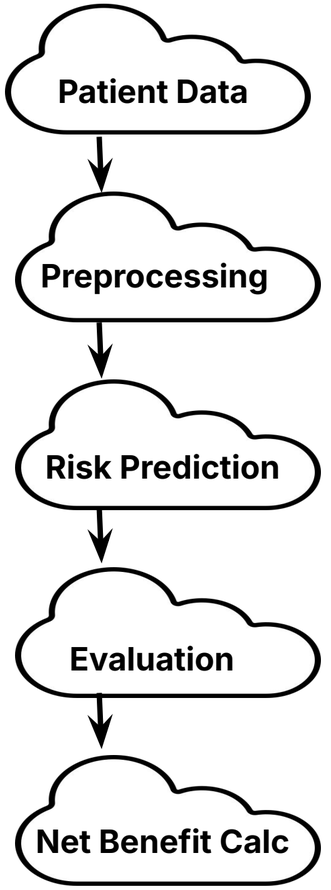
1. **Random Forest** scored 63.83% accuracy. It effectively predicts heart health risks and identifies key health factors.

2. **KNN** Results: Accuracy ranged from 54% to 61%. It's less reliable for patient data.

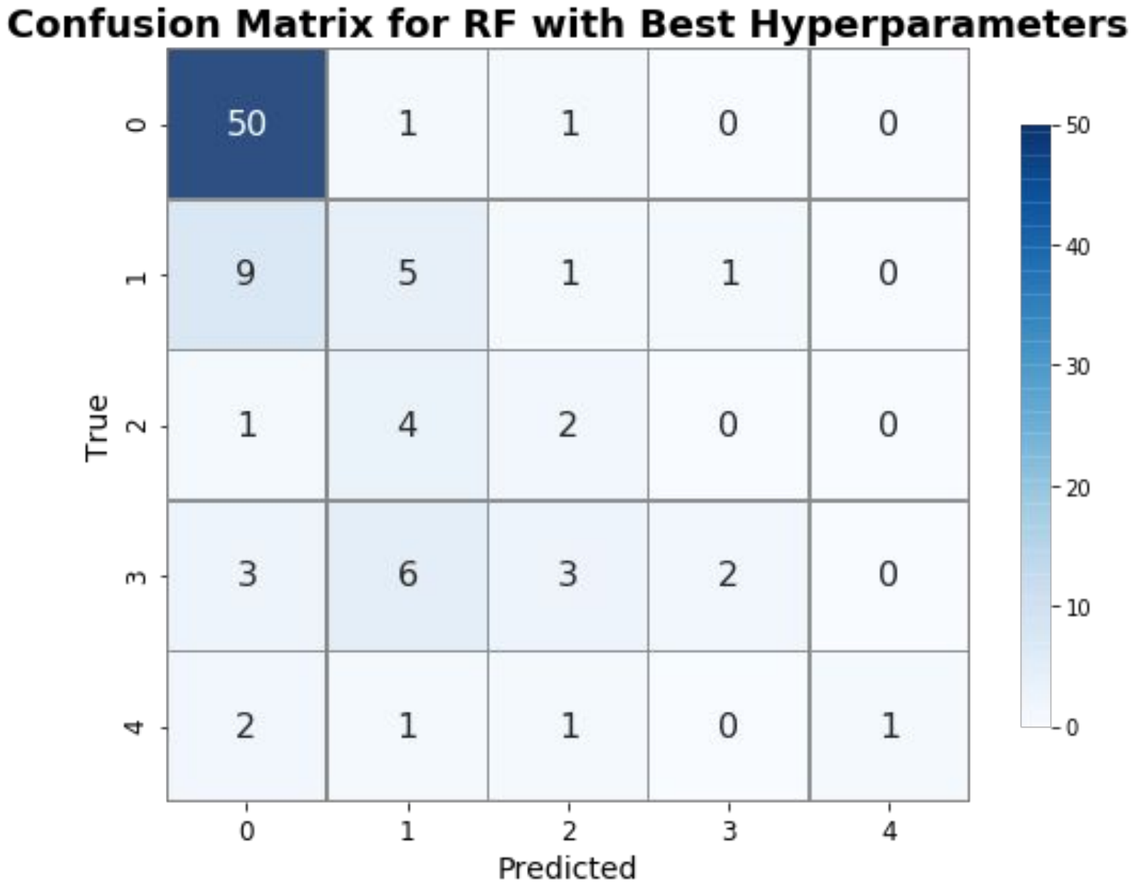
3. **Logistic Regression**: Achieved 56.38% accuracy. Easy to understand but misses complex patterns.

Business Impact

Random Forest allows better risk stratification, resulting in more accurate interventions and reduced overall costs.



Best Fit Model



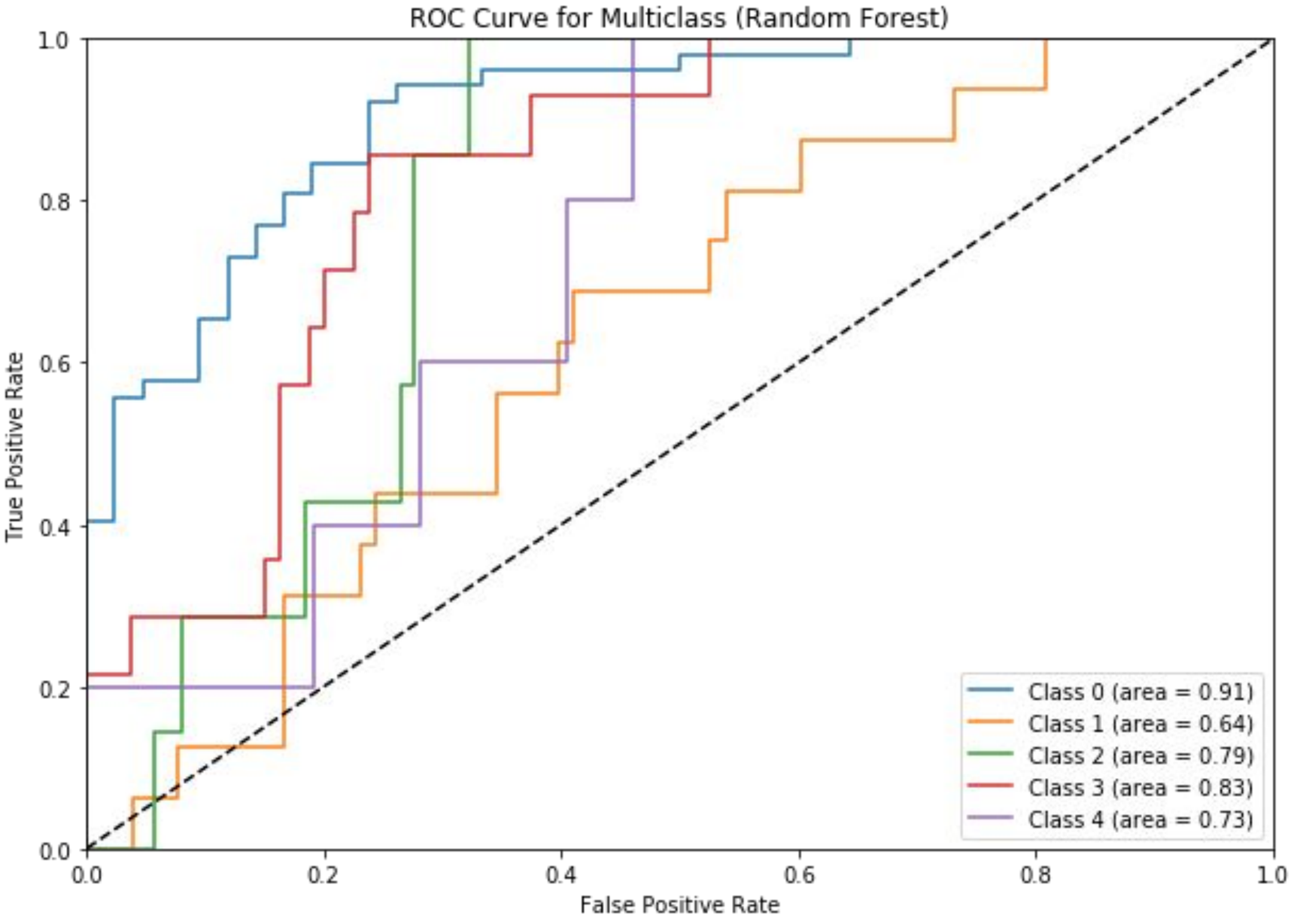
Recommendation

Implement Random Forest as main tool for predicting patient heart health risks, as it handles complex feature relationships better than KNN and LR.

Reasoning

1. **Improved Patient Care:** More accurate predictions lead to timely interventions, enhancing patient outcomes.
2. **Cost-Effectiveness:** By preventing serious health issues early, the model reduces long-term treatment costs.
3. **Strategic Advantage:** This method positions HHI as a leader in proactive healthcare, improving reputation and patient trust.

Final Note: **Investing in this solution supports HHI's mission to enhance heart health and demonstrates commitment to quality patient care.**


ROC Curve for Multiclass (Random Forest)
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
Class 0 (area = 0.91)
Class 1 (area = 0.64)
Class 2 (area = 0.79)
Class 3 (area = 0.83)
Class 4 (area = 0.73)

Thanks!

Do you have any questions?