PREDICTING HOSPITAL READMISSION FOR DIABETES PATIENTS

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01

INTRODUCTION

INTRODUCTION

Motivation

Increase quality of care, lower healthcare costs

Objective

Create a model to predict hospital readmission

Goal

Identify circumstances surrounding readmission

02

METHODOLOGY

METHODOLOGY

Data

10 years of patient data collected from VCU

Metrics

ROC/AUC, RMSE, Recall

Model

Random Forest
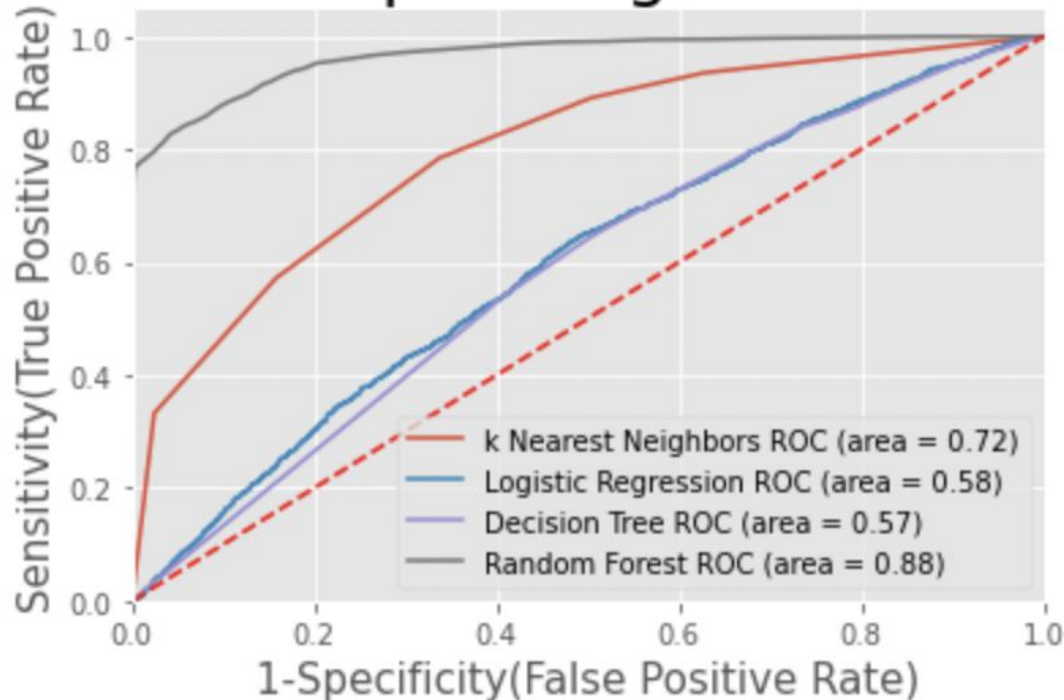
Tools

pandas, scikit-learn, matplotlib

03

RESULTS

RESULTS

Receiver Operating Characteristic

Sensitivity(True Positive Rate) vs 1-Specificity(False Positive Rate)

- k Nearest Neighbors ROC (area = 0.72)
- Logistic Regression ROC (area = 0.58)
- Decision Tree ROC (area = 0.57)
- Random Forest ROC (area = 0.88)

Interpreting AUC

ROC curves closer to the NW corner are better classifiers, making the AUC greater

RESULTS (CONTINUED)

Accuracy

99.98% Training Set after random upsampling

Accuracy

94.15% Test Set after random upsampling

Precision
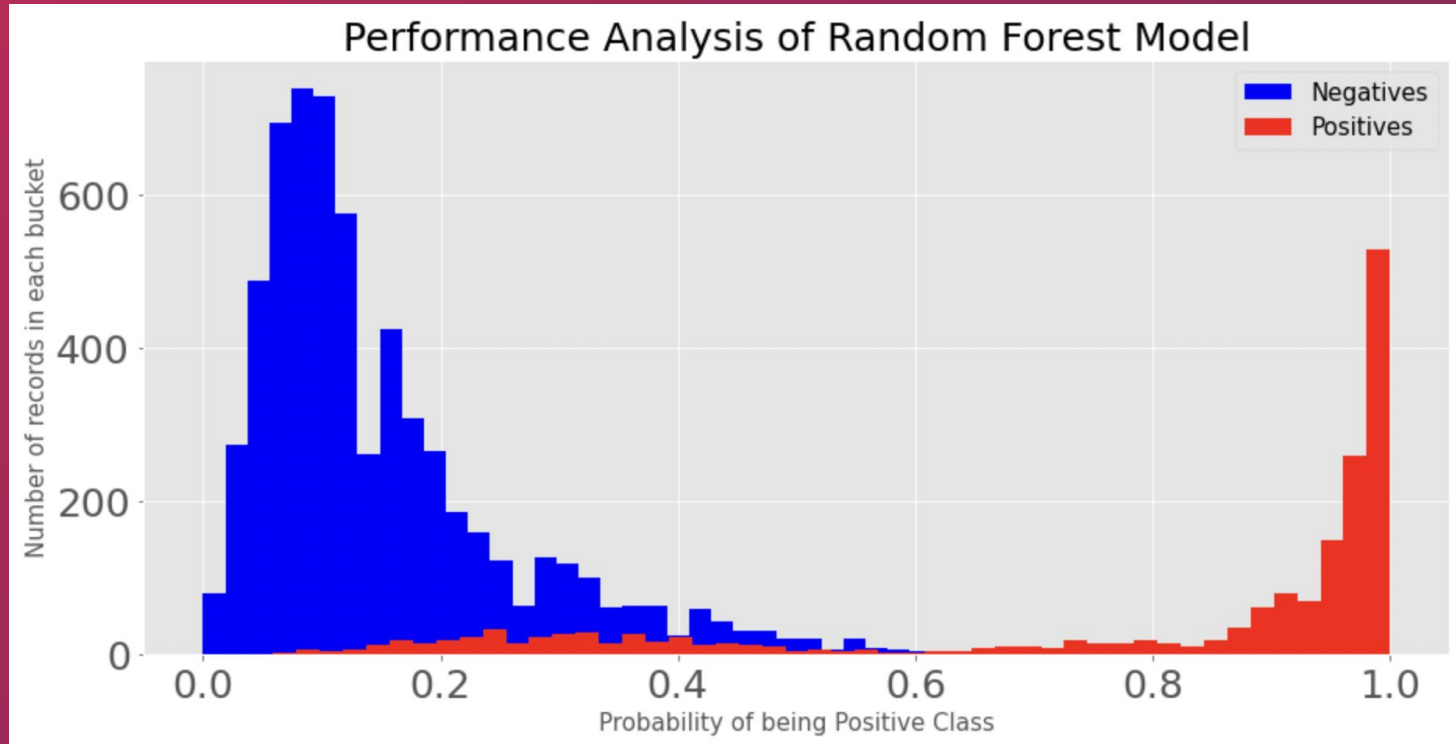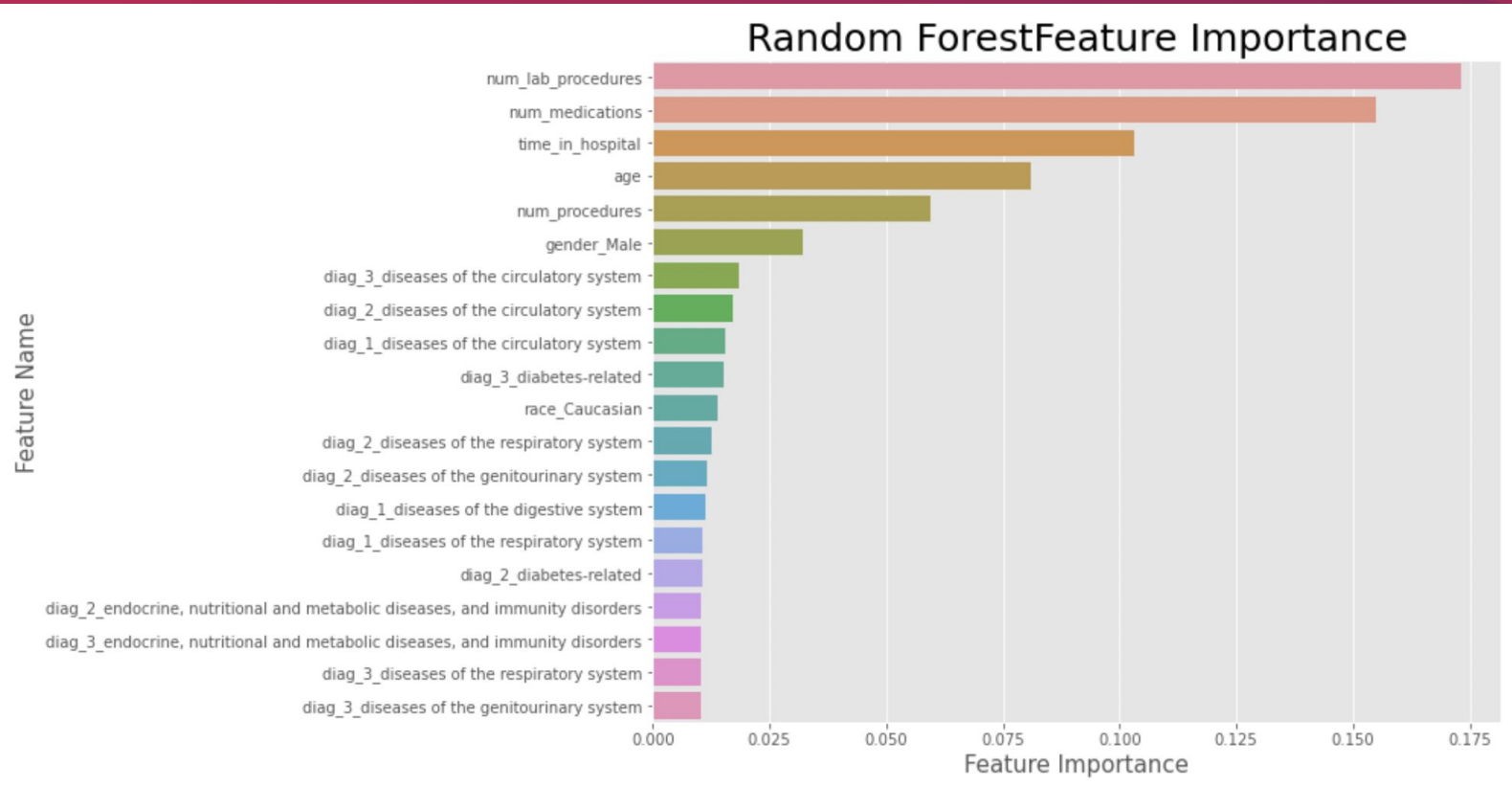
Percentage of correctly predicted positives **93.98%**

Recall

Percentage of positives correctly identified **78.41%**

RESULTS (CONTINUED)

Performance Analysis of Random Forest Model

RESULTS (CONTINUED)

Random ForestFeature Importance

04

CONCLUSIONS

CONCLUSIONS

Recommendations

Use the model to identify as many people as possible with diabetes

Impact

Decrease healthcare costs, save lives; model obsoletion

CONCLUSIONS: *INTERESTING INSIGHTS*

42

The average number of lab procedures a
diabetes patient has on record

CONCLUSIONS: *INTERESTING INSIGHTS*

16

The average number of medications a diabetes patient is on

CONCLUSIONS: *INTERESTING INSIGHTS*

4

The average number of days a diabetes patient spends in the hospital

CONCLUSIONS: *INTERESTING INSIGHTS*

66

The average of a diabetes patient

05

FUTURE WORK

FUTURE WORK

- Use K-Fold CV on the dataset

- Refine the model by less important features
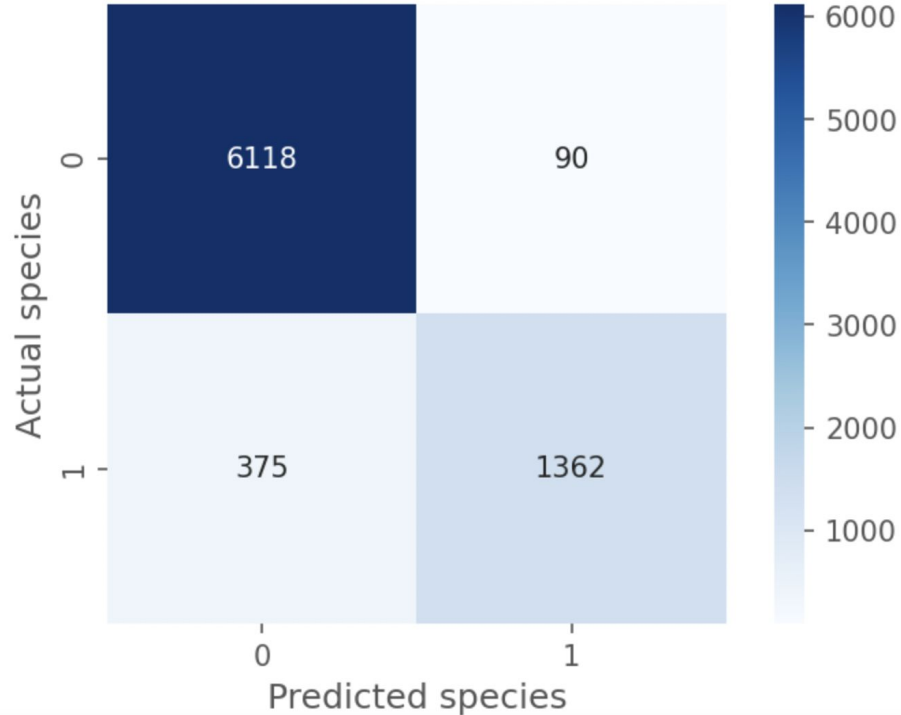
- Tune hyperparameters (n_estimators, max_features, etc.)
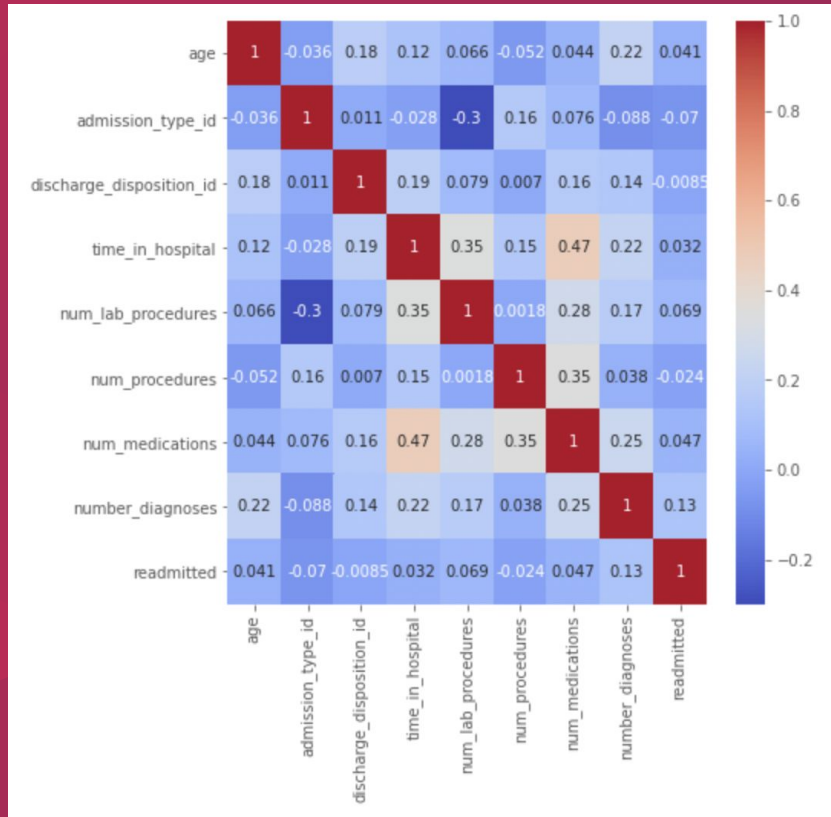
06

APPENDIX

APPENDIX

Oversampled Random Forest confusion matrix

Confusion Matrix

The number of correct and incorrect predictions for each outcome: not readmitted is 0, readmitted is 1
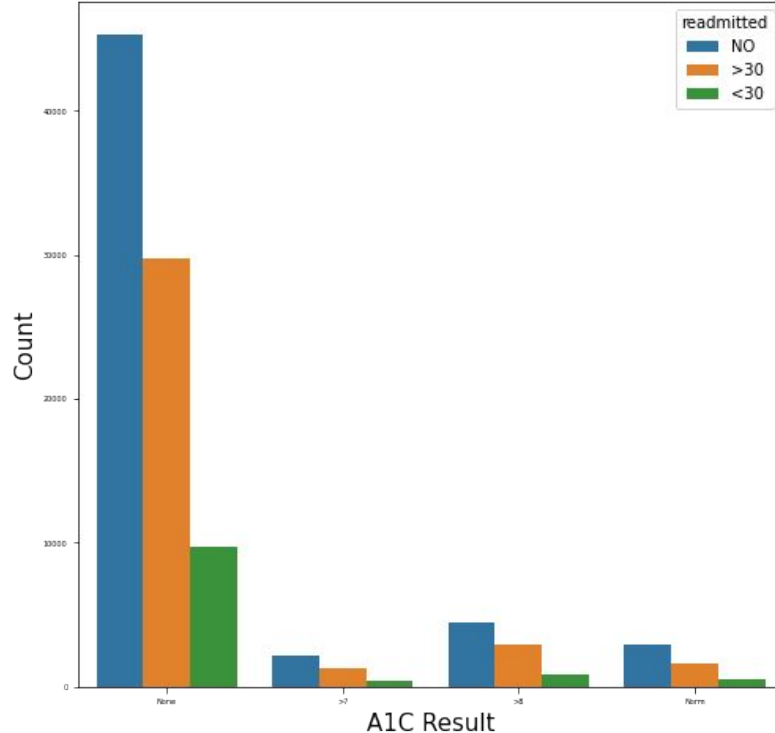
APPENDIX

Heatmap

Correlations between continuous features Stronger correlations are closer to 1, weaker correlations are closer to 0

APPENDIX

Hospital Readmission Based on A1C Result

A1C Histogram

Test results are: none; >7 and >8, which are recommended ranges for Type II Diabetes patients; and normal, signifying blood glucose levels in healthy individuals not consistent with diabetes

APPENDIX

Count of Individuals on Medication for Diabetes Based on Hospital Readmission