Predicting Mortality Of Sepsis-III Patients Using a Voting Classifier

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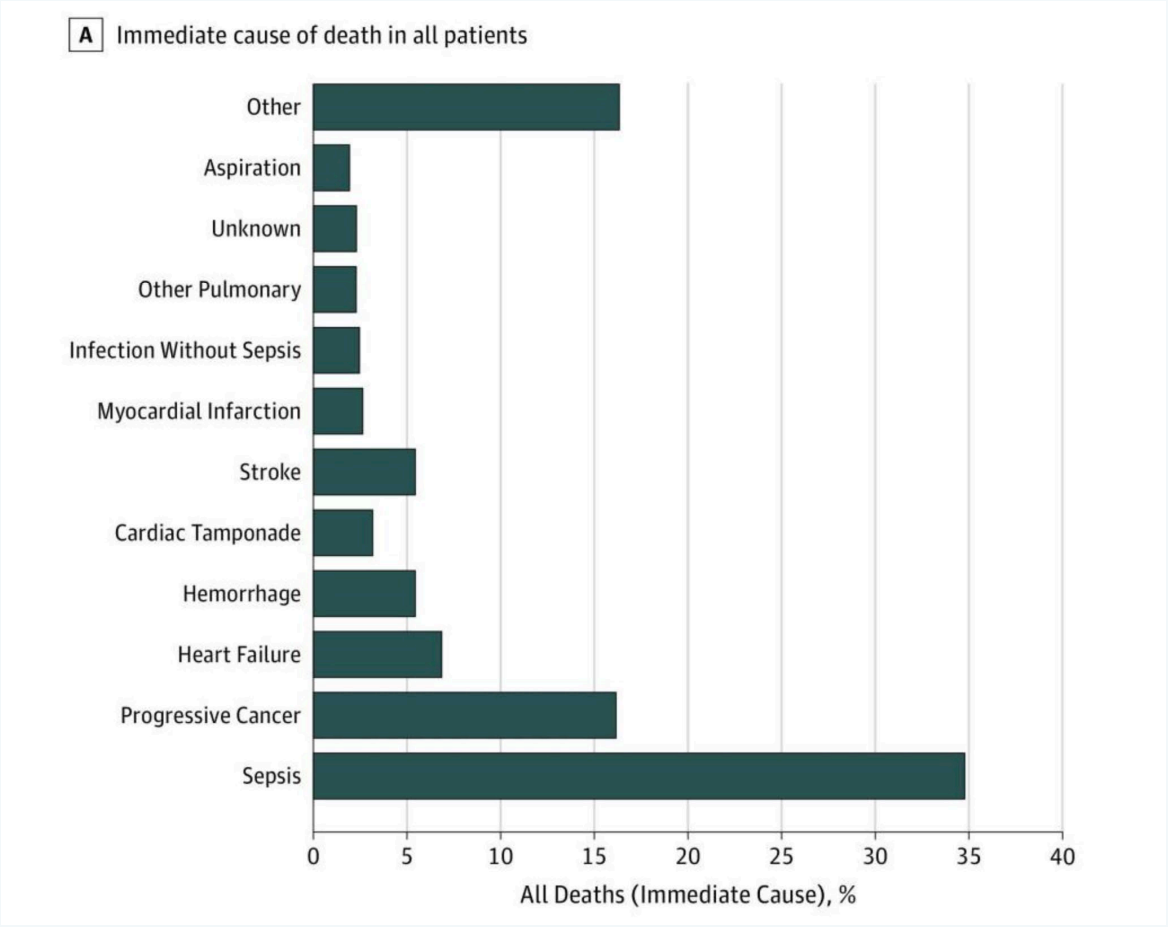
Sepsis is a Leading Cause Of Death Within Hospitals

The Goal

Develop a model that can predict mortality within 30 days of diagnosis

Implement to allow for additional intervention



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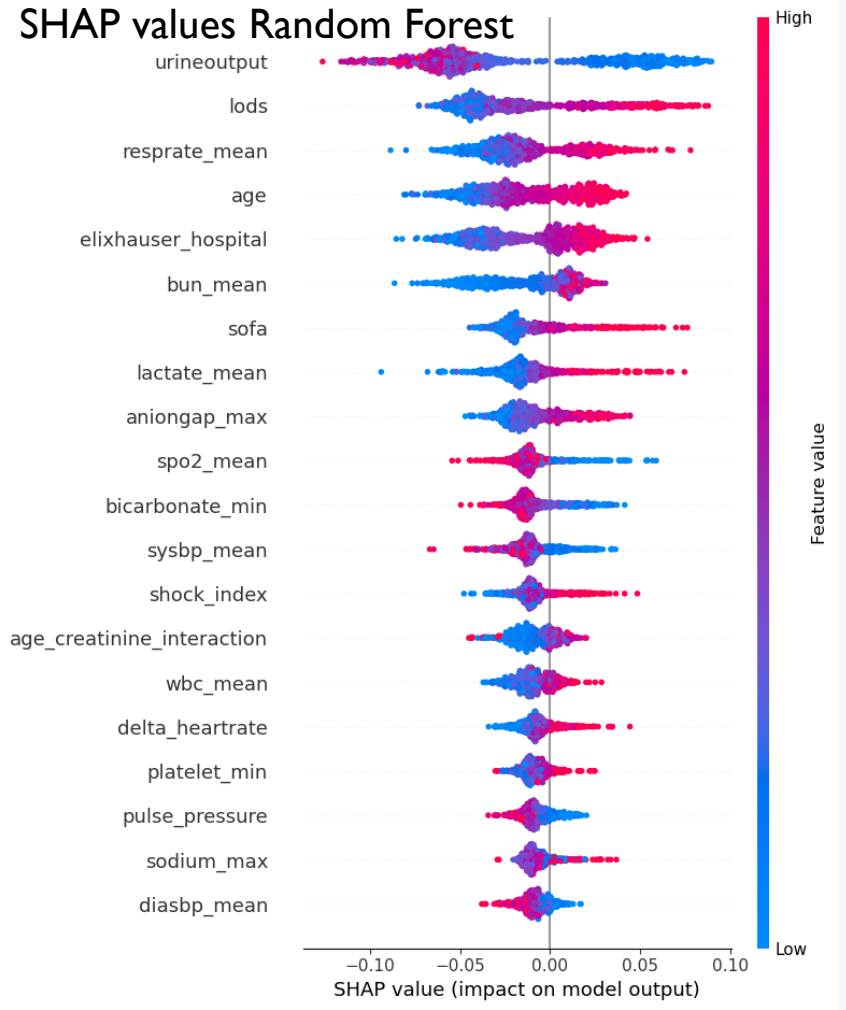
Voting Classifier Model Displayed Best Performance

- Ensemble of Logistic Regression, Random Forest and XGBoost
- Overall accuracy of 76%
- For Non-Surviving Class:
  - F1-Score of 0.54
  - Recall of 0.73
  - Precision of 0.43

Confusion Matrix	
TN **560**	FP **171**
FN **48**	TP **130**

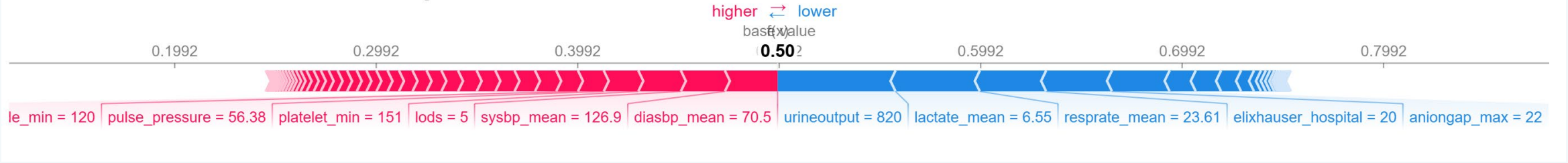


Examining Sample Correct Predictions

SHAP Force Plot for a Correct, Highly Confident Positive Prediction:

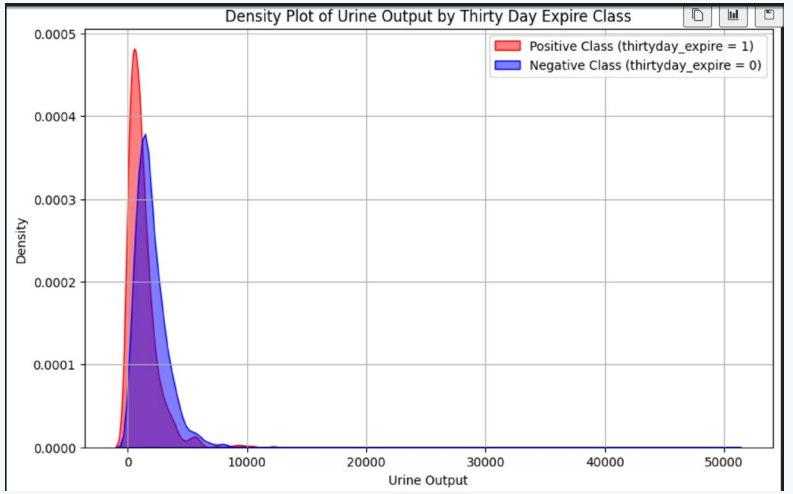
: No confident negative predictions were found in the test set. (f(x) <= .15)

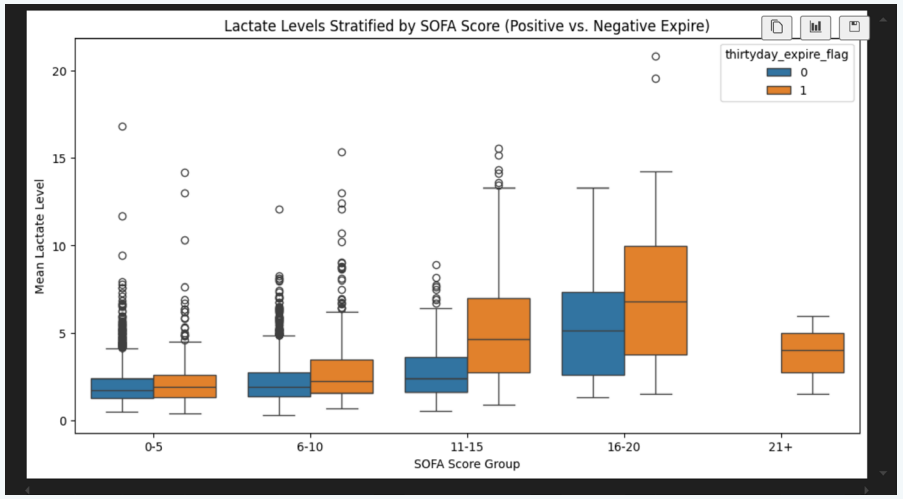
SHAP Force Plot for an Unconfident Correct Negative Prediction:

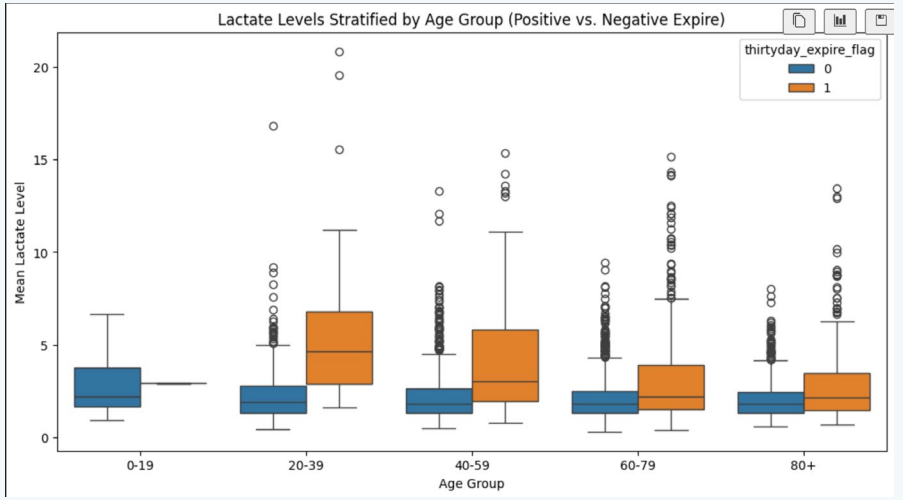


Method, Approach, and Clinical Findings

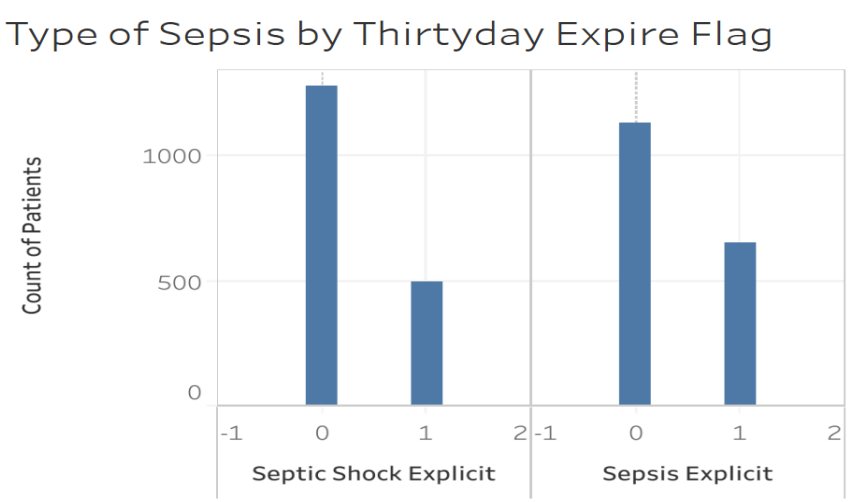
- Identified features strongly clustered to classes
- Excluded length of stay
- Strong predictors of sepsis based on domain knowledge:
  - Heartrate (min and max), urine output, creatinine, SOFA scores, BUN and WBC
- ANOVA tests

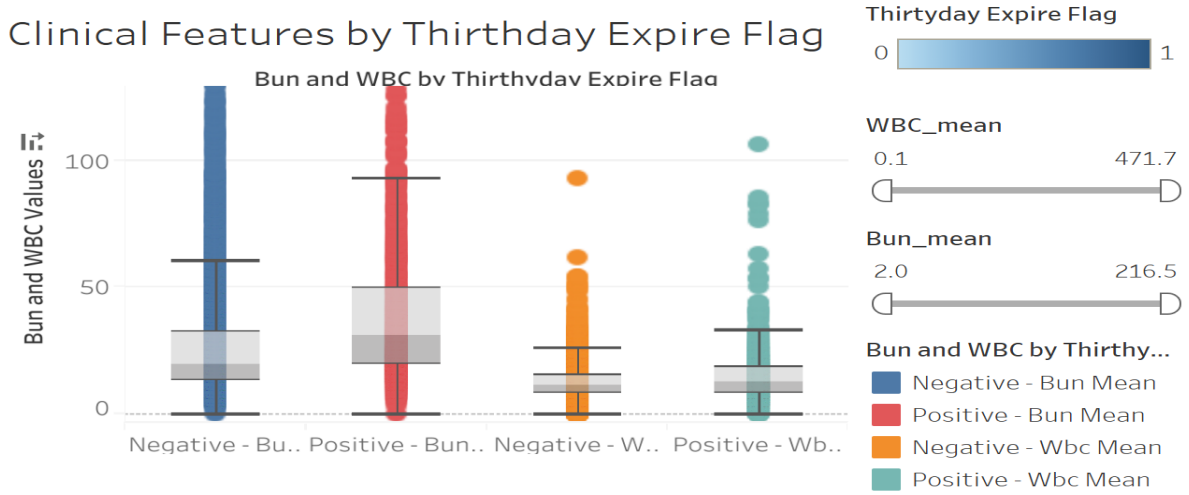


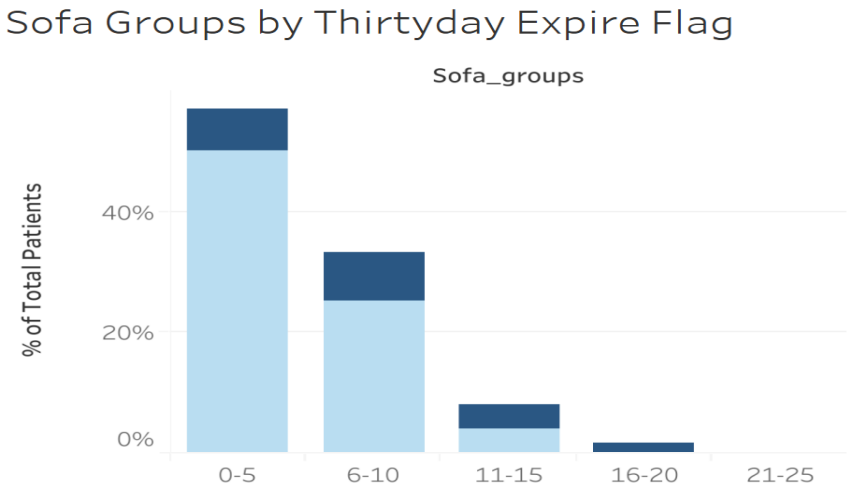


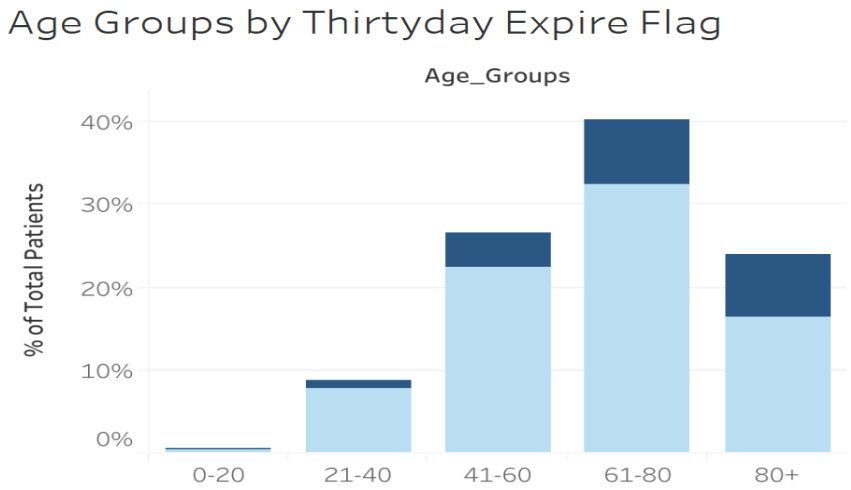


Feature Selection/Engineering- Showing Which Patients Have The Greatest Risk And Why









Recommendations for Future Research

Different models

Test different combinations of models

Additional Metrics

Utilize additional metrics and clinical markers (e.g. demographic information, comorbidity indices)

Diversity in Data

Collect data from diverse populations with similar distributions

Summary And Future Steps

https://hub.jhu.edu/magazine/2022/winter/ai-technology-to-detect-sepsis/

A Voting Classifier made up of Logistic Regression, Random Forest and XGBoost models can achieve decent performance

We uncovered key clinical insights about our patient population

Our findings reveal important features to utilize for these models, but more are necessary

Sepsis detection would be another important avenue to explore so patients receive fast and accurate treatment