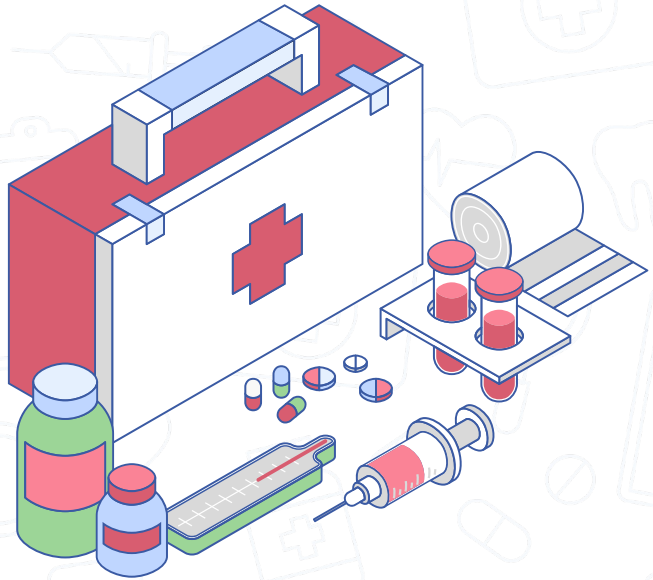
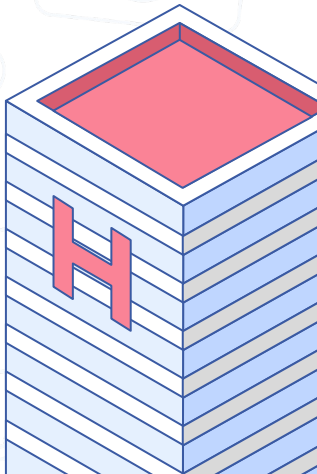


HARMONY HEALTHCARE

FEATURE SELECTION

Hibah Arshad
Samantha Nadler
Thomas Walsh



ACKNOWLEDGEMENTS

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for helping manage our classwide final project.

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BART, DANIEL, EDDIE, JAMARI, AND JUSTINE

for providing feedback on our work thus far and helping on the other stages of the project.

UNITED STATES EMERGENCY ROOM TRENDS

- 16.3% of emergency room patients were resulted in admission
- In 2018, the average rate of alcohol related ER admissions was 163.4 visits per 10,000 visits (1.63%)
- In 2020, that number increased to 184.8 (1.85%)

1) Pines, Jesse M., et al. “Variation in Emergency Department Admission Rates across the United States.” Medical Care Research and Review : MCRR, vol. 70, no. 2, 2013, pp. 218–31, https://doi.org/10.1177/1077558712470565.

2) Marissa B. Esser, Nimi Idaikkadar, Aaron Kite-Powell, Craig Thomas, Kurt J. Greenlund, Trends in emergency department visits related to acute alcohol consumption before and during the COVID-19 pandemic in the United States, 2018–2020, Drug and Alcohol Dependence Reports, Volume 3, 2022, 100049, ISSN 2772-7246, https://doi.org/10.1016/j.dadr.2022.100049.

EMERGENCY ROOM READMISSION TRENDS

10.5%

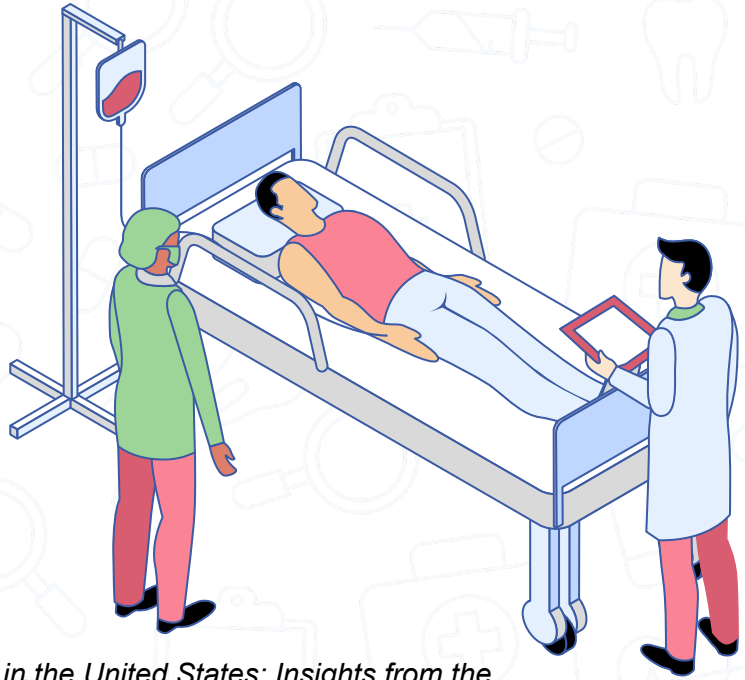
percent of patients readmit themselves to an emergency room within 30 days.

45+

Readmission within 30 days is more common in patients ages 45 and older.

MOST COMMON FACTORS

Heart failure and septicaemia were the most frequent factors causing readmission.

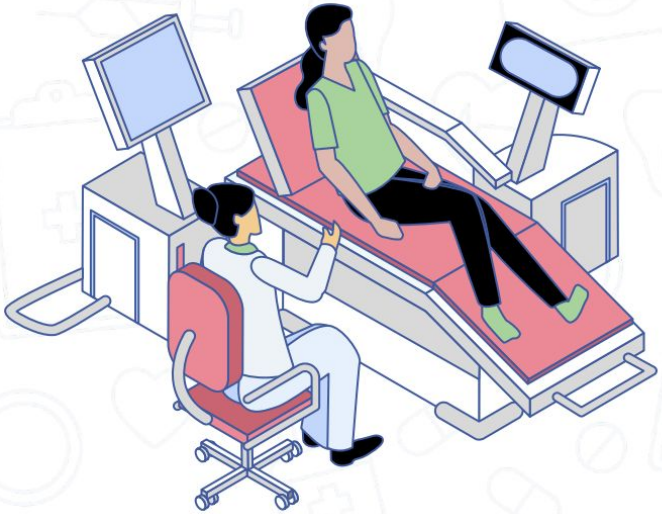


[1] Fonarow, Gregg C, et al. *All-Cause Unplanned Readmissions in the United States: Insights from the Nationwide Readmission Database*, 11 Oct. 2021, doi.org/10.1111/imj.15581.

MOST COMMON READMISSION CAUSES[1]

- Respiratory-related (22%)
- Nervous-related (17.3%)
- Cardiovascular-related (16.7%)
- Digestive-related (11.5%)
- Covid-19 (9.3%)

[1] Glynn, Nigel et al. “Emergency medical readmission: long-term trends and impact on mortality.” *Clinical medicine (London, England)* vol. 11,2 (2011): 114-8. doi:10.7861/clinmedicine.11-2-114
2) Abolfazl Akbari, Amirhossein Fathabadi, Mahya Razmi, Ahmadreza Zarifian, Mahdi Amiri, Alireza Ghodsi, Elnaz Vafadar Moradi, Characteristics, risk factors, and outcomes associated with readmission in COVID-19 patients: A systematic review and meta-analysis, The American Journal of Emergency Medicine, Volume 52, 2022, Pages 166-173, ISSN 0735-6757, https://doi.org/10.1016/j.ajem.2021.12.012.



RESEARCH QUESTION

What factors contribute the greatest to a patient getting readmitted to the emergency room?

- Feature engineering
- Build models to test variable correlation

MODELS WE CONSIDERED USING

LASSO METHOD

- Feature selection and regularization performed simultaneously

LOGISTIC REGRESSION

- Models log-odds of events as linear combinations of variables

XGBOOST

- Iteratively builds decision trees to determine an average prediction

MODEL WE DID USE

LASSO METHOD

- Feature selection and regularization performed simultaneously

LOGISTIC REGRESSION

- Models log-odds of events as linear combinations of variables

XGBOOST

- Iteratively builds decision trees to determine an average prediction

TEAM I'S DATA

Dataset cleanedDatasetV2.csv has no missing values:

- Categorical data all is lowercase to standardize text, replaced missing values with mode
- Numerical to binary to make predictions, replaces missing with mean
- Labels were converted to “Yes” or “No” to address imbalanced dataset

LASSO REGRESSION

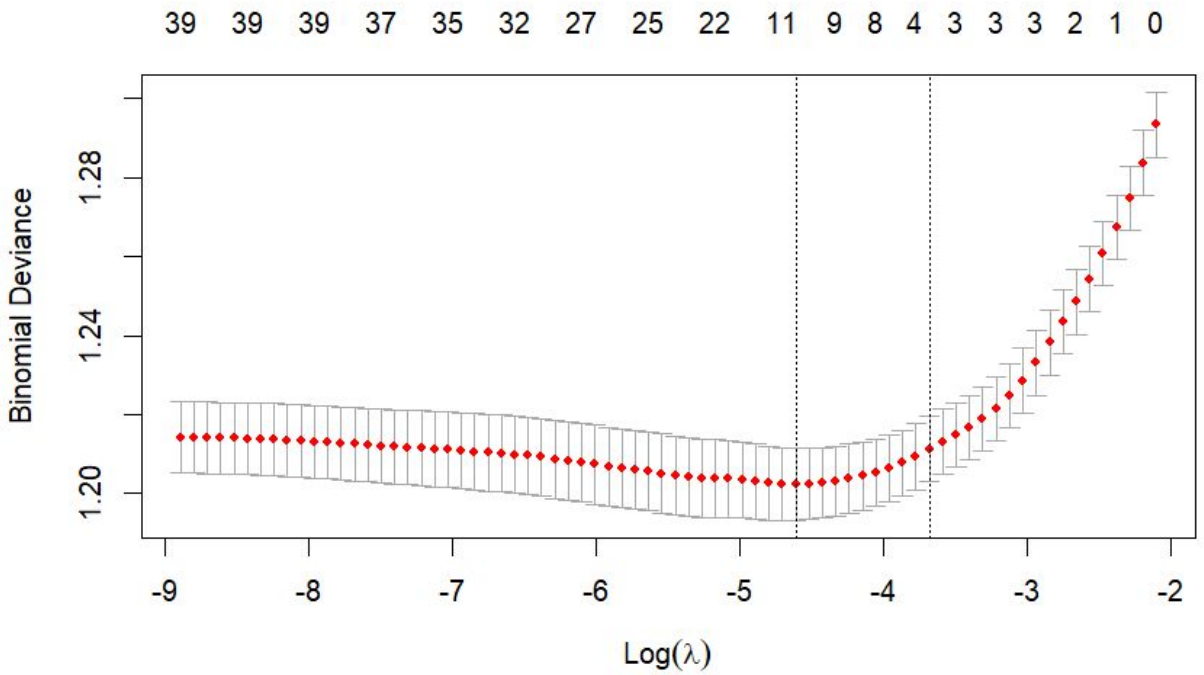
(Least Absolute Shrinkage and Selection Operator)

```
y ← HH_Data$Admission
x ← HH_Data %>%
  select(where(is.numeric), -Admission) %>%
  as.matrix()

library(glmnet)
set.seed(42)

lasso_model ← cv.glmnet(x, y, alpha = 1, family = "binomial")
best_lambda ← lasso_model$lambda.min
cat("Best lambda (from cross-validation): ", best_lambda, "\n")
plot(lasso_model)
```

LASSO REGRESSION



LASSO REGRESSION

- Patient.HCC.Risk.Total.Risk: -0.0446898215
- Active.Medications: 0.0443919593
- Primary.Care.Encounter.Count: 0.0331995417
- SDOH.Assessment.Count: 0.0146984831
- Patient.Appointment.No.Show.Rate..: 0.0146875578
- Depression.Screening.Count.Past.Yr: 0.0086325980
- eGFR.Result: 0.0067602679
- Most.Recent.BMI.Value: 0.0037749693
- UDS.Qualifying.Encounter.Count: 0.0032103970
- COVID.19.Immunization.Code: -0.0006886961
- Fasting.Glucose.Test.Result: -0.0006487510

FUTURE STEPS / LIMITATIONS

USE OTHER PREDICTIVE MODELS

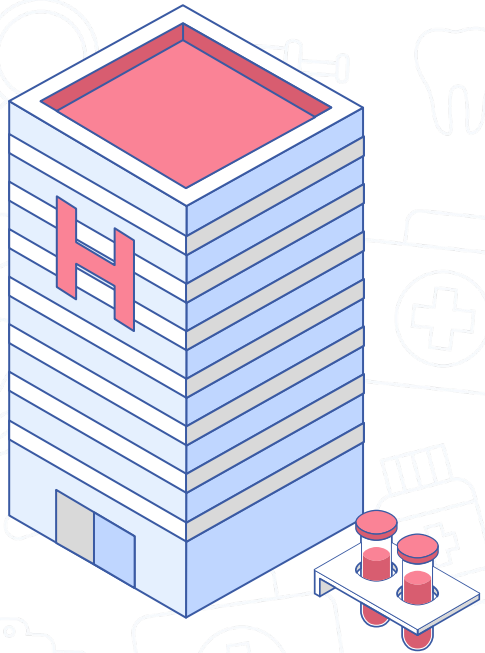
- Consider using logistic regression and/or XGBoost

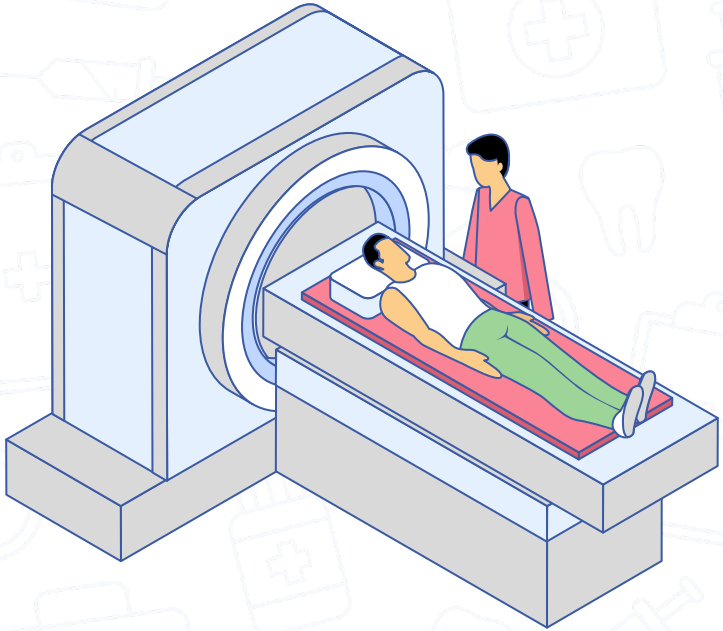
CONSIDER MORE RECENT DATA

- Dataset only contained one week's worth of data

GET FIXED AGES

- Not on us, but age column got corrupted and produces ages all ending in "1900"





THANK YOU!

DOES ANYONE HAVE ANY QUESTIONS?