



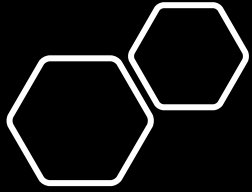
Diabetes Inpatient Services

Z² Solutions



Overview

- Business Problem
- Method/Classification Analysis
- Findings
- Recommendations
- Future Work

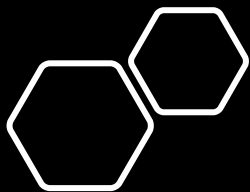


Problem

- The generation of bed tracking systems is a recent endeavor undertaken by states as tools for providers, patients and caregivers to more efficiently identify bed availability for inpatient care at medical facilities that has seen mixed results.
- In 2010, 6.76 million hospital stays listed diabetes as one of the discharge diagnoses; these accounted for a total of 34.67 million hospital days.
- Diabetes affects 1 in 4 people over the age of 65, so with an aging population, it seems prudent to consider inpatient readmission rates when tracking bed availability.

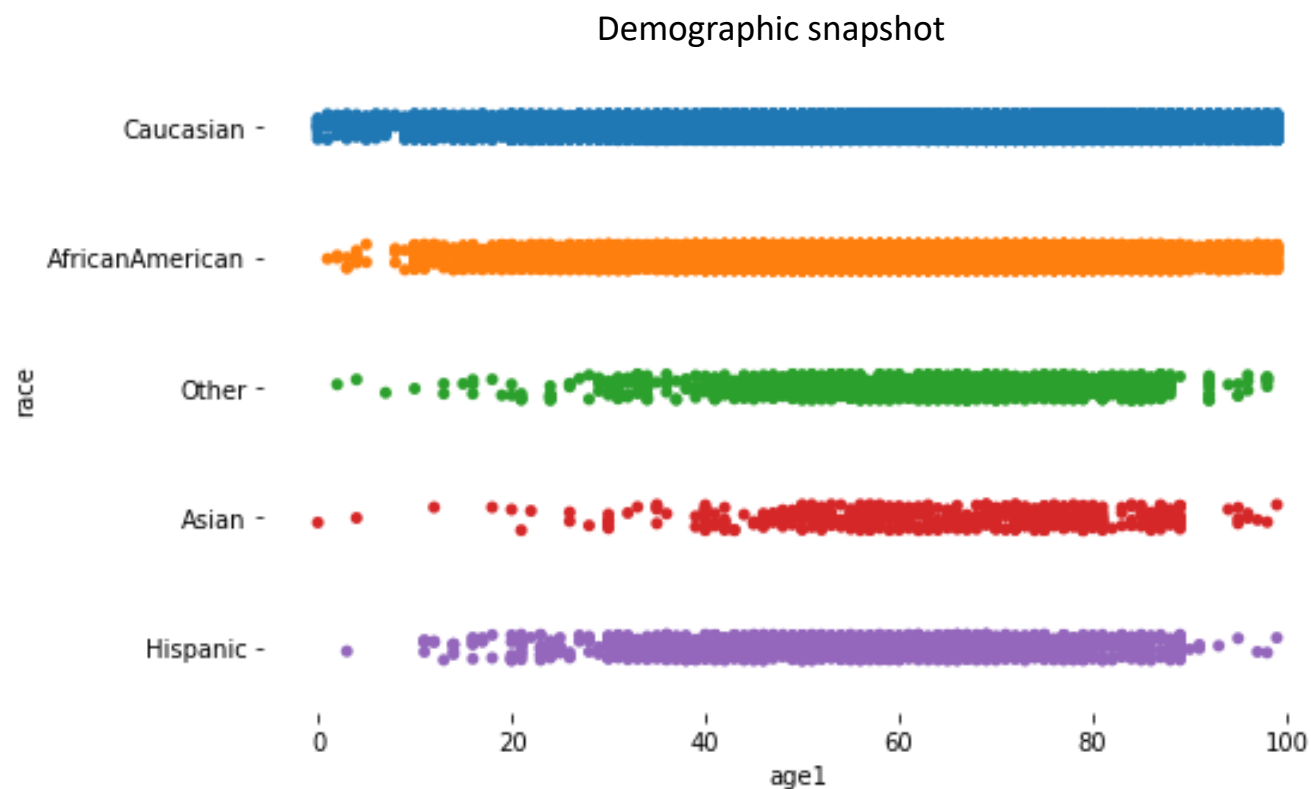
(Source: <https://aspe.hhs.gov/basic-report/inpatient-bed-tracking-state-responses-need-inpatient-care>)

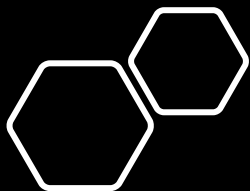
(Source: https://www.niddk.nih.gov/-/media/Files/Strategic-Plans/Diabetes-in-America-3rd-Edition/DIA_Ch40.pdf)



Method

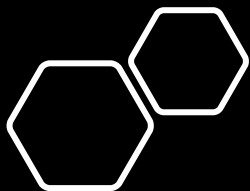
- This was data pulled from 130 hospitals over ten years (1999-2008)
- Patients had some diagnosis of diabetes during the encounter
- Length of stay was no more than 2 weeks





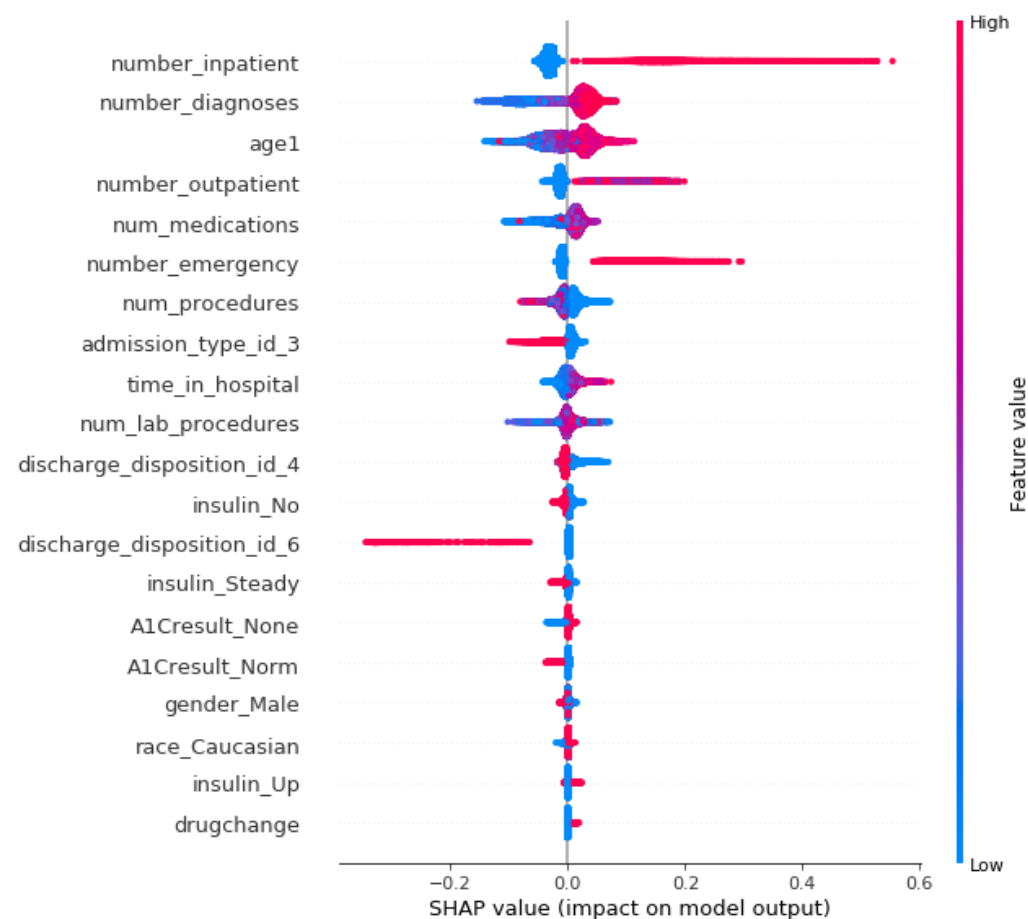
Method

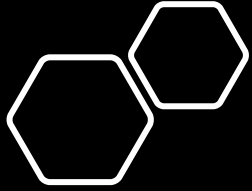
- Examined 59,408 patient encounters with an inpatient stay of 1-14 days during which diabetes of any type was entered as a diagnosis
- Features considered were:
 - The length of the inpatient stay
 - The number of lab tests performed for the patient during the encounter
 - The number of distinct generic name medicines administered during the encounter
 - The number of outpatient visits the patient had in the year preceding the encounter
 - The number of emergency room visits the patient had in the year preceding the encounter
 - The number of inpatient visits the patient had in the year preceding the encounter
 - The number of changes to any of 24 medications
 - Age and race of the patient
 - Was the admission Elective or Emergency
 - The discharge category – did the patient go on to receive Continued Care, was the patient Expired, No additional care provided, Short term care provided, or did they go on to Hospice
 - Test results that show whether a patient's levels of blood glucose over the past 3 months has not changed, remained normal, increased >8%, or increased >7% (A1C test results)
 - Indication of whether insulin was not prescribed, or whether it was held steady, increased, or decreased
- Tested multiple classification methods to build a predictive model for patient readmission



Findings

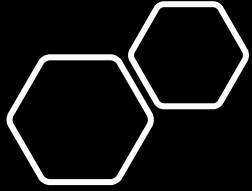
- Extreme Gradient Boosted classifier had best performance, however the predictive power for long term outcomes were relatively weak
- Shapley Additive Explanations show feature values' impact on predicted outcomes
 - E.g. a high number of inpatient visits in the last year push the predicted outcome towards 'Readmit' (1).





Recommendations

- Hospitals who receive increased numbers of new patients with numerous inpatient, outpatient, and emergency room visits in recent years should plan to receive these patients as readmittance
- Collect additional details during future encounters, e.g. the types of lab tests done while the patients were receiving care

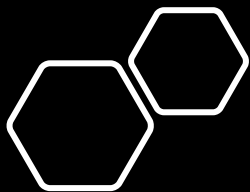


Future work

- Gain better understanding of the types of diabetes these patients had
- Utilize discharge diagnoses to better understand if there were common ailments bringing patients back in
- Search for similar, more recent data. This is a decade old and treatments for diabetic patients has likely changed

Thank you!





Appendix

- Admission_type_id_3 – elective admission
- Discharge_disposition_id_4 – No additional care
- Discharge_disposition_id_6 – Hospice service