Diabetes Hospitalization

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OUR PROCESS

01 Business Understanding

$17,000 per year per diabetic

$1 of every $4 spent in healthcare

02 Data Understanding

Parsing +70,000 diabetic observations

Understanding impact of HbA1c

03 Cleaning & EDA

04 Modeling

Logistic regression

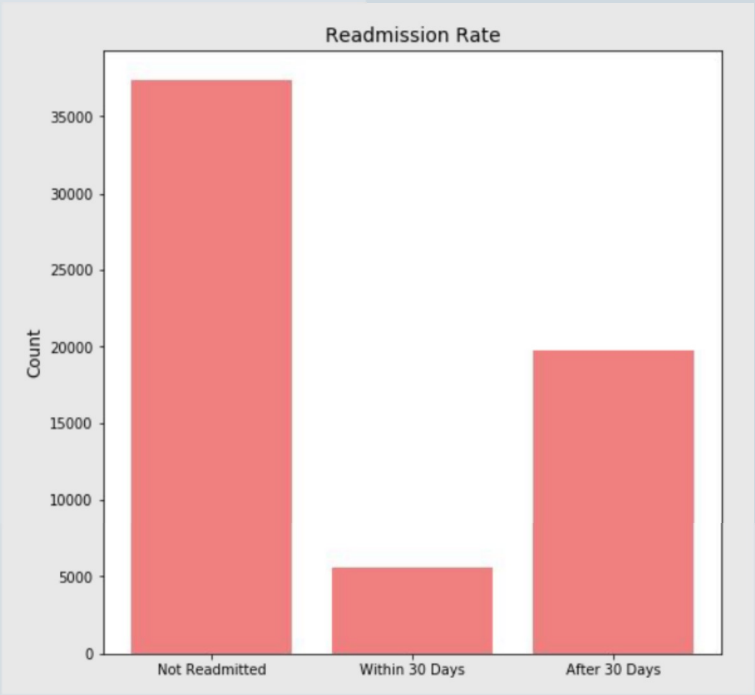
Decision Tree classification

05 Insights

INTRODUCTION

- Diabetes affects **30 million** Americans
- Cannot produce or utilize insulin to absorb glucose
- **HbA1c** test measures long-term blood sugar levels
- HbA1c testing leads to better diabetes management.

THE DATA

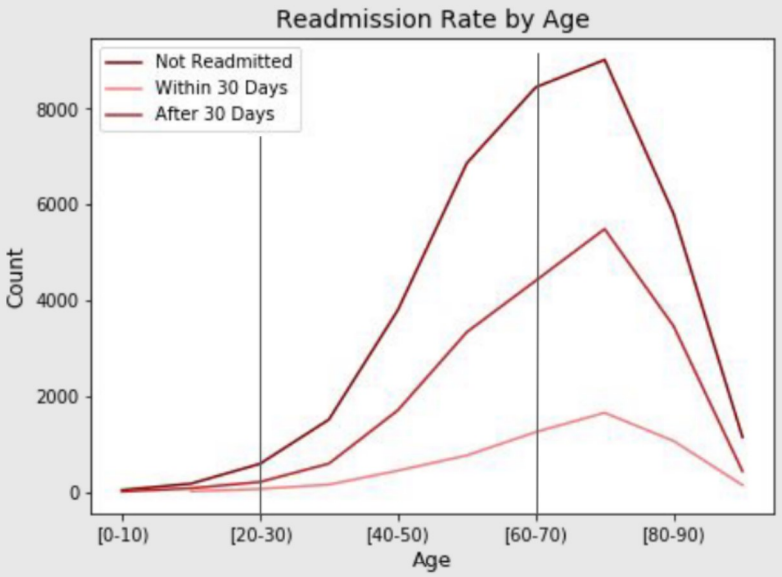


- Parent dataset was 75 million inpatient visits between 1998-2008
- We used subset of diabetic patients
- De-identified healthcare data
- Cleaning: 100,000 → 70,000 obs

40% of patients had diabetes listed as a top 3 diagnosis

18% of patients received a HbA1c test

55% of patients changed meds after HbA1c test



Final Model

Logistic Regression

No Polynomial/Interaction Features
F1 Score: 0.71

Runner Up

Logistic Regression

Polynomial/Interaction Features
F1 Score: 0.69

Runner Up

Decision Tree

Tomek Links
F1 Score: 0.50

No Readmit

.12 Not on Diabetes Meds

.11 Age 0-30

-.32 Prev Visits

-.19 Diabetes as Diag 1

-.14 Age 60-100

-.11 On Diabetes Meds

Within 30 Days

.23 Prev Visits

.12 Diabetes as Diag 2

.10 Age 60-100

-.14 No Blood Sugar Test

-.08 Changed Meds

After 30 Days

.11 Diabetes as Diag 1

.09 No Blood Sugar Test

-.09 Age 0-30

-.09 Not on Diab Meds

-.08 A1c Test Normal

KEY INSIGHTS

01

Patients with Diabetes as top diagnoses more likely to be readmitted both within and beyond 30 days of inpatient visit.

02

Reducing diabetic visits through increased HbA1c testing likely reduces rate of readmission.

03

Patients 60-100 years of age more likely to be readmitted after 30 days. Patients 0-30 less likely to be readmitted in either case.

NEXT STEPS

- Encourage use of the HbA1c test during inpatient visits.
  - 55% lead to change in medication
- Target particularly susceptible demographics for increased testing.
- Include financial elements in analysis to assess optimizing care and minimizing cost.

Thank you!

Any Questions?

Sources

- B. Strack, J. DeShazo, C. Gennings, et al. Impact of HbA1c Measurement on Hospital Readmission Rates. Biomed Research International. 2014.
- M. Riddle and W. Herman. The Cost of Diabetes Care. American Diabetes Association. 2018.