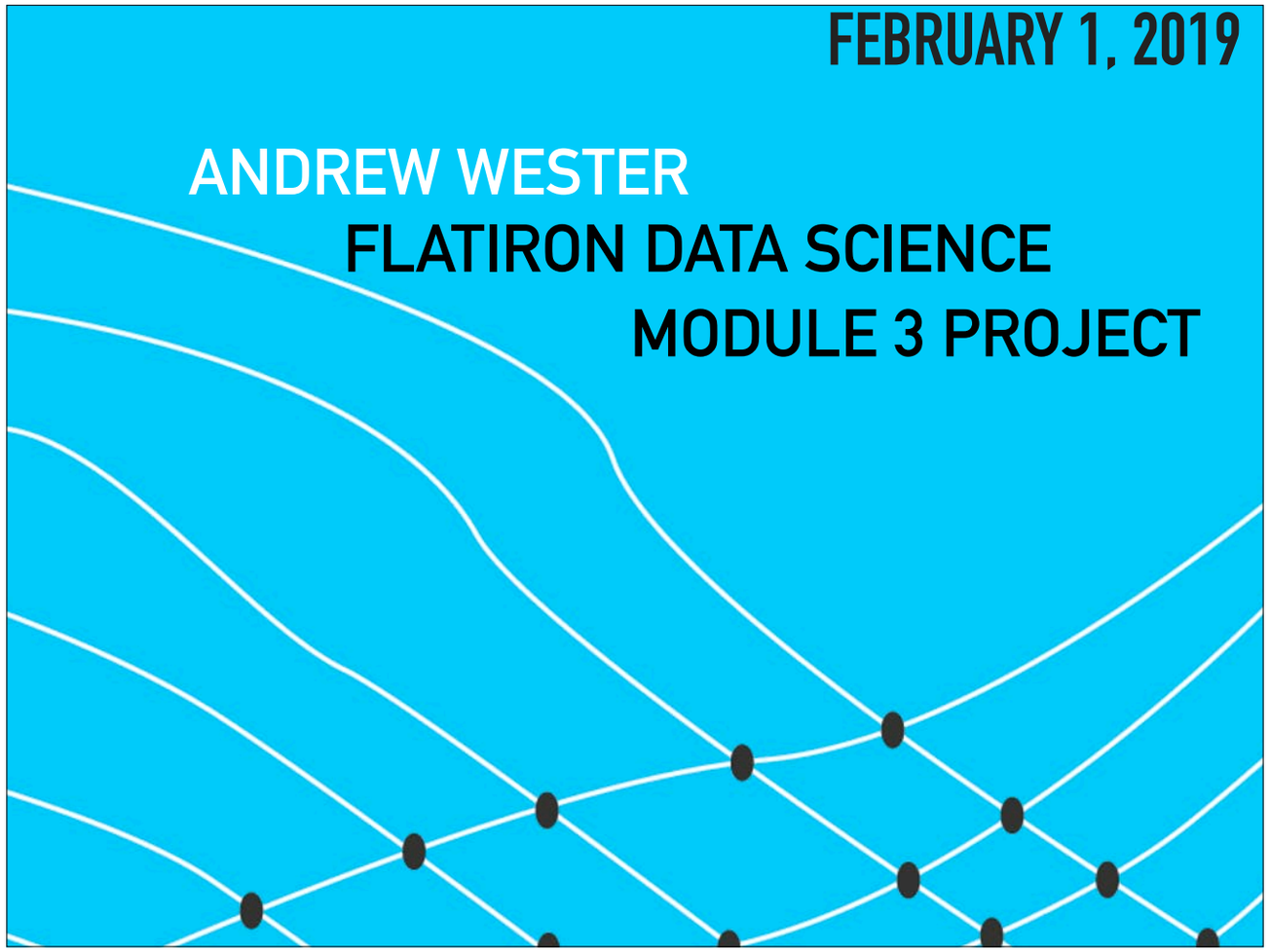
FEBRUARY 1, 2019

ANDREW WESTER

FLATIRON DATA SCIENCE
MODULE 3 PROJECT

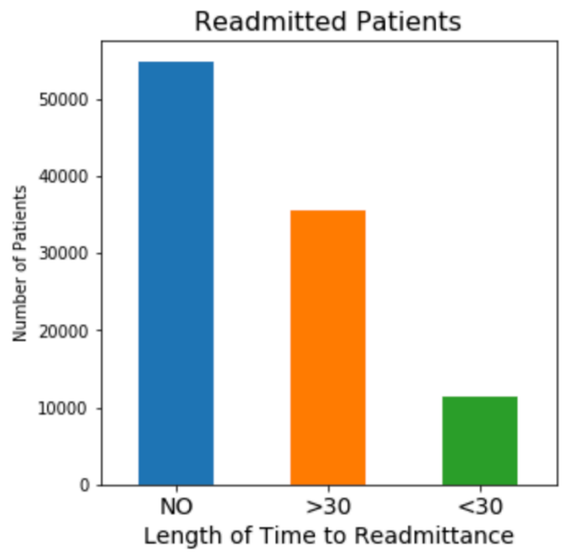


DIABETES CARE IN HOSPITALS ACROSS USA:

- 130 Hospitals examined from 1999 - 2008 across US:
  - Midwest (18 Hospitals)
  - Northeast (58 Hospitals)
  - South (28 Hospitals)
  - West (16 Hospitals)
- Hospital # of Beds: 100-499 (78), <100 (38), >500 (14)

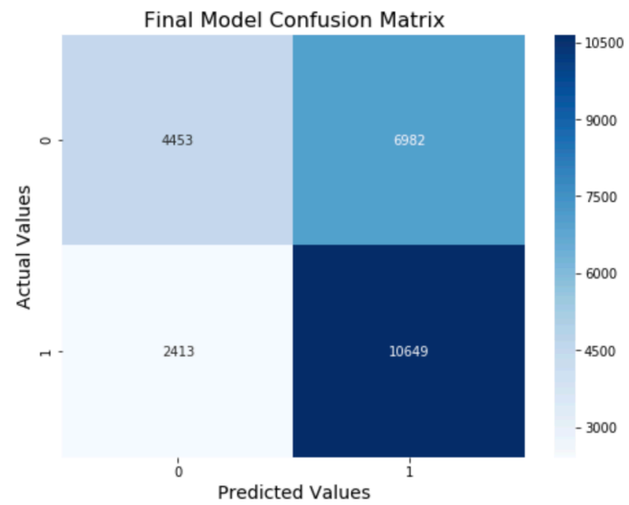
DIABETES CARE IN HOSPITALS ACROSS USA:

- Readmitted Patients:
  - Not Readmitted (54,864)
  - <30 Days (11, 357)
  - >30 Days (35,545)
- **Goal: Predict factors contributing to those who return to hospitals**



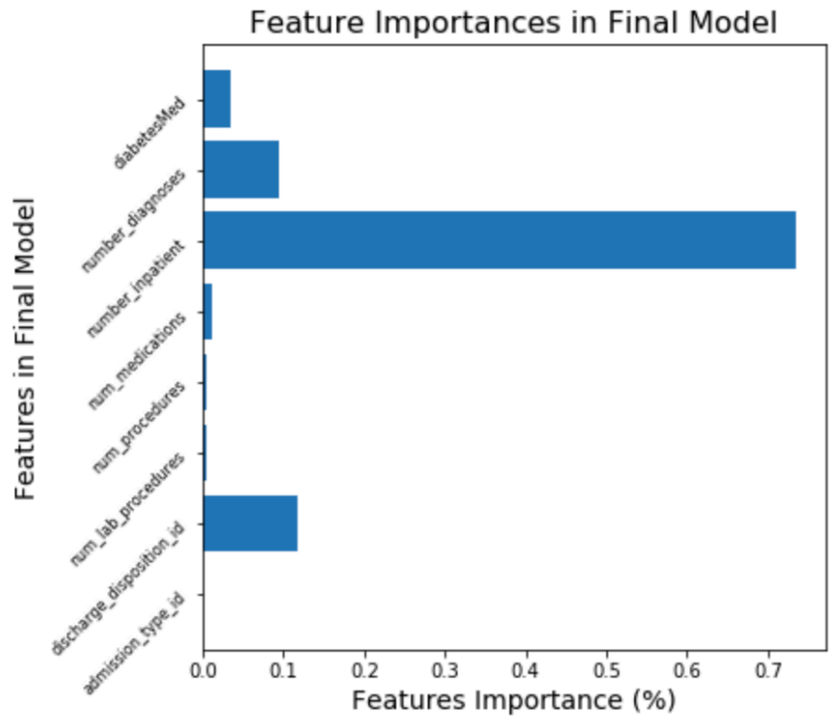
DIABETES CARE IN HOSPITALS ACROSS USA:

- Final Model:
  - 61% Accuracy
    - 60% - False Positives
    - 18% - False Negatives



- While our Model's final accuracy is far from perfect, healthcare in general is an imperfect business
- 61% accuracy does not convey full information
  - 60% of patients who are predicted to return, end up not returning (good treatment?)
  - Only 18% of patients predicted to not return will end up returning
    - This low rate of False Negatives leads to better staffing and budgeting at the hospitals, plus better long term, more likelihood to get better results from our studies and treatment

DIABETES CARE IN HOSPITALS ACROSS USA:



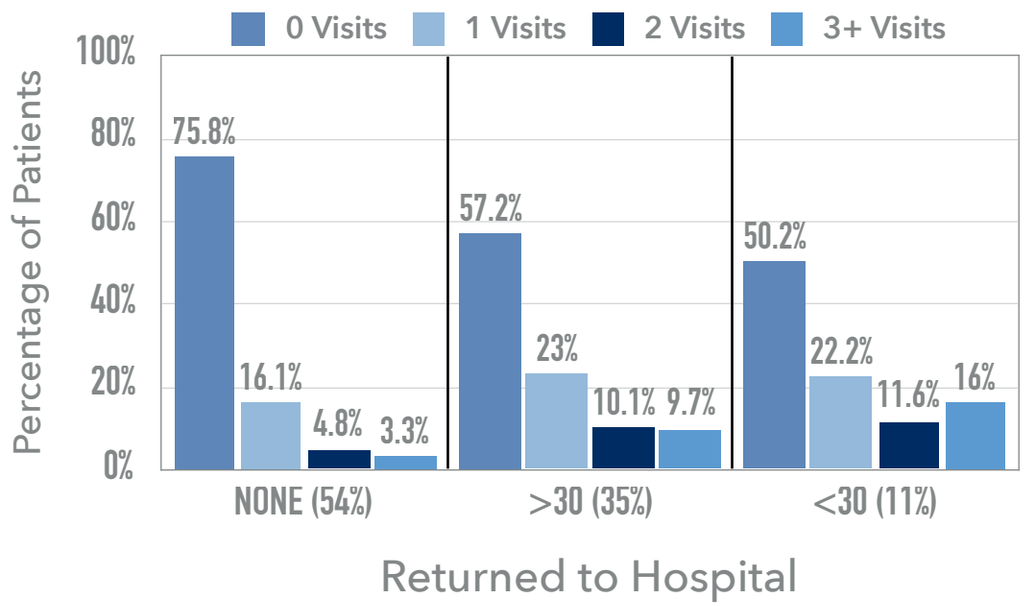
Our feature importances are valuable for the long term improvement of treatment, by recognizing which factors are most important, we can identify strategies of improving our performance of diagnosing diabetes and treating the disease effectively.

EARLY DIAGNOSIS: INPATIENT VISITS MOST IMPORTANT FACTOR!

	None	>30	<30
# Patients	54,864 (54%)	35,545 (35%)	11,375 (11%)
0 Inpatient Visits	75.8%	57.2%	50.2%
1 Inpatient Visit	16.1%	23.0%	22.2%
2 Inpatient Visits	4.8%	10.1%	11.6%
3+ Inpatient Visits	3.3%	9.7%	16.0%

- 84% of patients who returned to the hospital <30 days had 0-2 Inpatient Visits:
  - This tells us that early diagnosis was very poor for this group
- 90.3% of patients who returned >30 days had 0-2 inpatient visits
  - Tells us our early diagnosis was better, and we were able to accurately diagnose and treat
- 96.7% of patients who did not return had 0-2 inpatient visits
  - Tells us our early diagnosis was best, and we were able to accurately diagnose and treat

EARLY DIAGNOSIS: INPATIENT VISITS MOST IMPORTANT FACTOR!



- We can see visually the effect of early diagnosis and treatment
  - Our group of patients who did not return to the hospital had much higher likelihood of early diagnosis, as a large majority had 0-2 inpatient visits prior to diagnosis
  - Our group who returned in >30 days had a decent majority with 0-2 inpatient visits prior to diagnosis. Longer time to return indicates appropriate treatment and diagnoses
  - Group who returned in <30 days had much wider spread of patients with number of prior inpatient visits. This means we did a poor job at early detection, as well as our treatment plans to help the patients deal with their diagnosis and how best to manage their health.

RECOMMENDATIONS:

- Previous study: HbA1c Measurement Good Predictor
- Our results: Improve Early Diagnosis of Diabetes
  - Decreases likelihood of return to hospital
    - Improves ability of hospitals to operate efficiently
  - Early diagnosis more effective than long-term treatment
    - Decrease cost for patients (out of pocket) and hospitals (staffing and medication/treatment)