

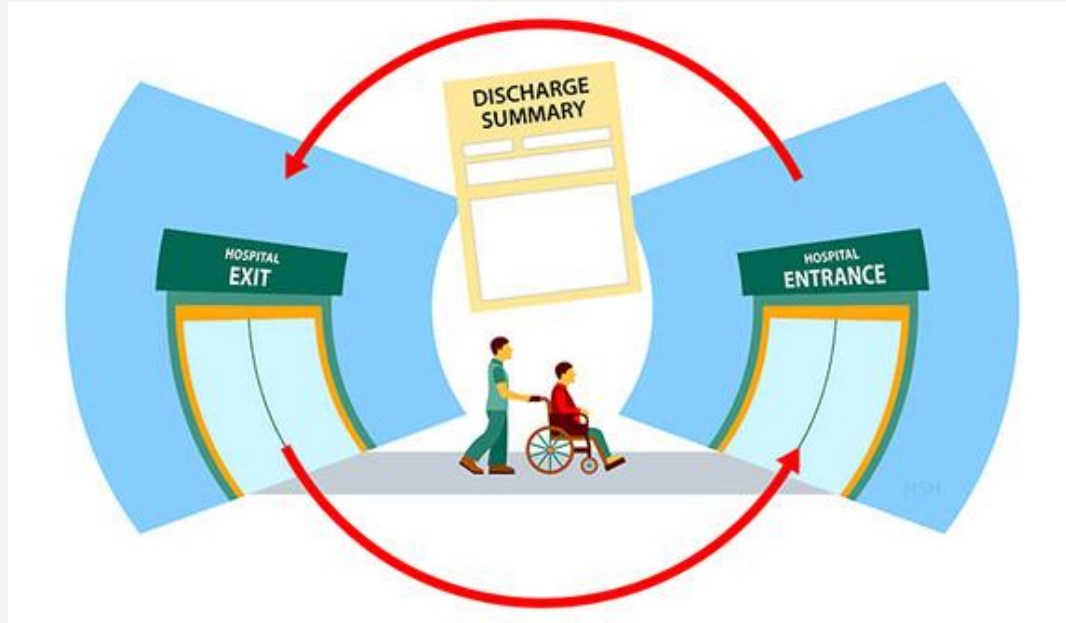
Classifying Hospital Readmission Risk in Diabetes Patients



Sam Rudovsky

What constitutes a “readmission”?

- Subsequent hospital encounter within 30 days of the original admission



Readmission statistics

- Readmission rate for the general population is ~ 10%
- Readmission rate for diabetes patients is ~ 20%

Diabetes

- 10% of U.S. population has diabetes
- Linked to higher readmission rates
 - Comorbid conditions
 - High blood pressure, cardiovascular disease, kidney disease
 - Raises one's risk of infection

Costs

- In 2011, hospital readmissions were associated with \$41.3 billion dollars in cost
 - For $\frac{2}{3}$ of cases, rehospitalization was more expensive than the original encounter

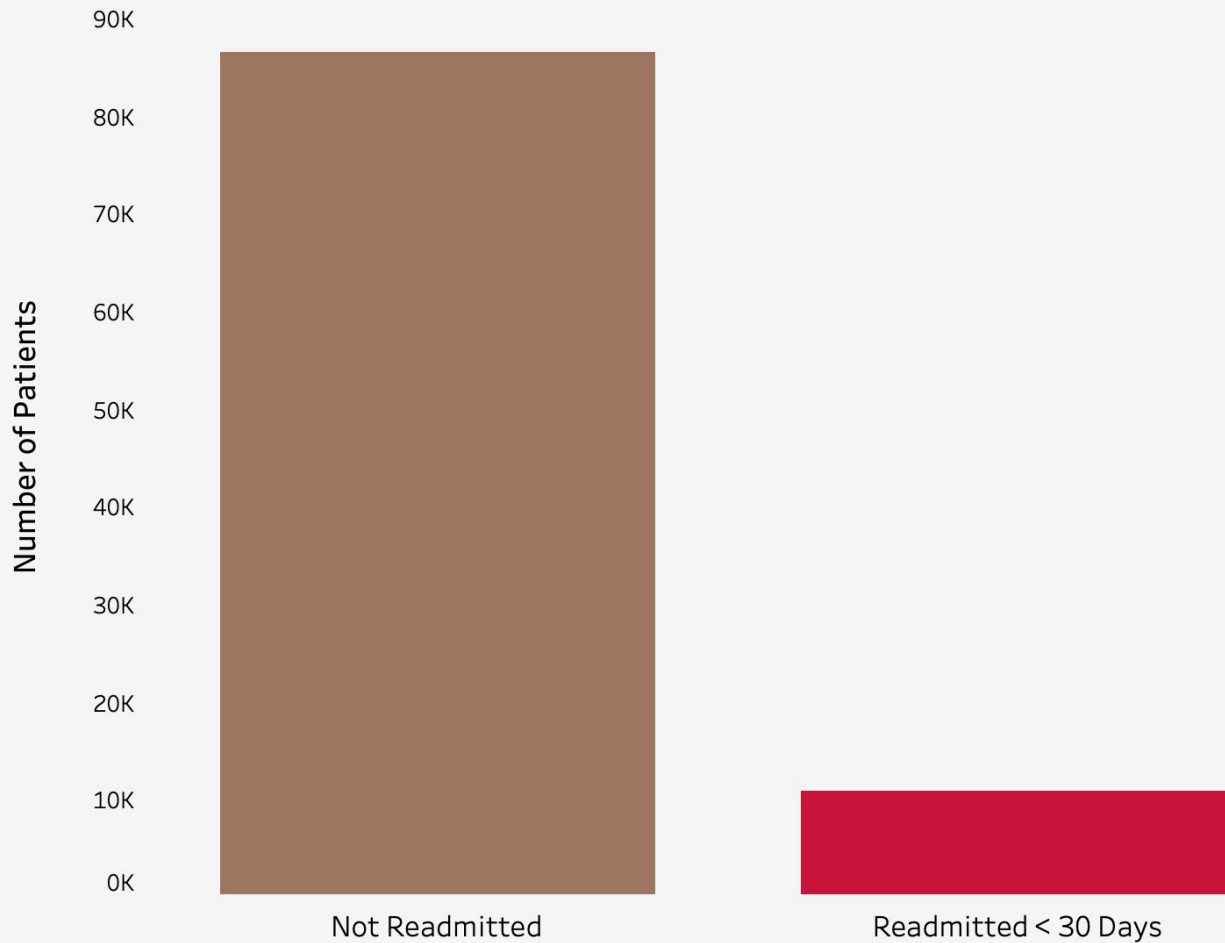
Data

Collected from VCU and UCI Repository

Hospital Data

- 10 years of clinical encounters – collected from 1998-2008
 - ~ 100,000 inpatient, diabetic encounters
 - Features
 - Patient demographics and medical history
 - Hospital decisions

Hospital Readmission Rate



What is the goal of the model?

- It is essential to classify high risk patients
 - Trivial risk in a false positive
 - Considerable risk in a false negative
 - Optimize for recall and AUC

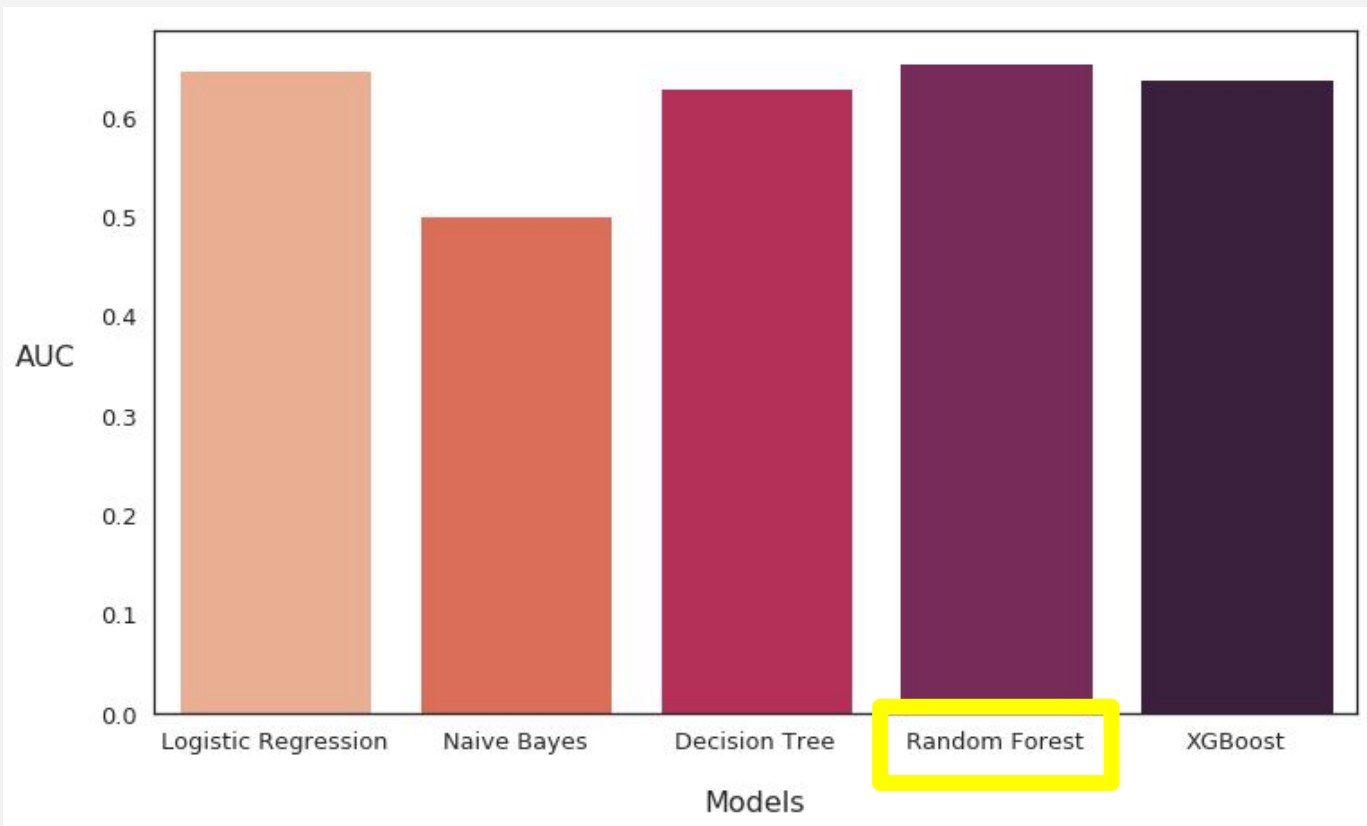
Preprocessing

- Remove patients who couldn't be readmitted
 - Death, hospice care
- Class Imbalance
 - Random oversampling of the “positive” class – 8 to 1

Promising models

- Logistic Regression
 - Regularization on the L1 norm; C parameter of 0.5
- Random Forest
 - 600 trees; Max depth of 12
- XGBoost
 - 700 trees; Max depth of 10; Learning rate 0.05

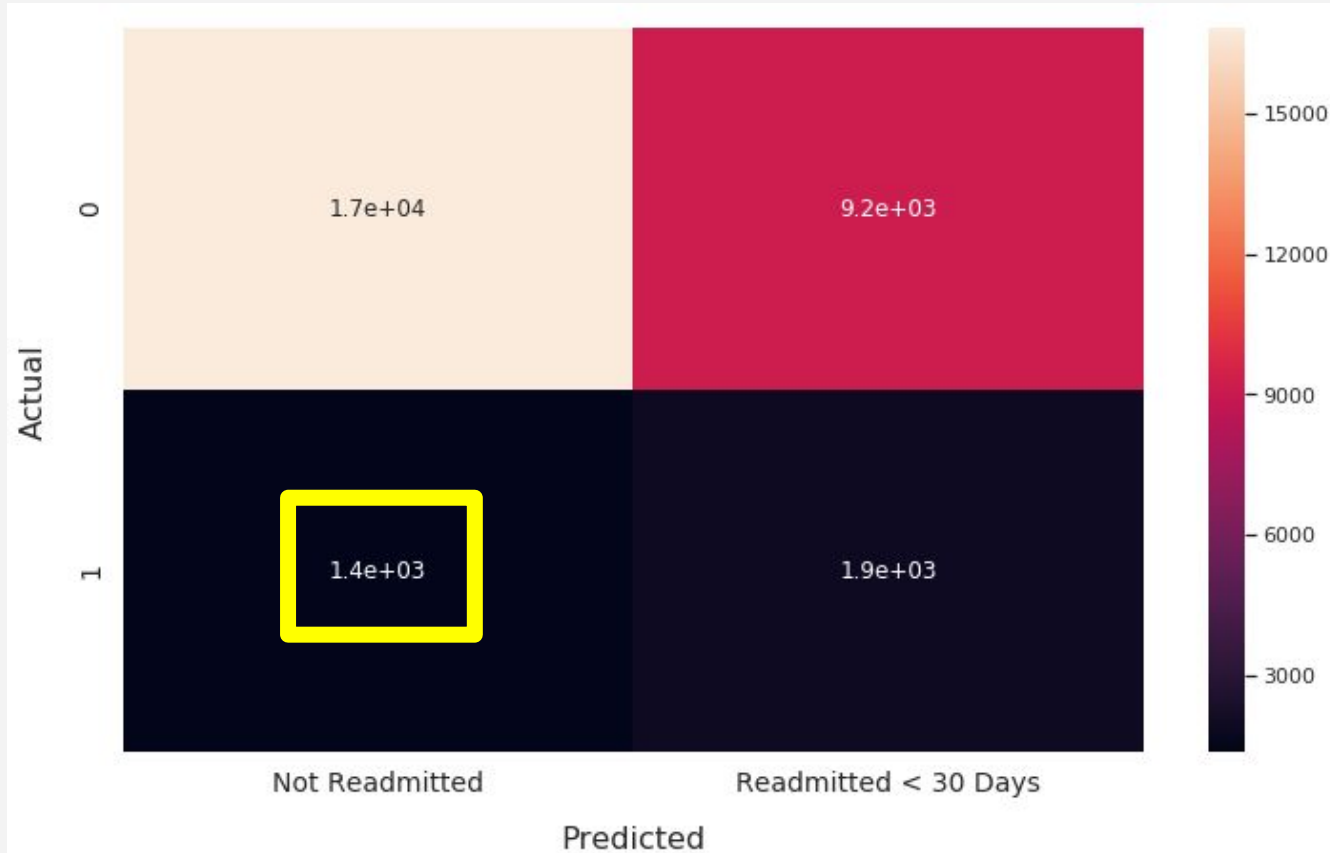
AUC by Model



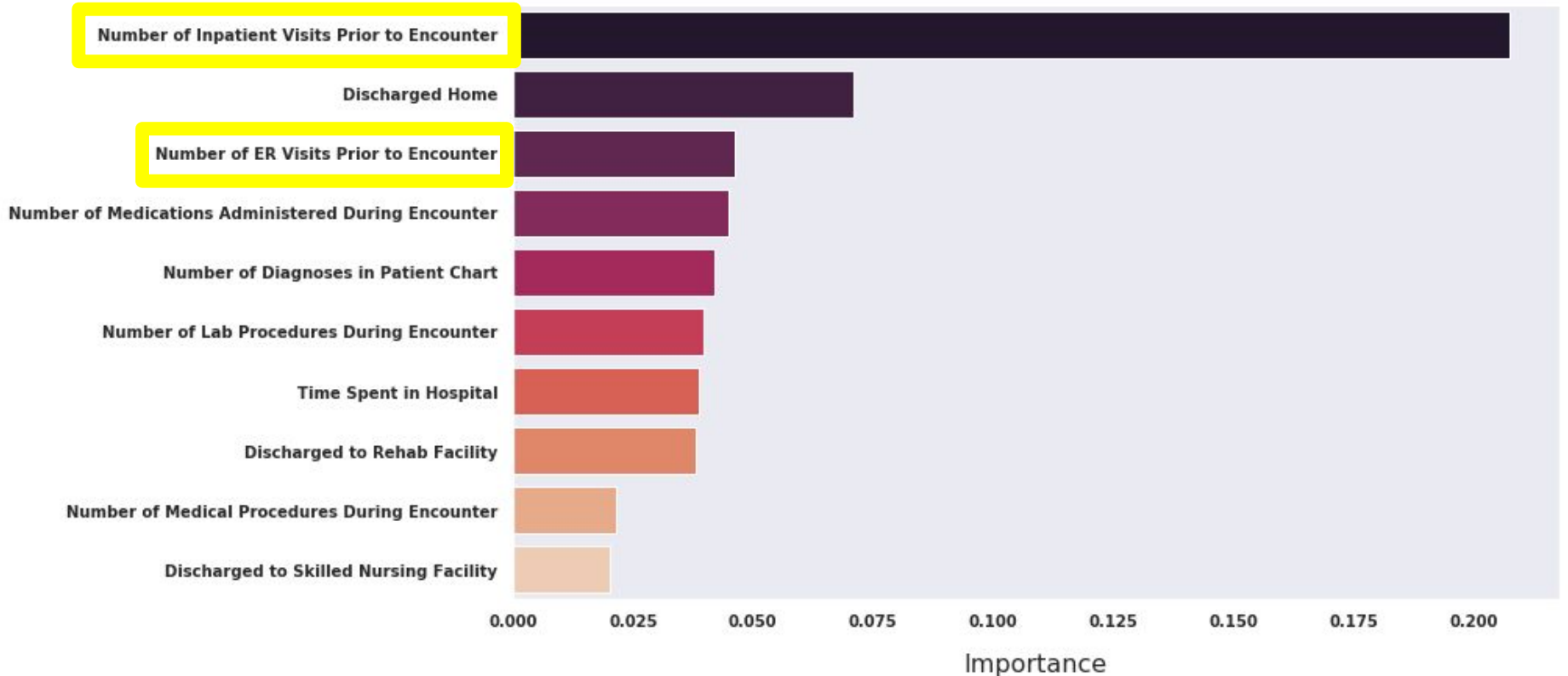
Random Forest Confusion Matrix



Random Forest Confusion Matrix



Top Features in Random Forest Model

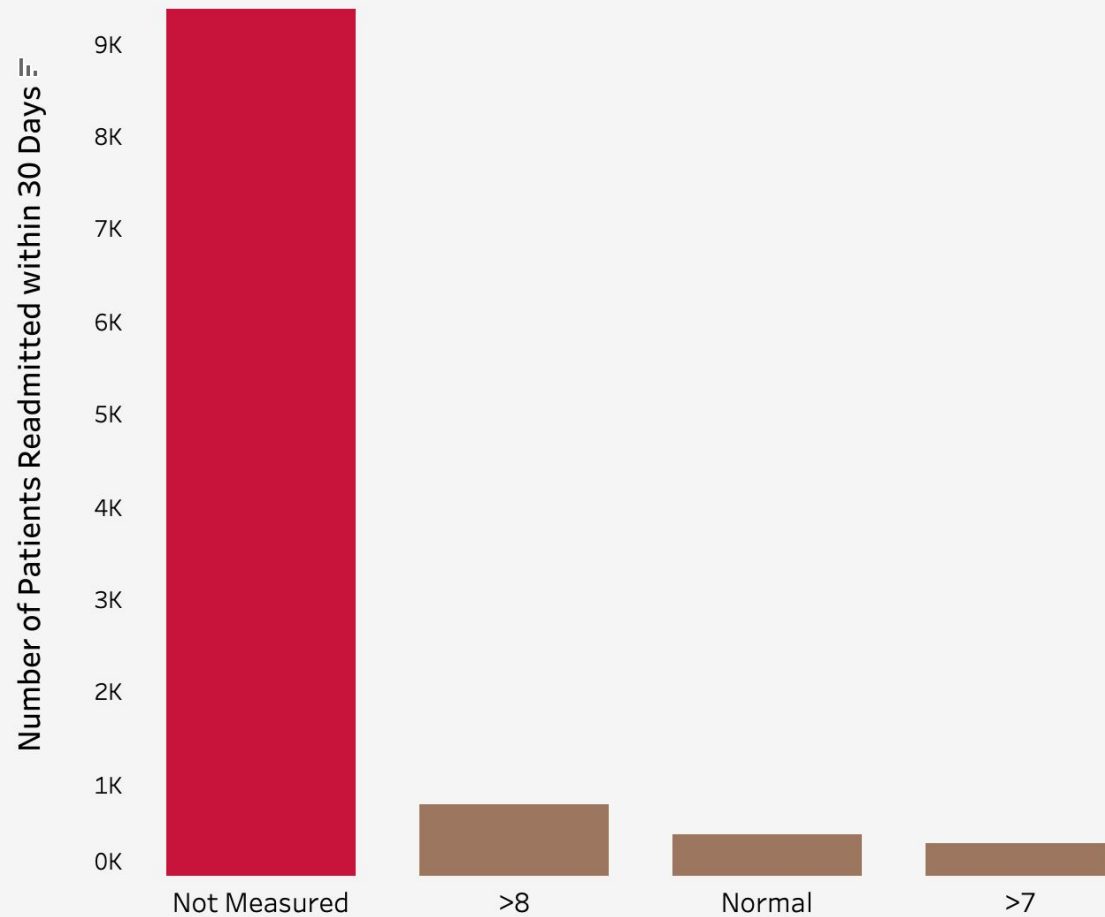


Looking Beyond the Primary Diagnosis

How to Lower the Rate of Hospital Readmissions



Hemoglobin A1c is Rarely Monitored



Thank you