

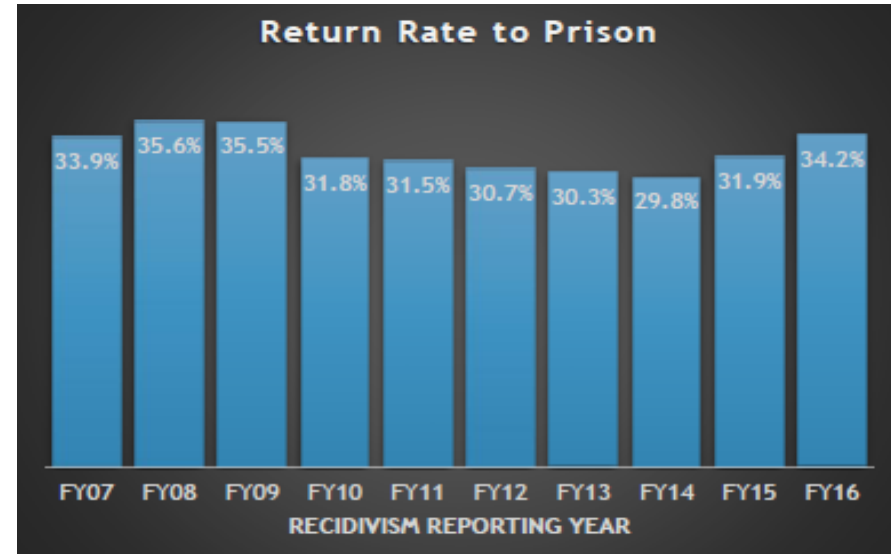
# Using Machine Learning to Predict Which of Iowa's Prisoners Will Return to Crime?

James M. Irving,  
Ph.D.

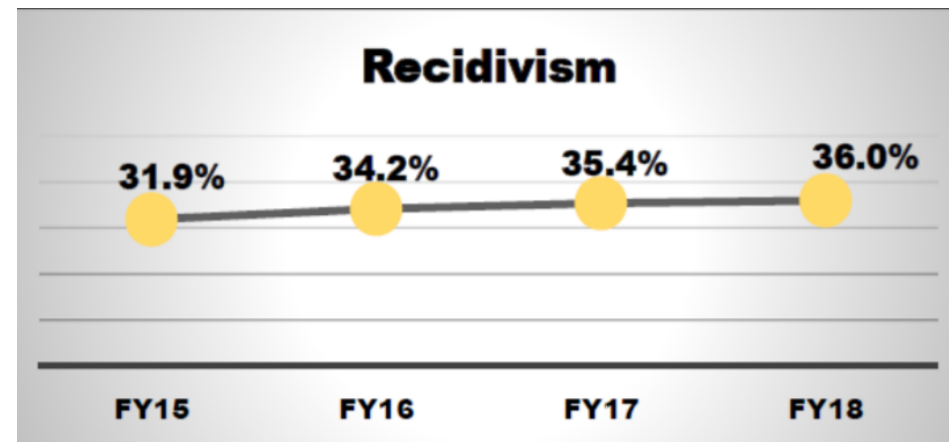


- By 2015, nearly 1/3 of all released prisoners from Iowa were returning to crime.
- In 2015, US Dept. of Justice gave Iowa \$3M Grant to help reduce
- However recidivism rates continue to climb (36% 2018).

# IOWA'S RECIDIVISM PROBLEM



From: <https://doc.iowa.gov/data/prison-recidivism-fy2016>



Excerpt form IOWA Dept of Corrections Annual Report - 2018

Can we use data describing Iowa's released prisoners to predict *which* prisoners will return to a life of crime?

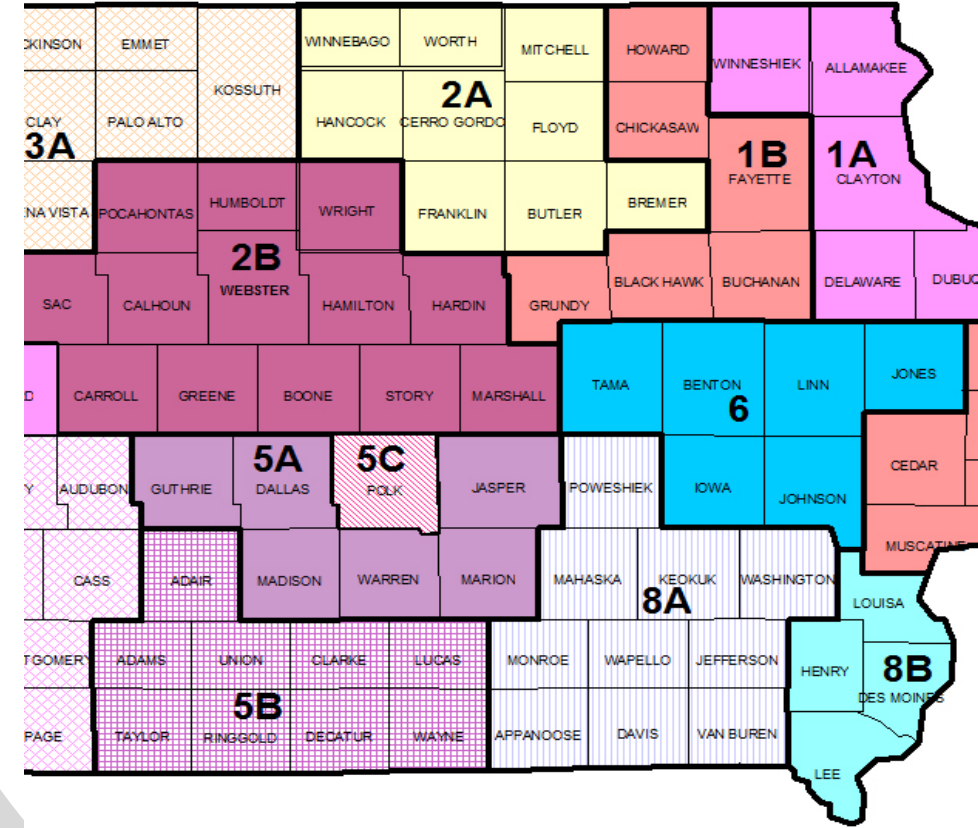
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**FUNDAMENTAL QUESTION**

# Iowa Dept. of Corrections

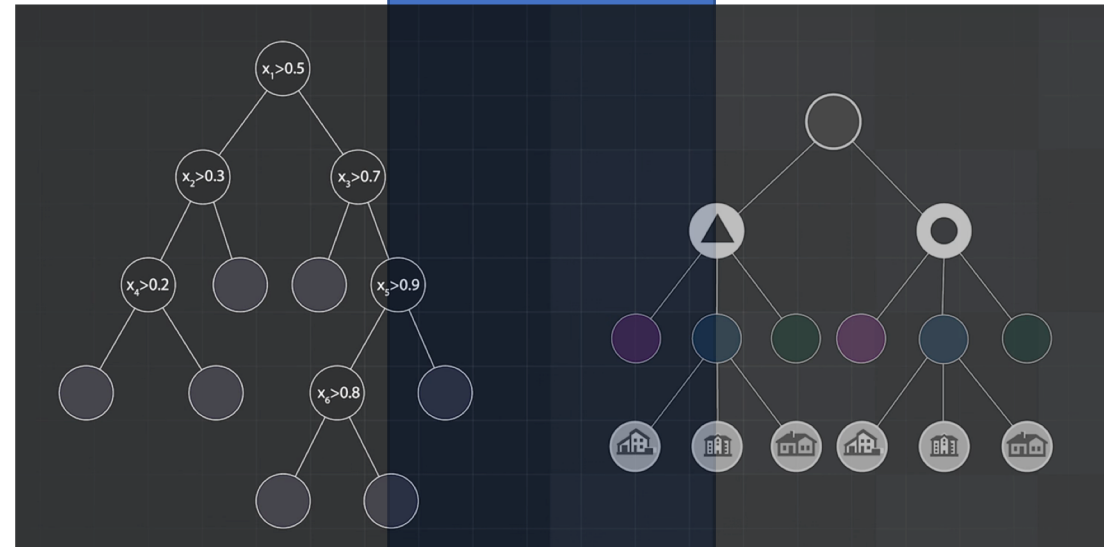
## Features Analyzed:

- Convicting Offense Classification
- Convicting Offense Type
- Convicting Offense Subtype
- Release Type
- Main Supervising Judicial District
- Race - Ethnicity
- Part of Target Population
- Fiscal Year Released
- Recidivism Reporting Year



# OUR MODEL FOR PREDICTING IOWA'S PRISONER- RECIDIVISM

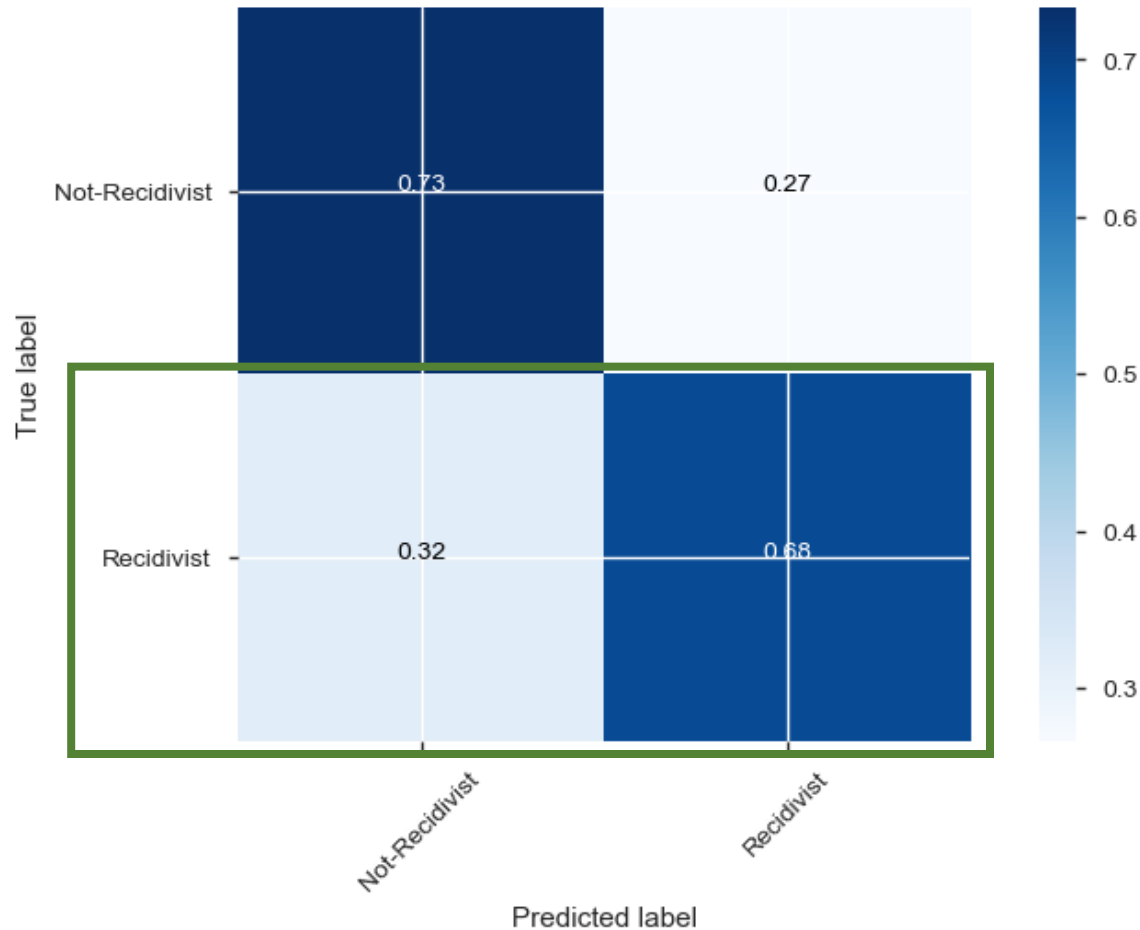
- Used Next-Generation Algorithms
  - Tree-based classification to find critical points in prisoner data.
- Our Model Performance:
  - 70% Accuracy
  - 72% Precision
  - 0.79 AUC (random chance=0.50)



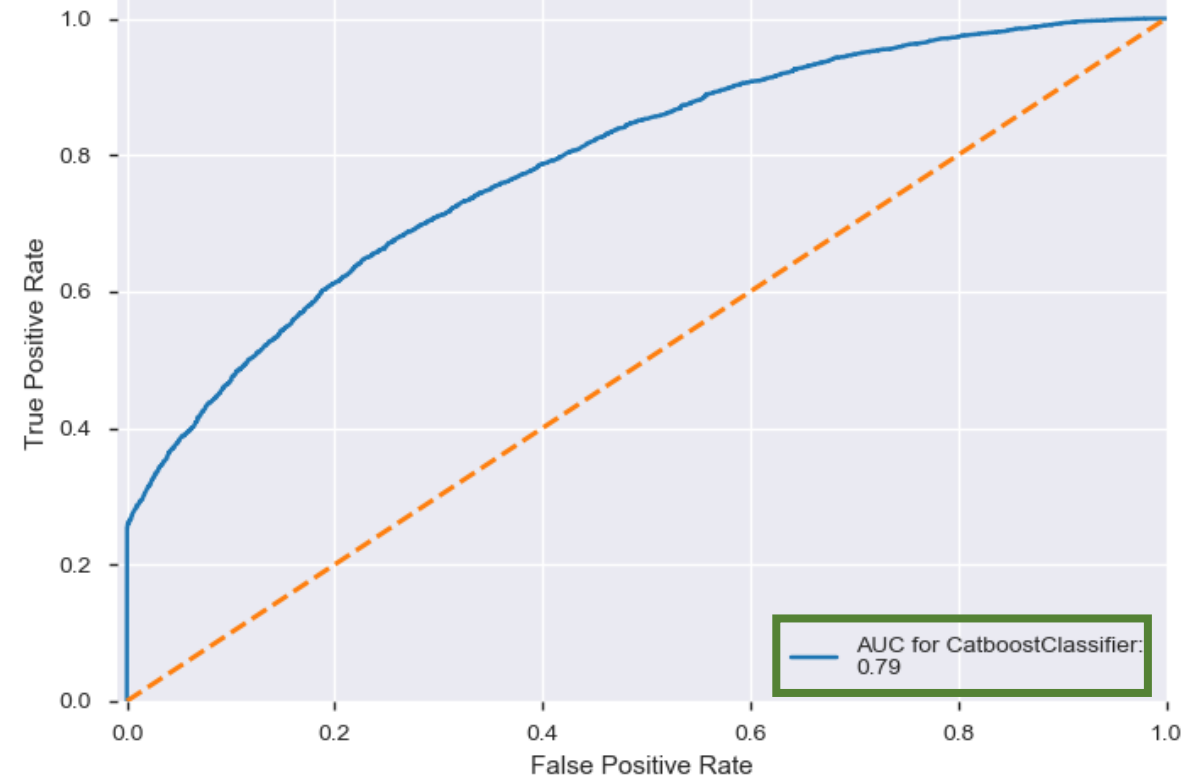
RECIDIVIST NON-RECIDIVIST

# Classification Model Performance

Confusion Matrix: CatBoost Recidivist Classification

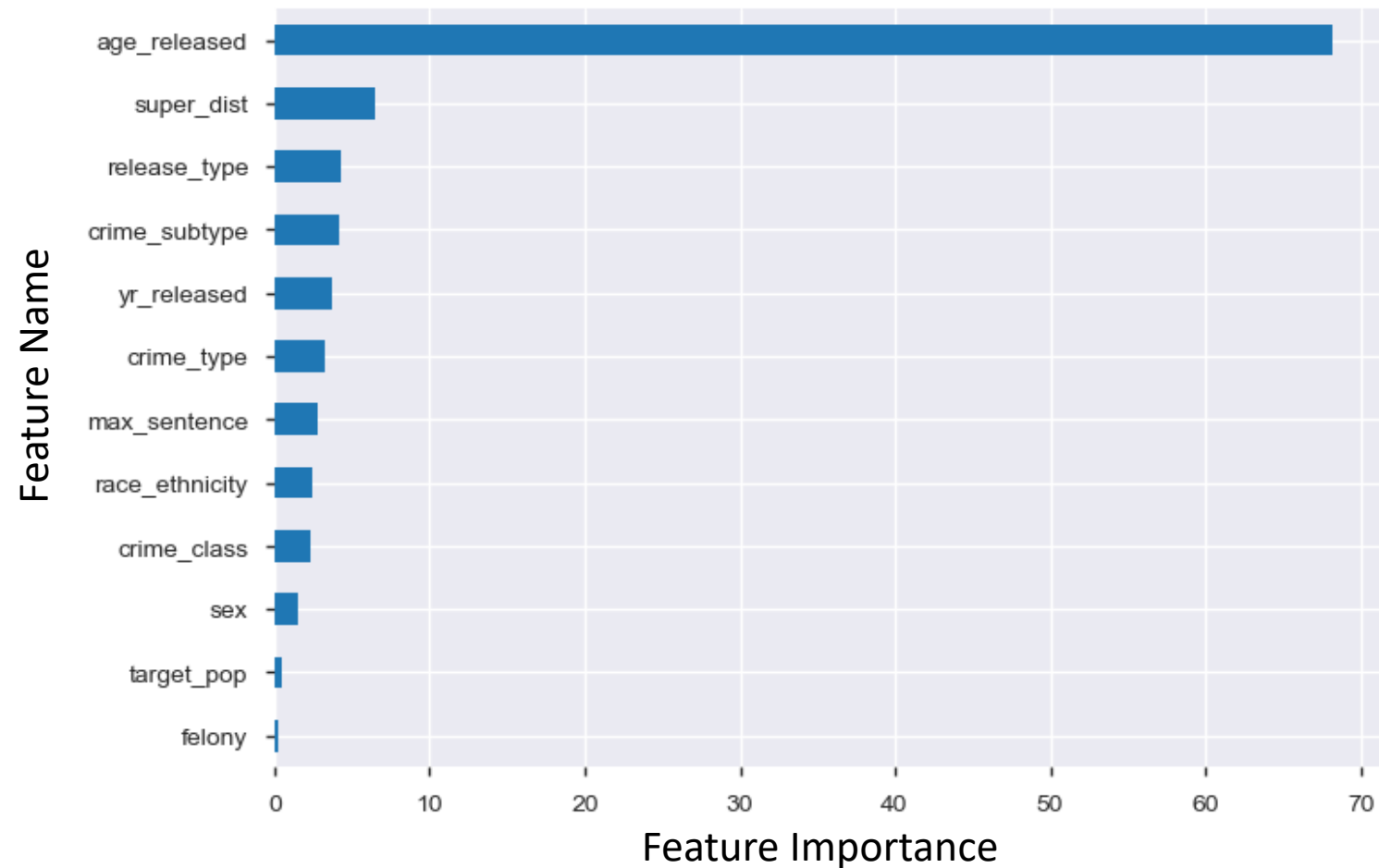


Receiver operating characteristic (ROC) Curve

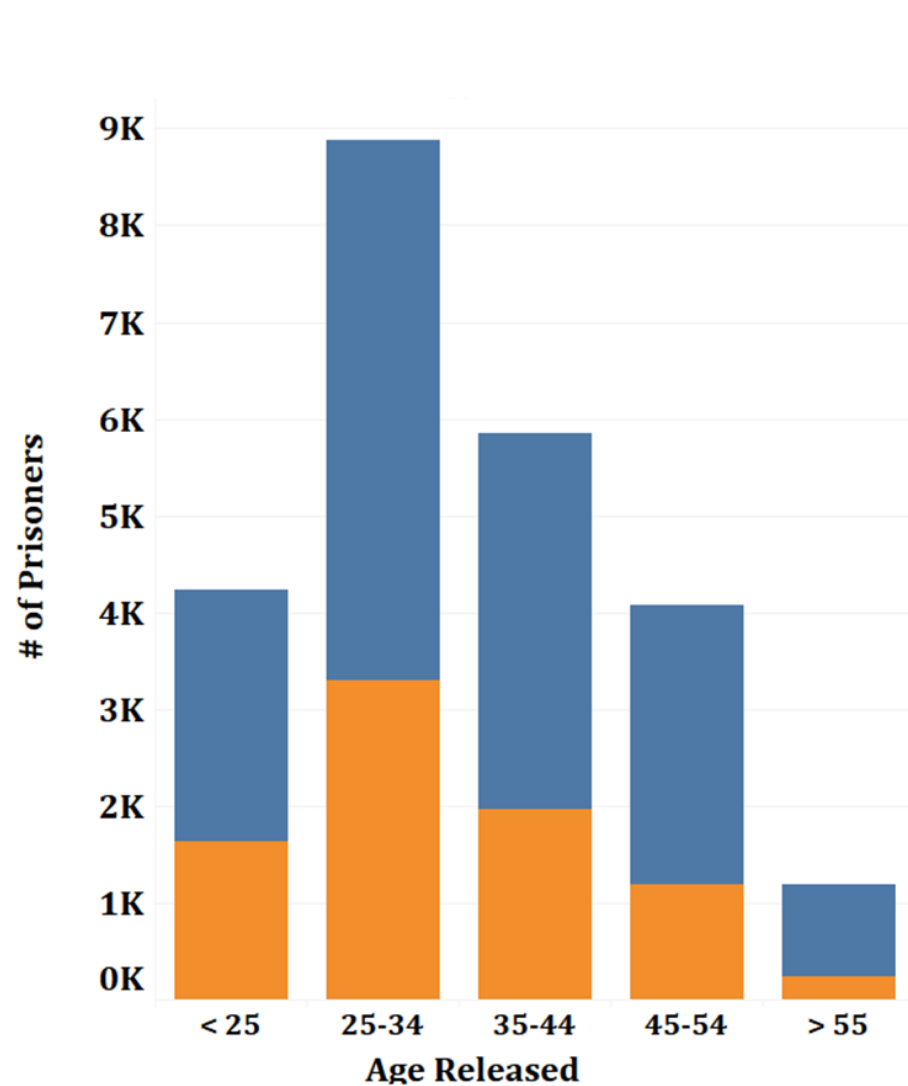


## Important Features in Predicting Recidivism

1. Age-At-Release
2. Supervising Judicial District
3. Type of Release
4. Crime Subtypes



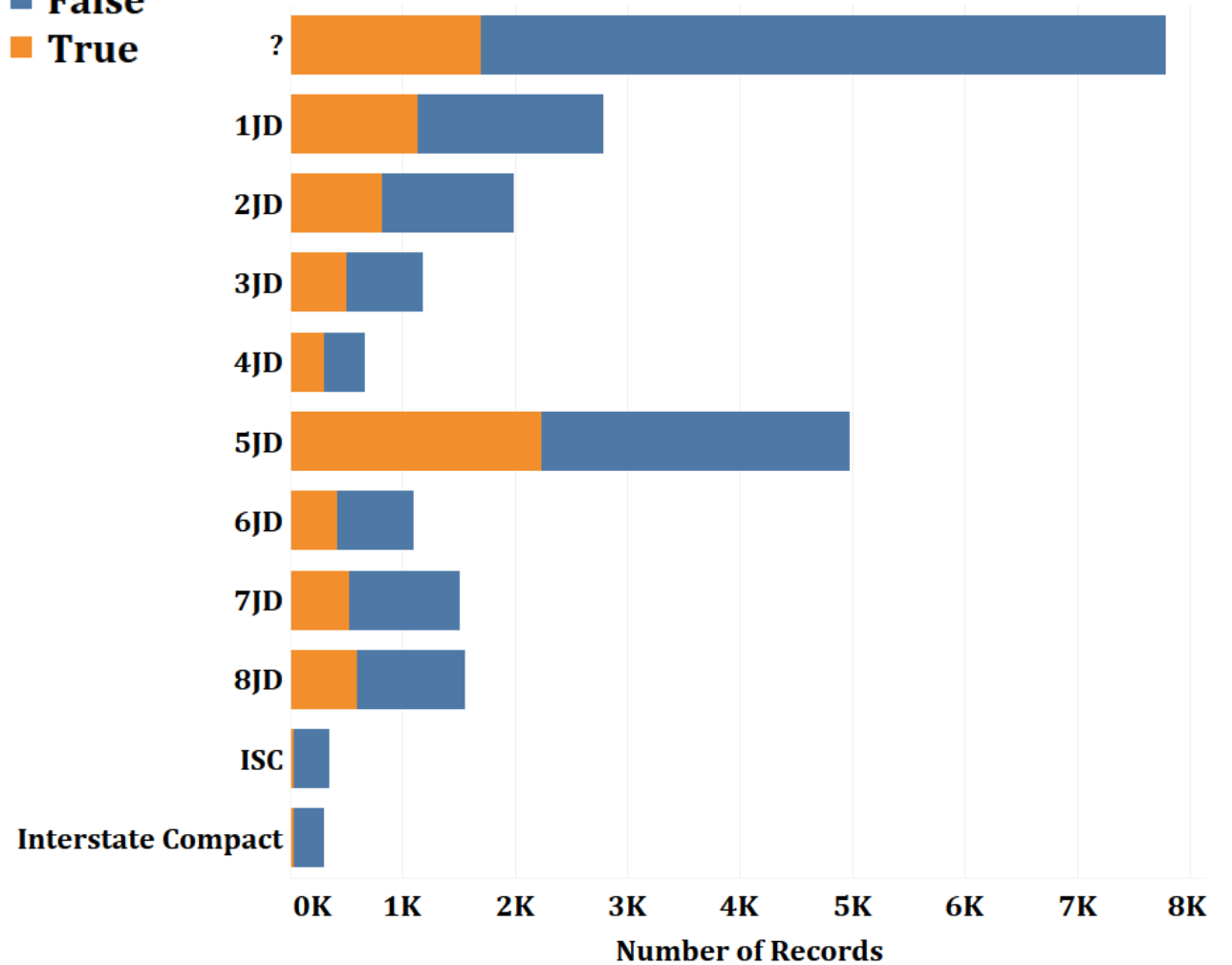
# #1) Age at Release



# #2) Judicial District

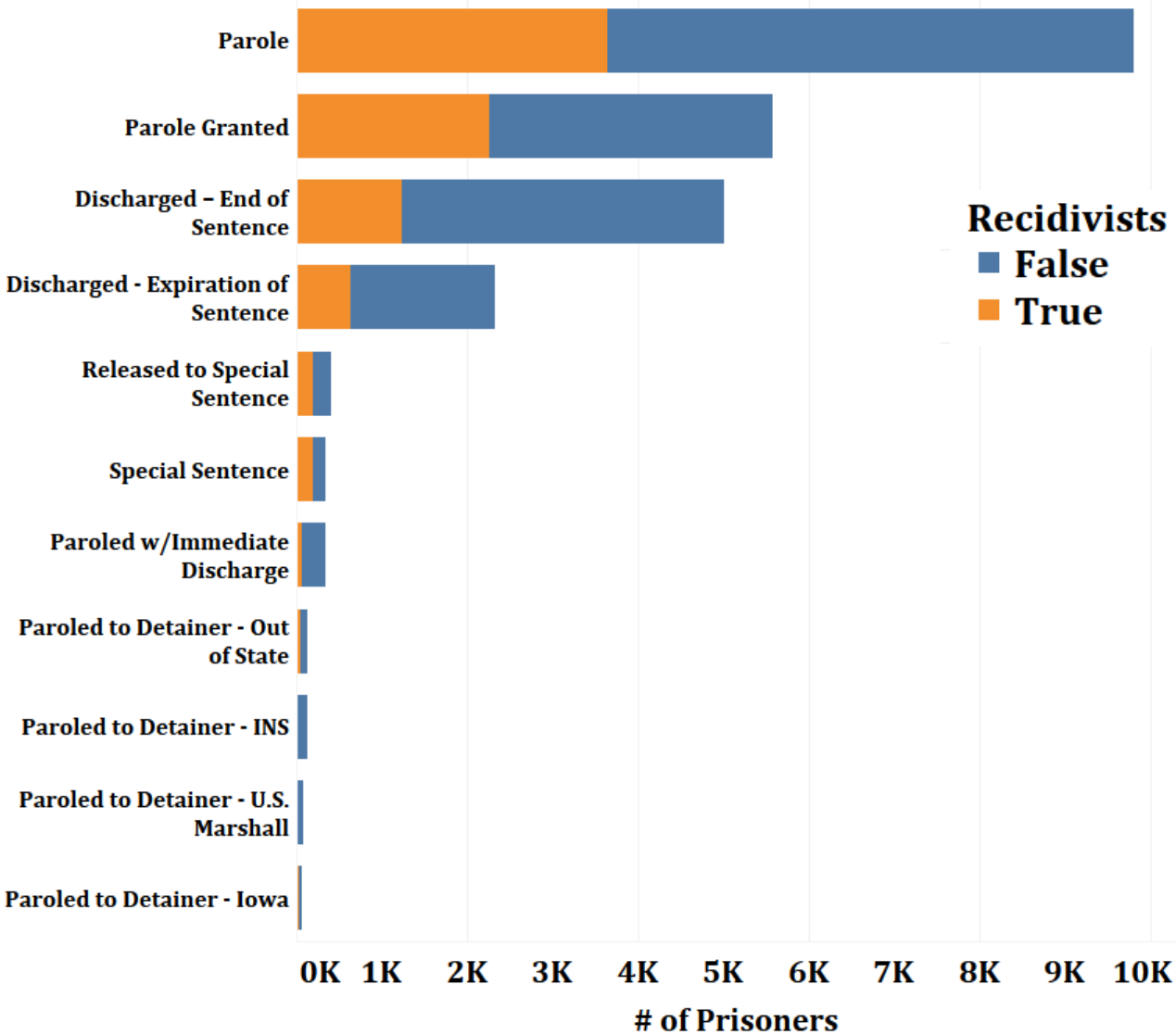
## Recidivists

False  
True

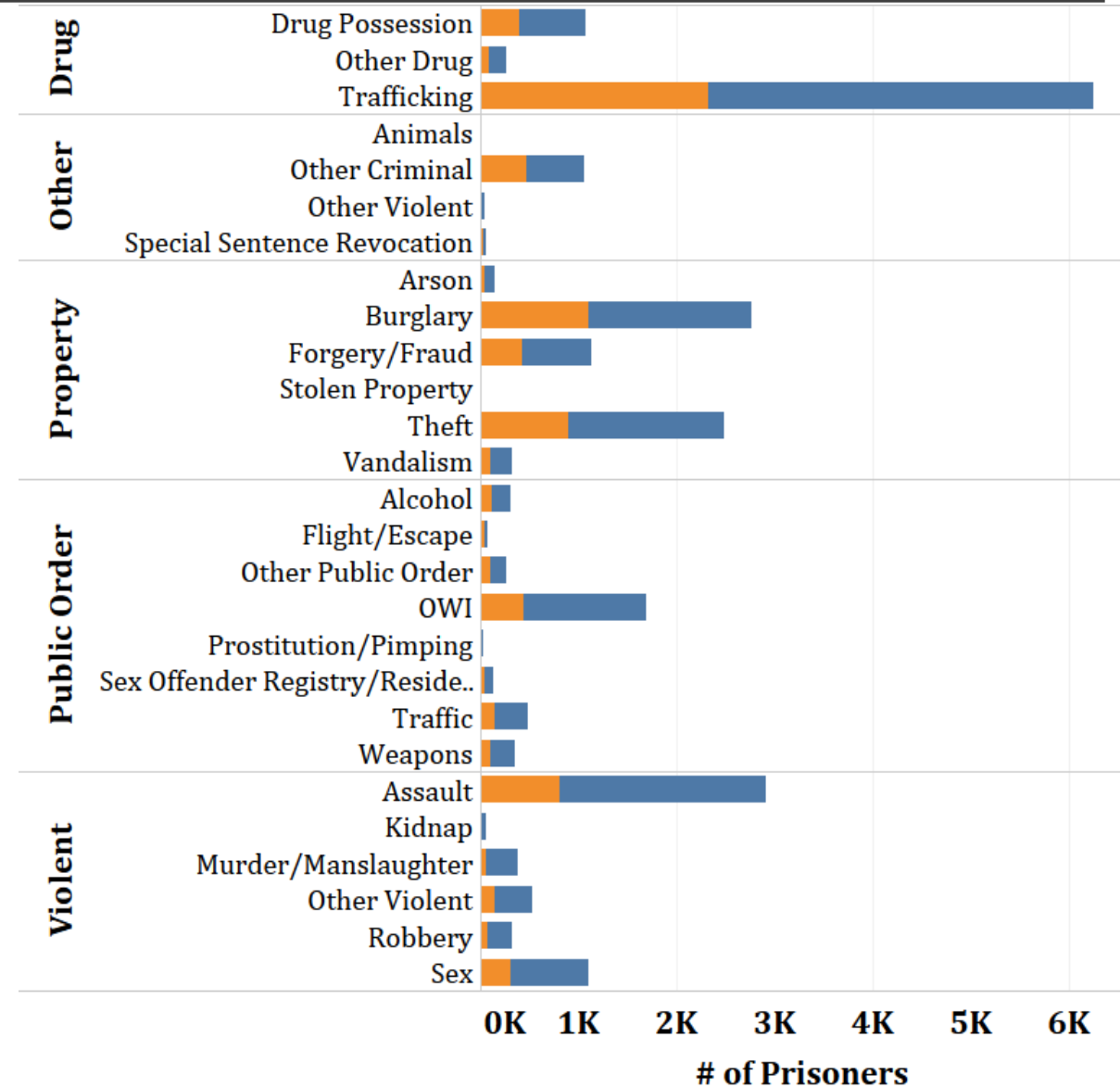




## #3) Release Type



## #4) Crime Type-Subtypes



# Conclusions & Recommendations

- Using our model, **Iowa Department of corrections can predict which prisoners may become recidivist.**
- Using this information, Iowa can **implement pre-release educational programs** to target at-risk prisoners.
- Following release, Iowa could also **provide post-release support and intervention** to at-risk prisoners.



# THANK YOU

- Michael Moravetz – Collaborator
- Flatiron School – Data Science Bootcamp
  - Brandon Lewis – Instructor
  - Jeff Herman – Advisor
- CatBoost Machine Learning Package
  - Superior Modeling with categorical data.

