Animal Shelter Adoption Returns

By Jacky Lu

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"Saving one dog will not change the world, but surely for that one dog, the world will change forever."
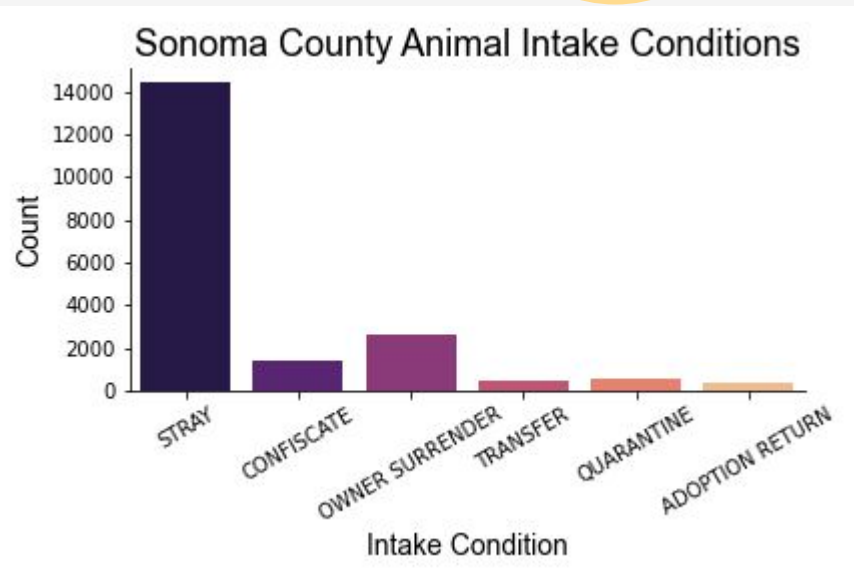— **Karen Davison**

Data Collection

- Sonoma County Animal Services Intake and Outcome Data

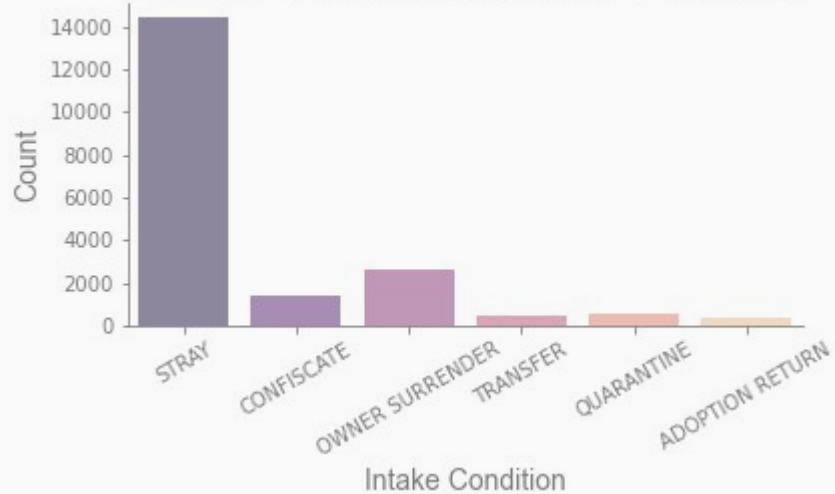- Features:
  - Type, Gender, Size, Spay/Neuter, Intake Location
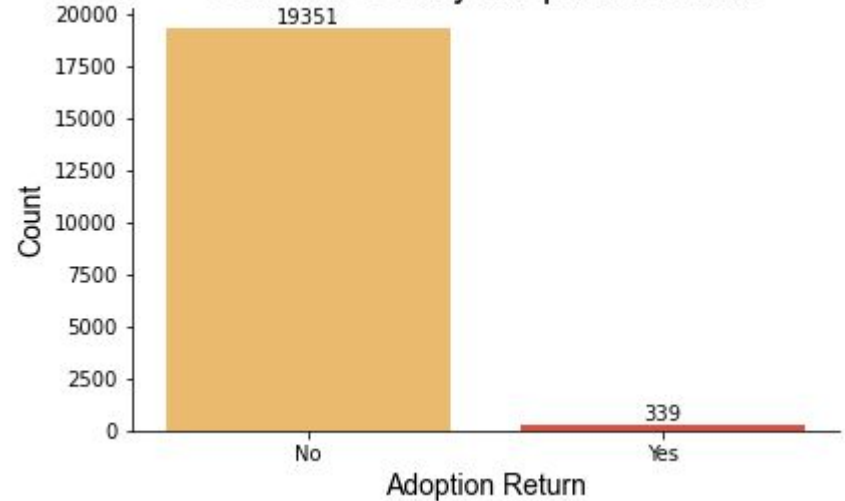
Adoption Returns are rare

Sonoma County Animal Intake Conditions

Adoption Returns are rare
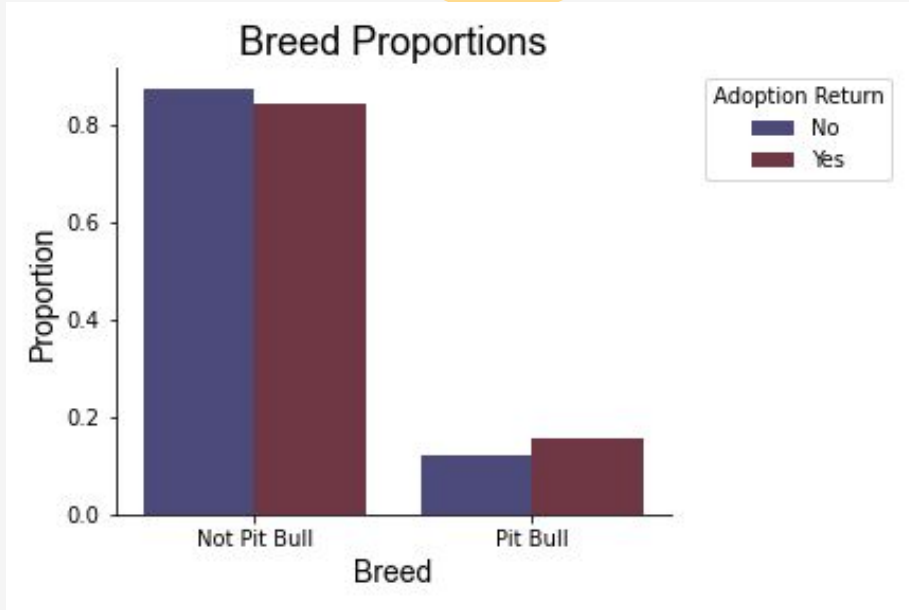

Sonoma County Animal Intake Conditions
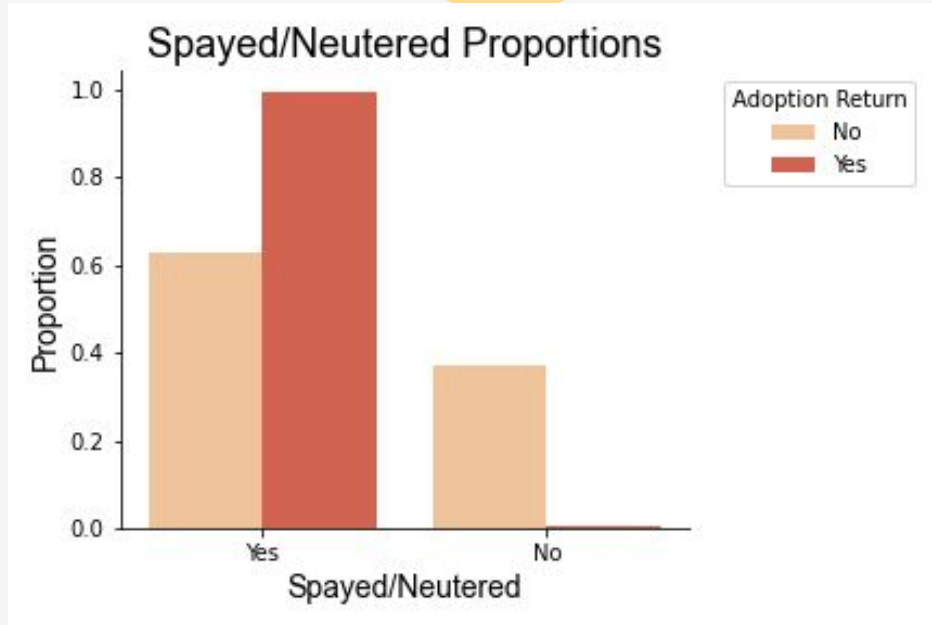

Sonoma County Adoption Returns

Only 1.7% of data

Exploratory Data Analysis

- What features differentiate adoption returns?
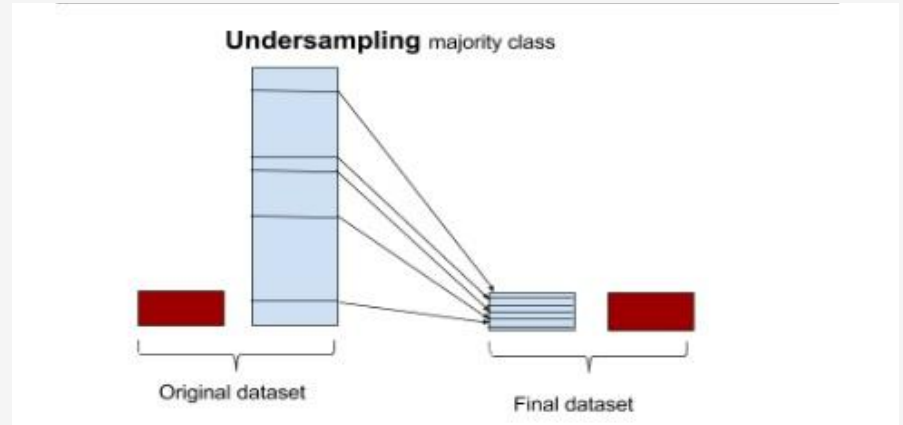 - Breed: Pit Bull

Exploratory Data Analysis

Spayed/Neutered Proportions

- What features differentiate adoption returns?
  - Breed: Pit Bull
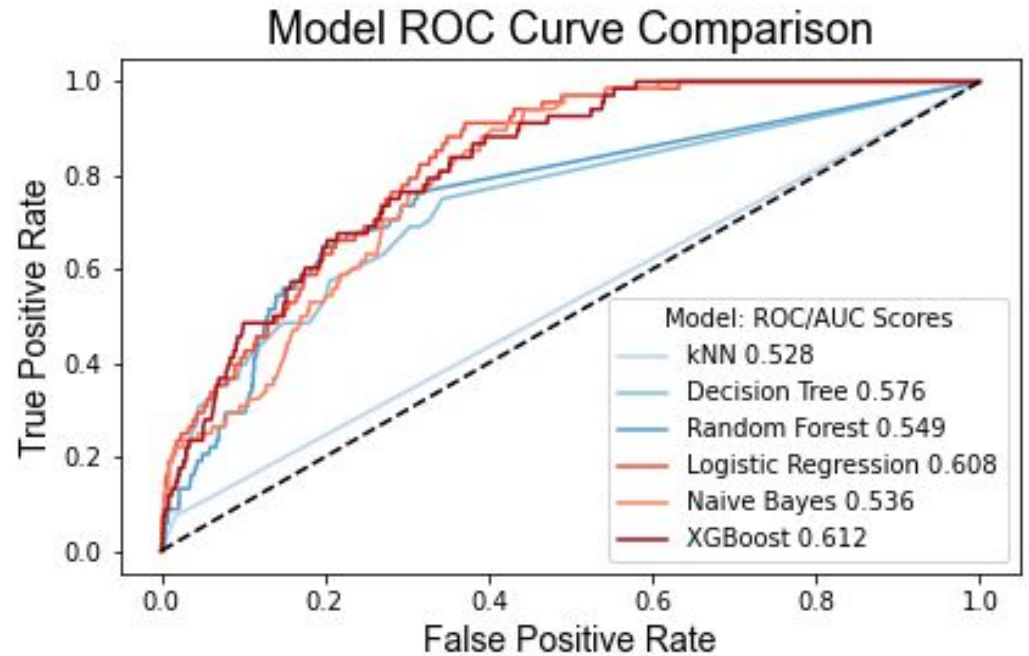 - Spayed/Neutered

Be The Solution: Spay, Neuter, Adopt

Classification Models

- Imbalanced Dataset

Classification Models

- Imbalanced Dataset
- Model Comparison
- Why XGBoost?

Model ROC Curve Comparison

Model: ROC/AUC Scores
- kNN 0.528
- Decision Tree 0.576
- Random Forest 0.549
- Logistic Regression 0.608
- Naive Bayes 0.536
- XGBoost 0.612

Feature Importance

Top 10 Features by Gain Score
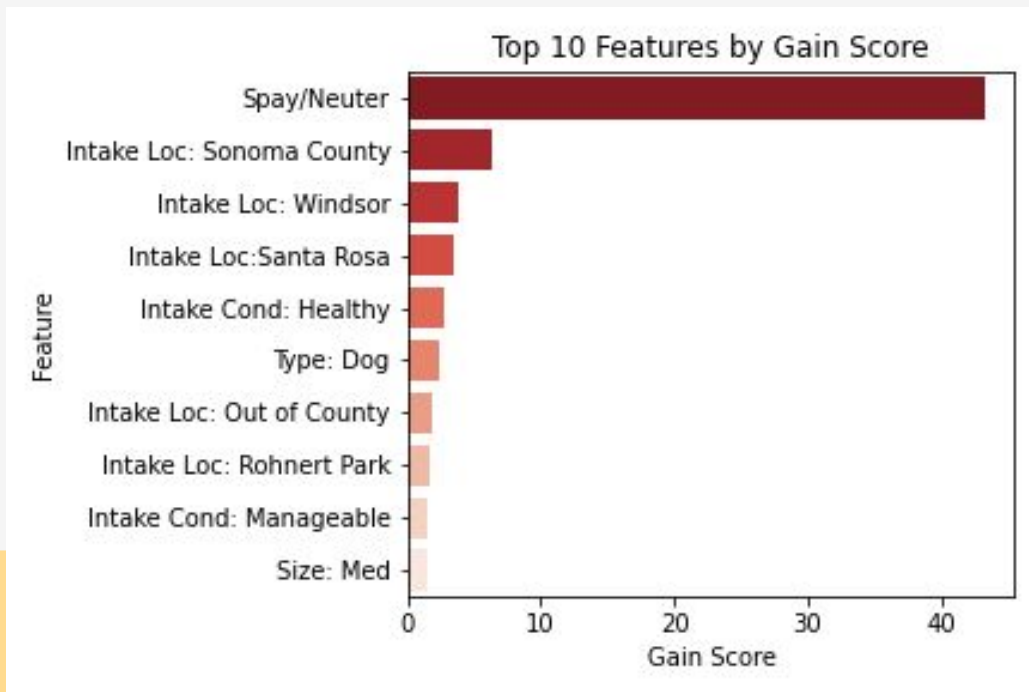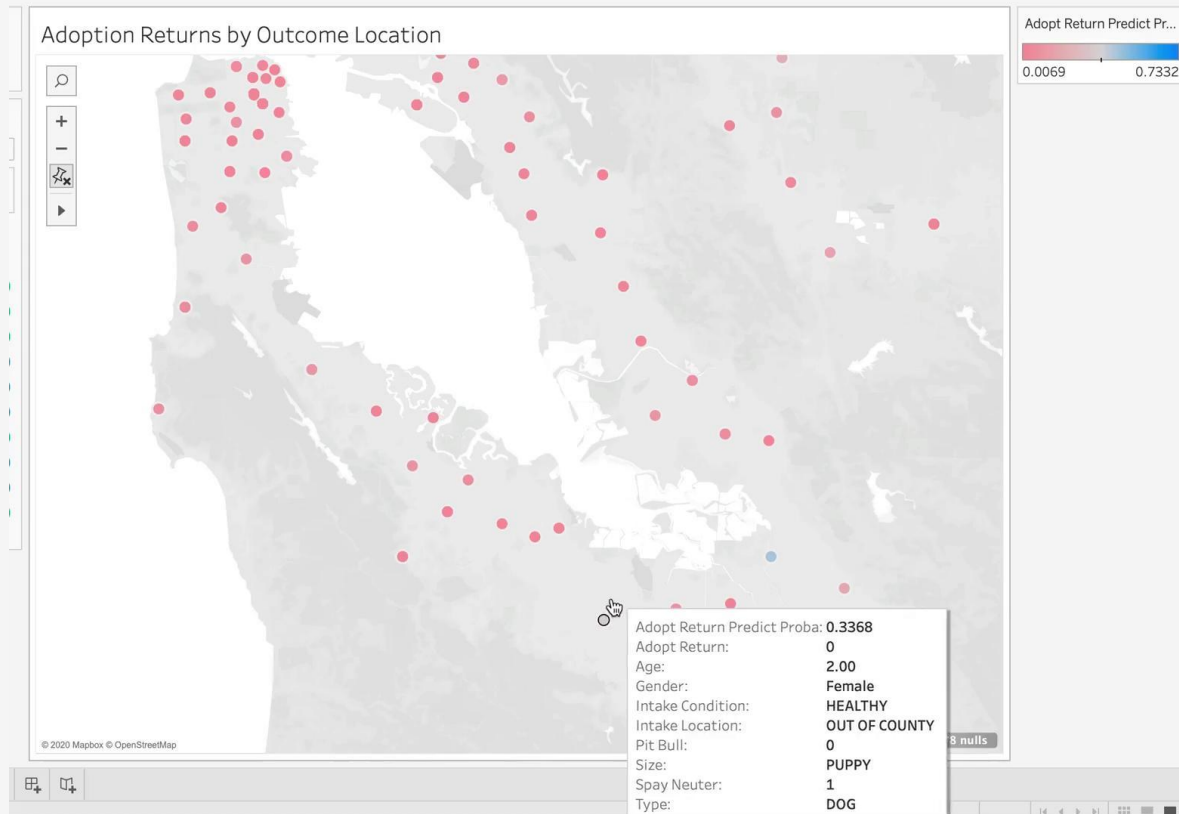
XGBoost Gain Score:

- Relative improvement in accuracy for including that feature on a branch

Tableau Visualization

Conclusions & Future Work

Conclusions

- Best predictors for adoption returns
  - Spayed/Neutered
  - Intake Location
- Other factors at play?

Conclusions & Future Work

Conclusions

- Best predictors for adoption returns
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Future Work

- Animal Behavioral Data
- Adoption Return survey
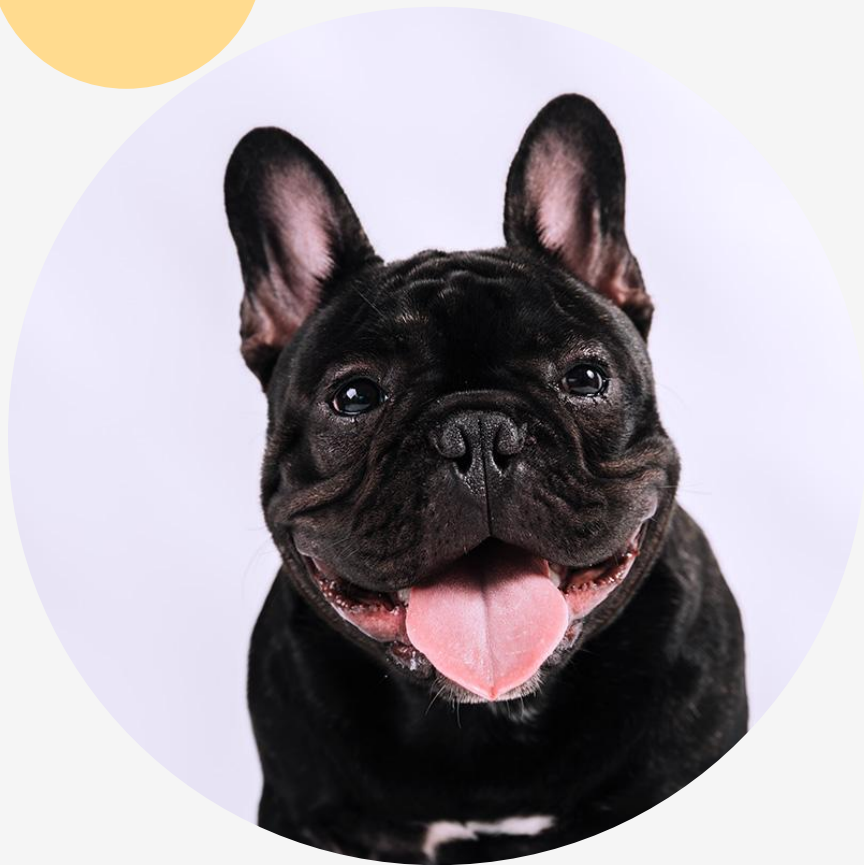
THANKS!

Any questions?

Image Credits

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- https://i.stack.imgur.com/FEOjd.jpg
- https://images.squarespace-cdn.com/content/v1/585dff2fbebafb653396d0c3/1491764777968-V3HLLPGXZBDQGM107J5X/ke17ZwdGBToddI8pDm48kCaemIODX4hjD9MYcixN4QR7gQa3H78H3Y0txjaiv_0fDoOvxcdMmMKkDsyUqMSsMWxHk725yiiHCCLfrh8O1z5QPOohDIaIeljMHgDF5CVlOqpeNLcJ80NK65_fV7S1Ud5FqhqUGS8D2IGEzPgA8x0CzKLTQtTwuS9JQgRmUsh1LYrZgXWI4-zdz44S_DaIUg/dog+training+obedience+orem+utah
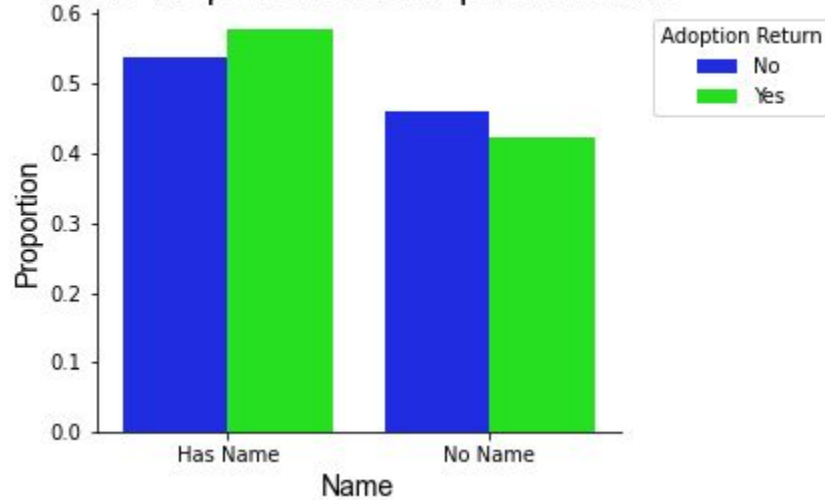
Appendix

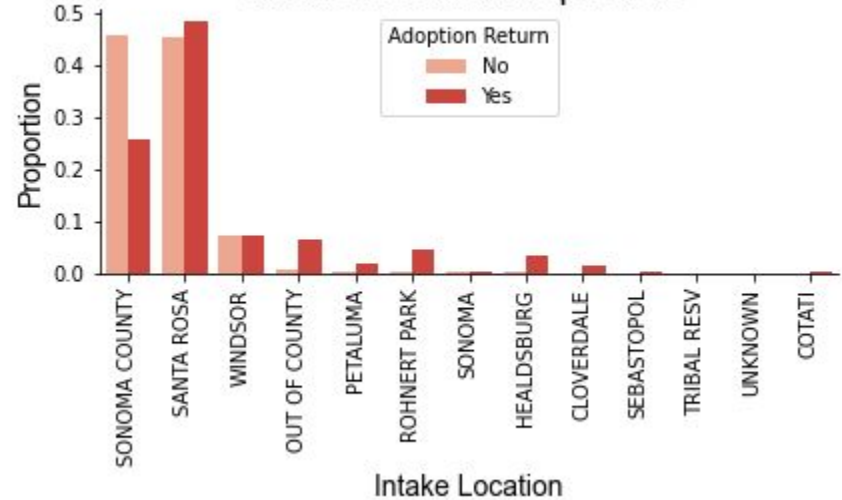# Age Distribution
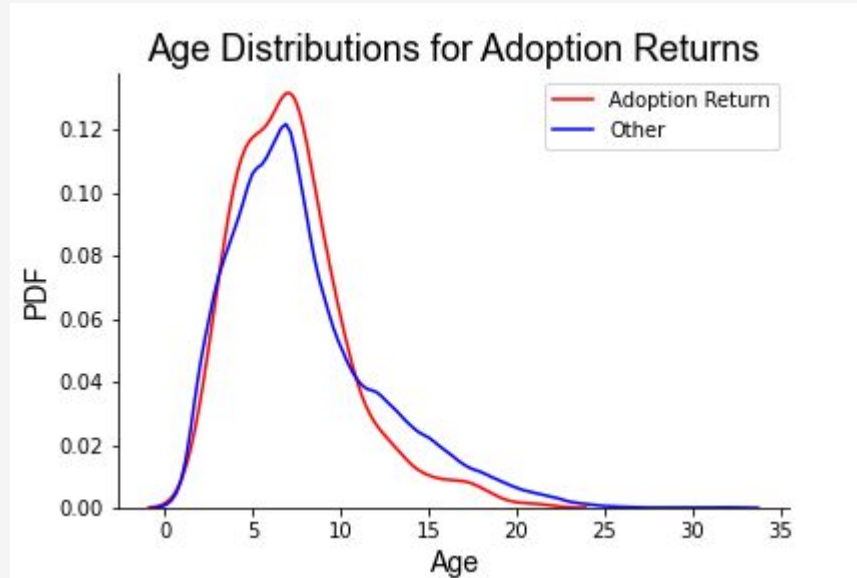
Outcomes Types
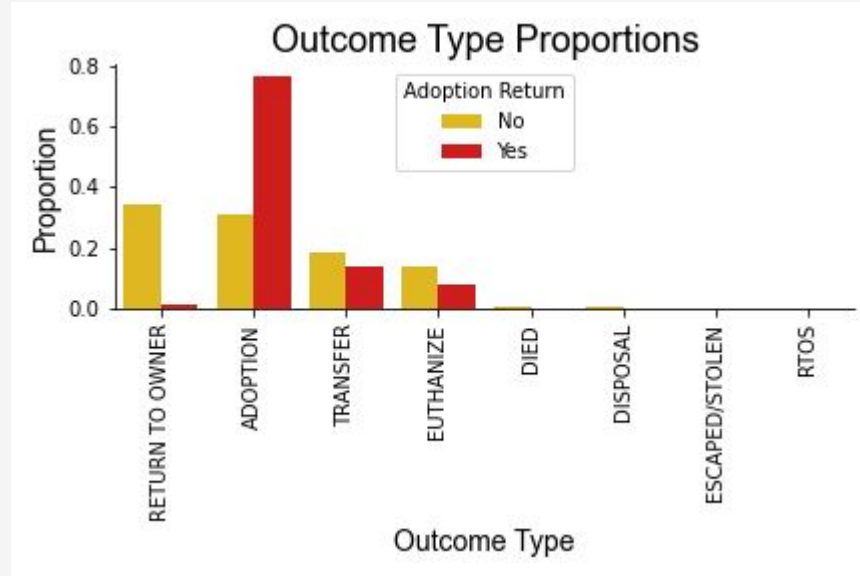
Other Feature Distributions
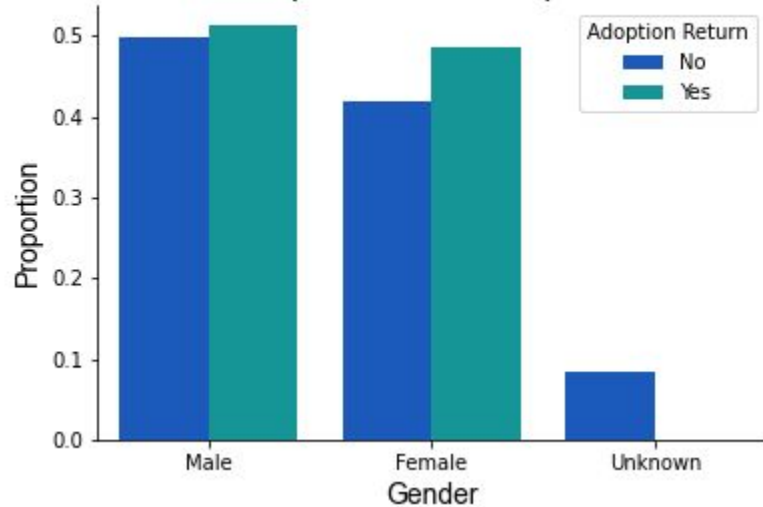

Name Proportions for Adoption Returns

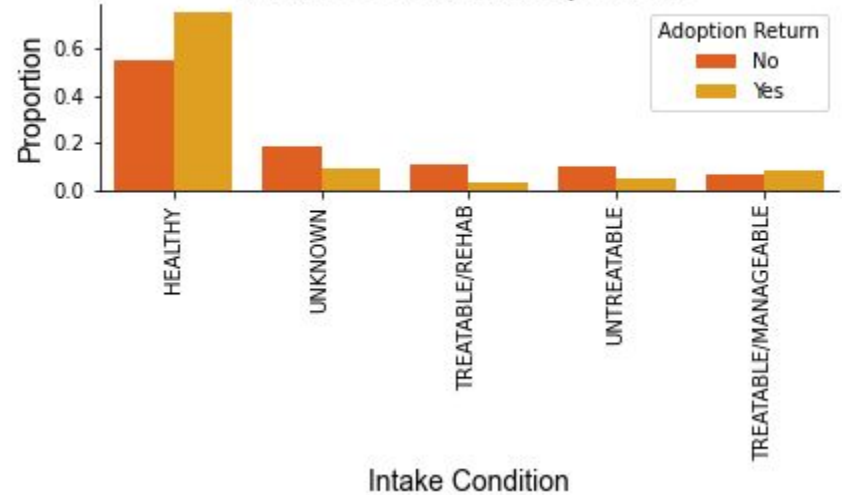Intake Location Proportions

Other Feature Distributions
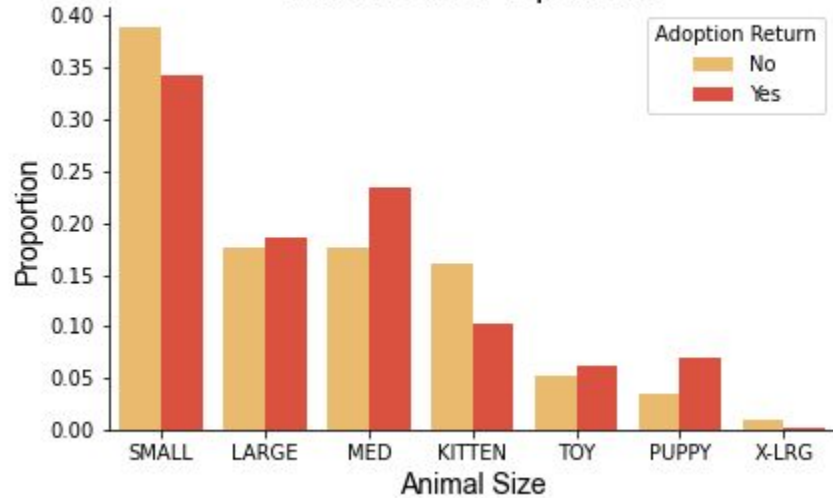

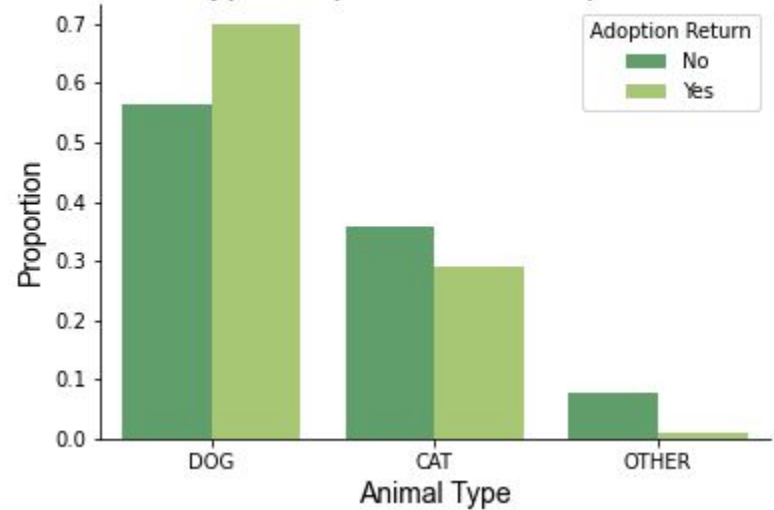Gender Proportions for Adoption Returns

Intake Condition Proportions

Other Feature Distributions

Animal Size Proportions

Animal Type Proportions for Adoption Returns

Final Model: XGBoost

Metric	Score
Accuracy	0.79
Precision	0.06
Recall	0.74
F score	0.11
ROC/AUC score	0.76

Final Model: XGBoost