

Analysis of Shelter Dog Experience



UNIVERSITY
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Agenda



Overview



Exploratory Data Analysis



Findings



Predictions



Future Work

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Future Work



Overview

Animal rescue shelter industry

Our data and process

Why we care so much



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The industry's future is bright



- **6-8M** cats and dogs rescued per year
- **34%** of dogs obtained from animal shelter
- **75%** decrease in euthanasia since 2019
- **56%** of dog owners prefer adoption

Tomorrow

- **2.1%** annualized revenue growth forecasted – people want pets
- **4.1%** annualized growth in number of shelters
- Continued euthanasia decreases

Today - 2019

- Disposable **income** increasing
- Rising consumer **awareness** of euthanasia
- Non-profits offering **microchipping**
- Government **funding** for shelters increasing

By 2024

Citations: 1-4

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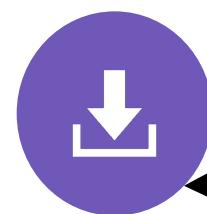
Future Work

Data science is iterative



SUMMARIZING AND CLEANING

Downloading
and joining
data



Narrower views may expose
issues in data preparation



Visualizations
Predictions
Implications



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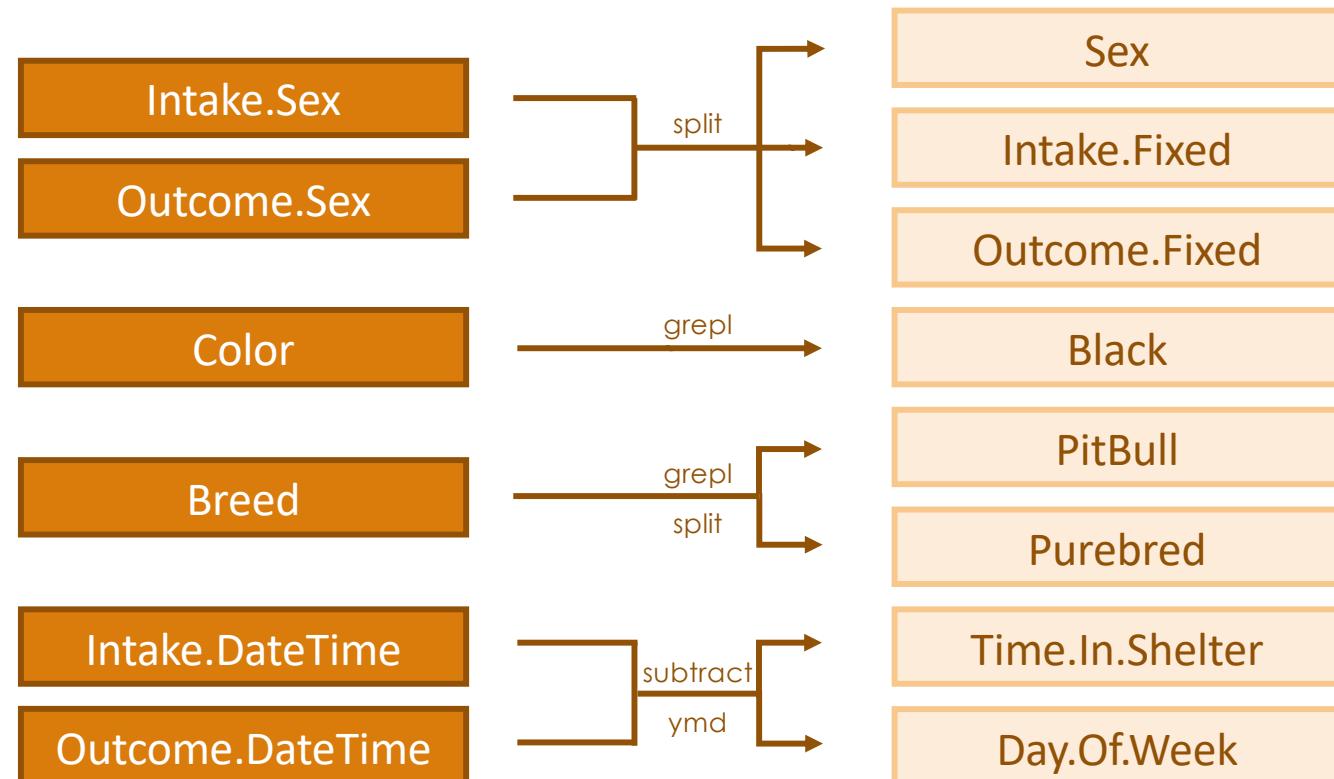
Exploratory Data Analysis

Feature engineering

Key metrics and visualizations



Feature engineering



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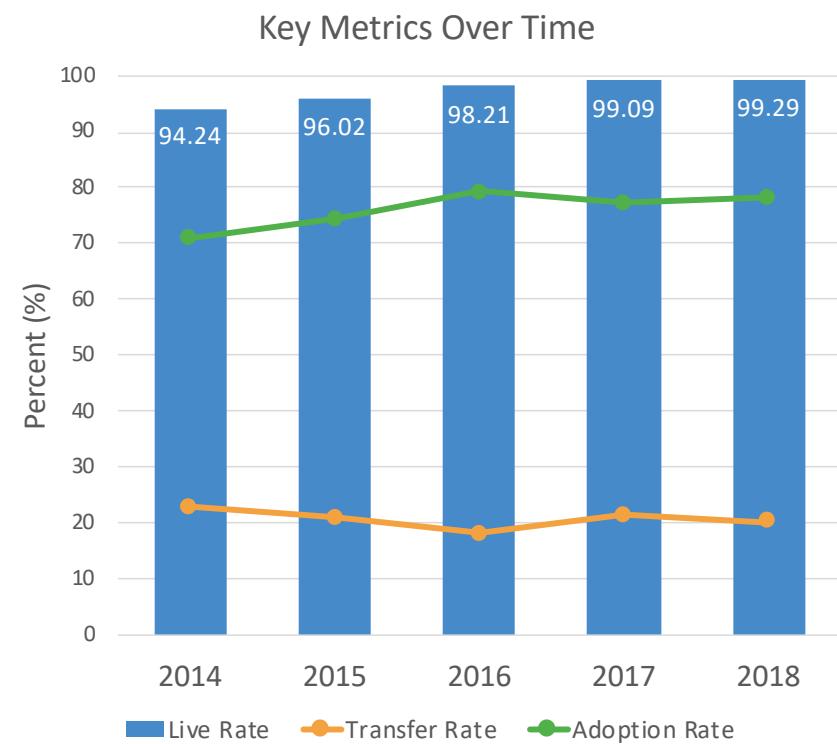
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Live rate and adoptions both up

Intake Year	Live Rate	Transfer Rate	Adoption Rate
2014	94%	23%	71%
2015	96%	21%	74%
2016	98%	18%	80%
2017	99%	22%	77%
2018	99%	20%	79%



Note: data feeds in constantly

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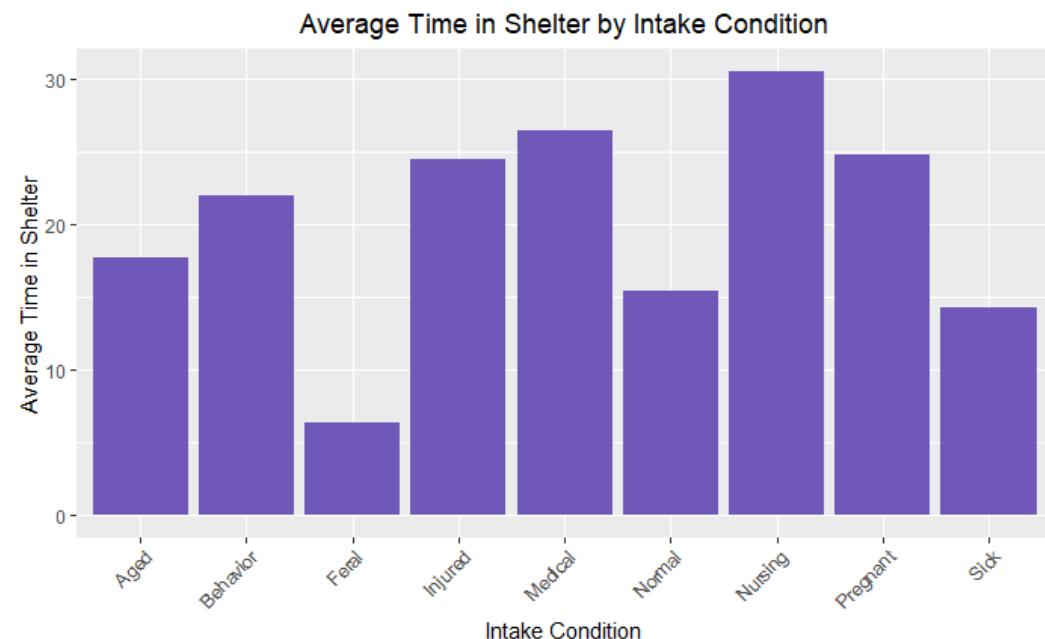
Predictions

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Intake condition affects time in shelter

- Dogs with health conditions stay longer
- Feral dogs stay the least time



Related to the next slide...

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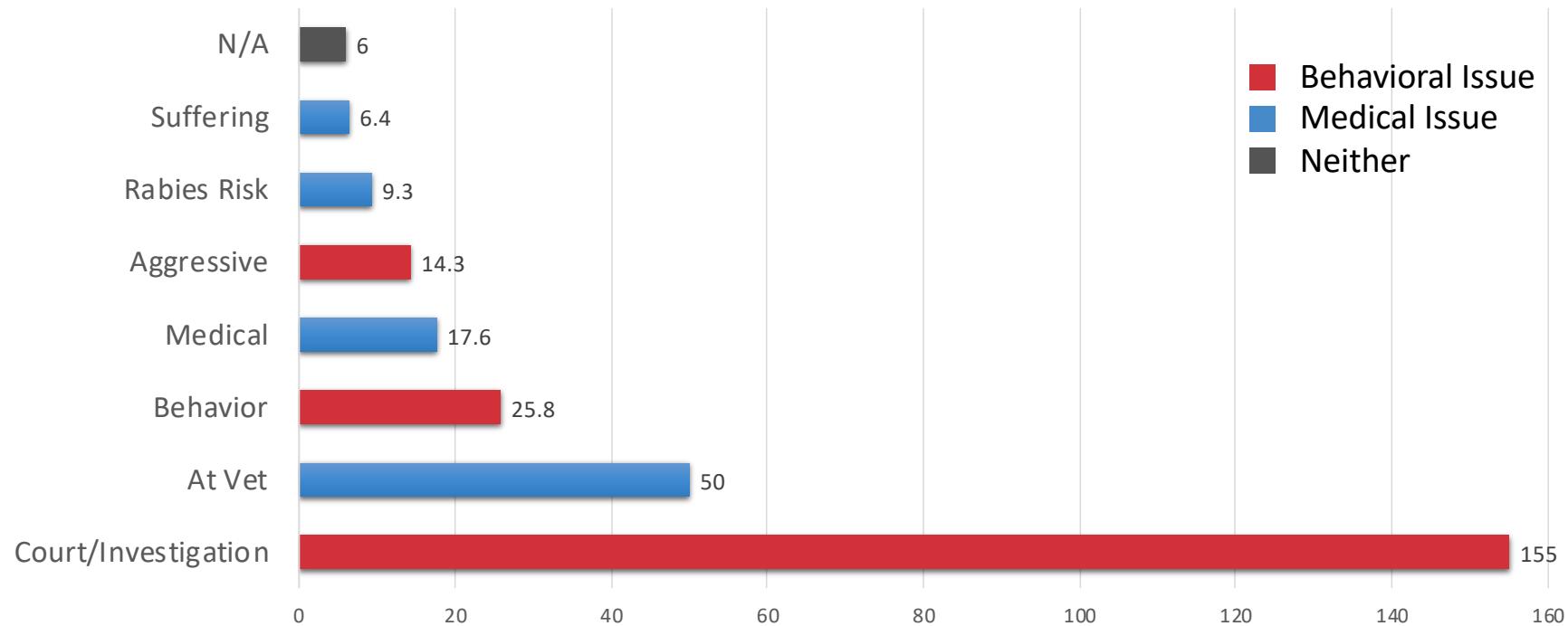
Predictions

Future Work



Behavior affects time in shelter

Outcome Subtype vs Days Spent in Shelter



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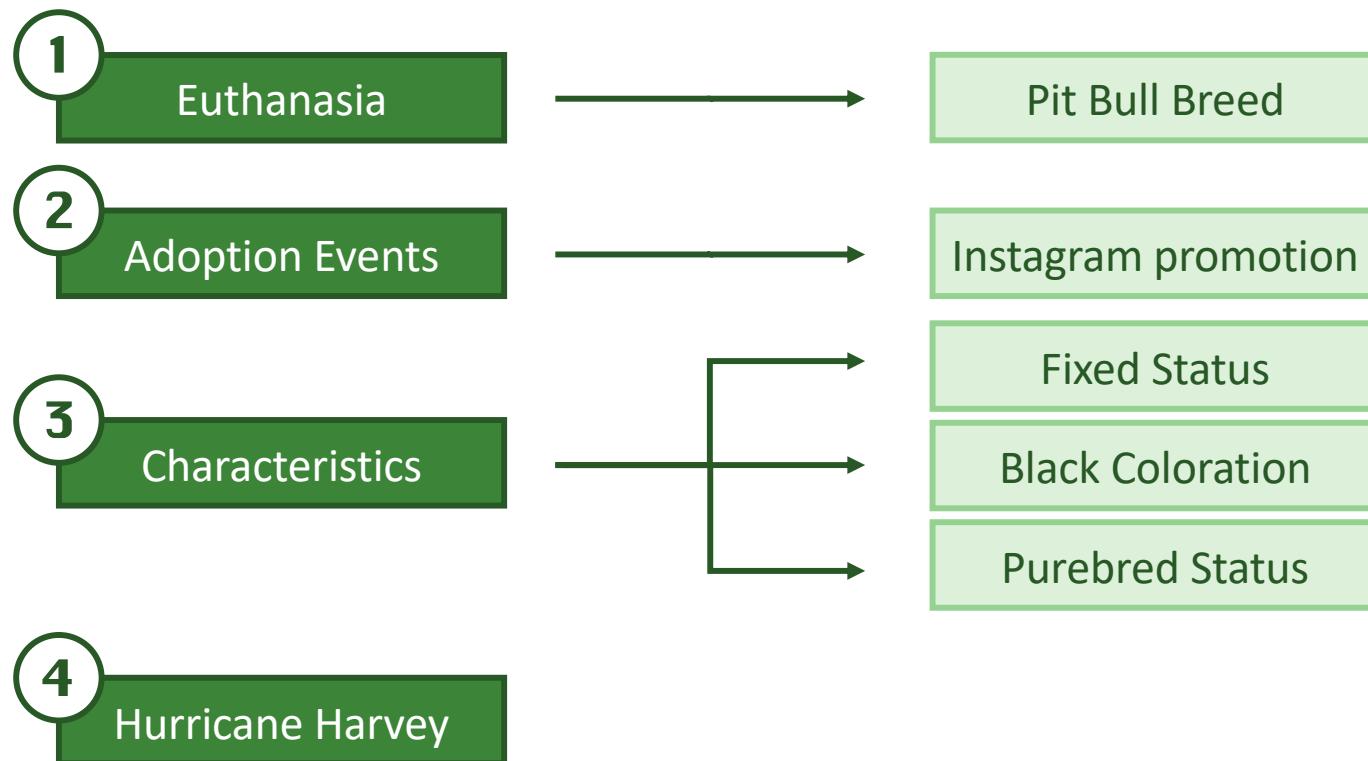
Findings

Areas of interest

Visualizations



We looked at dog outcomes related to...



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1

What is a no-kill shelter?



Austin's goal
is to have a
live rate of

90%

Equates to

+15,000

animals saved per
year versus 2009

Some are critical of this target, specifically AAC volunteers

Citations: 5-7

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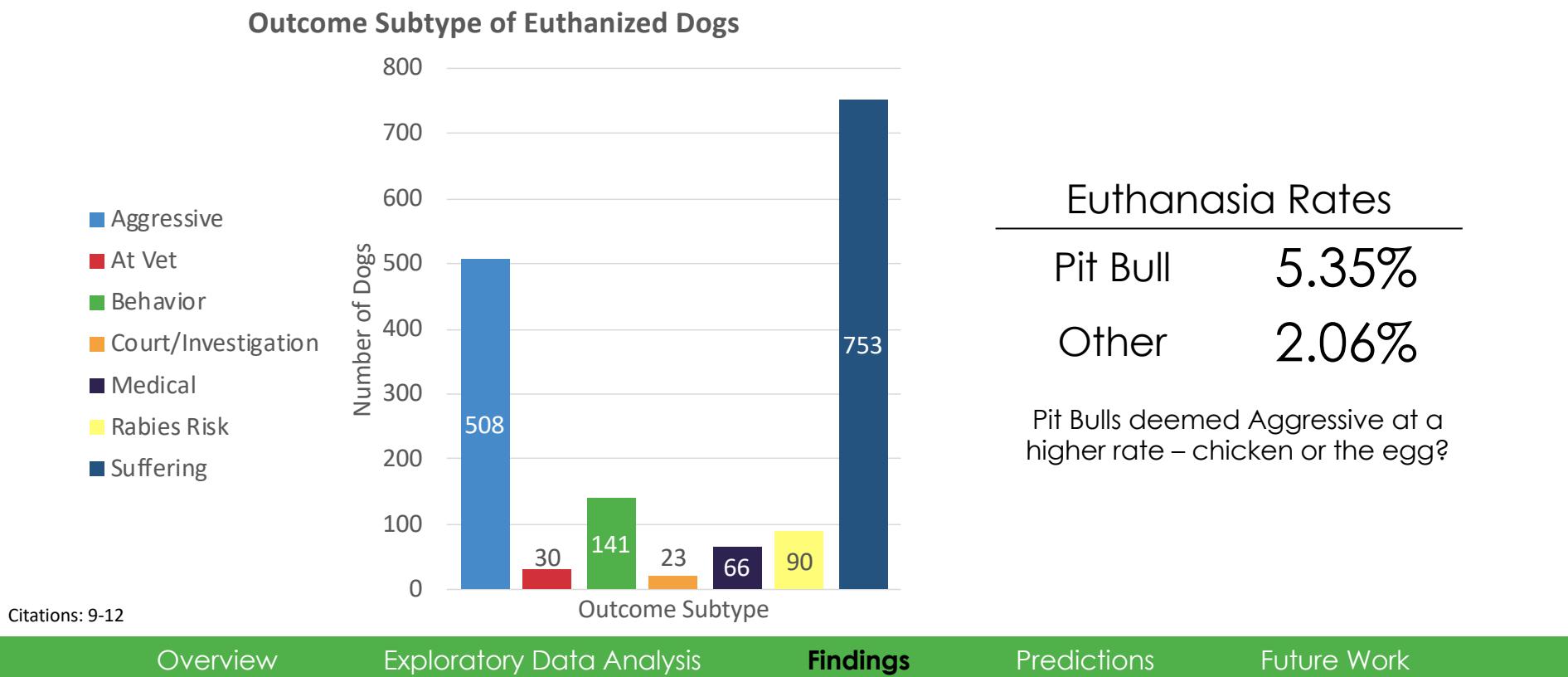
Predictions

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1

Euthanasia is a last resort



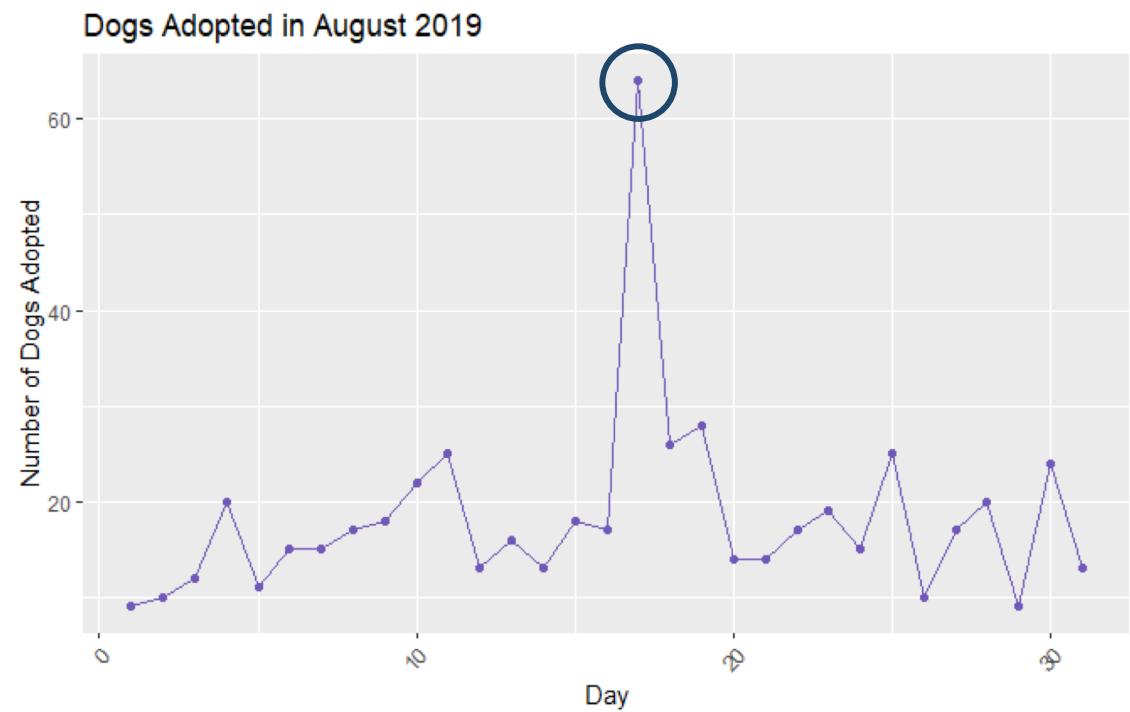
2

Adoption events are effective



"Clear the Shelters" event:
8/17/19, 60+ dogs
adopted

This was more than
double the number of
adoptions on any other
day in August



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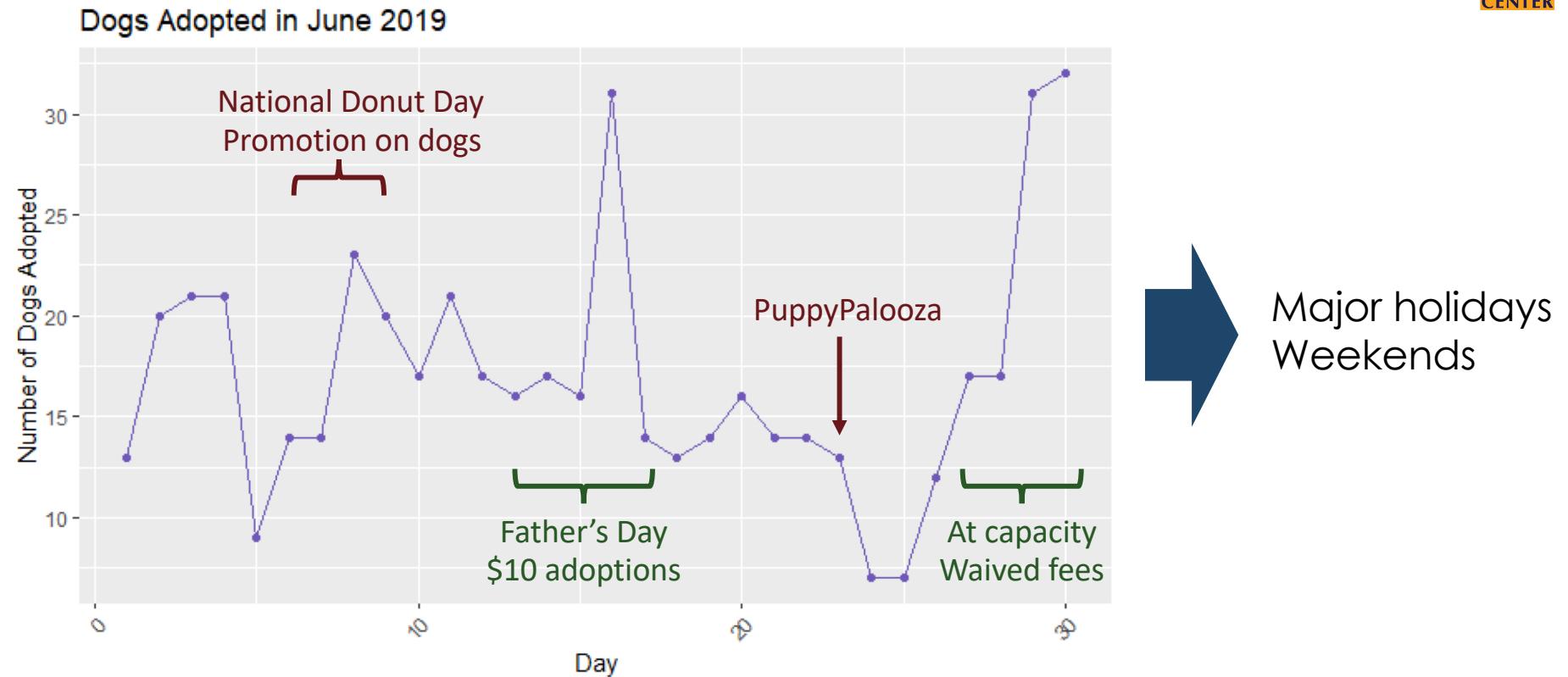
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2

Not all events are equal



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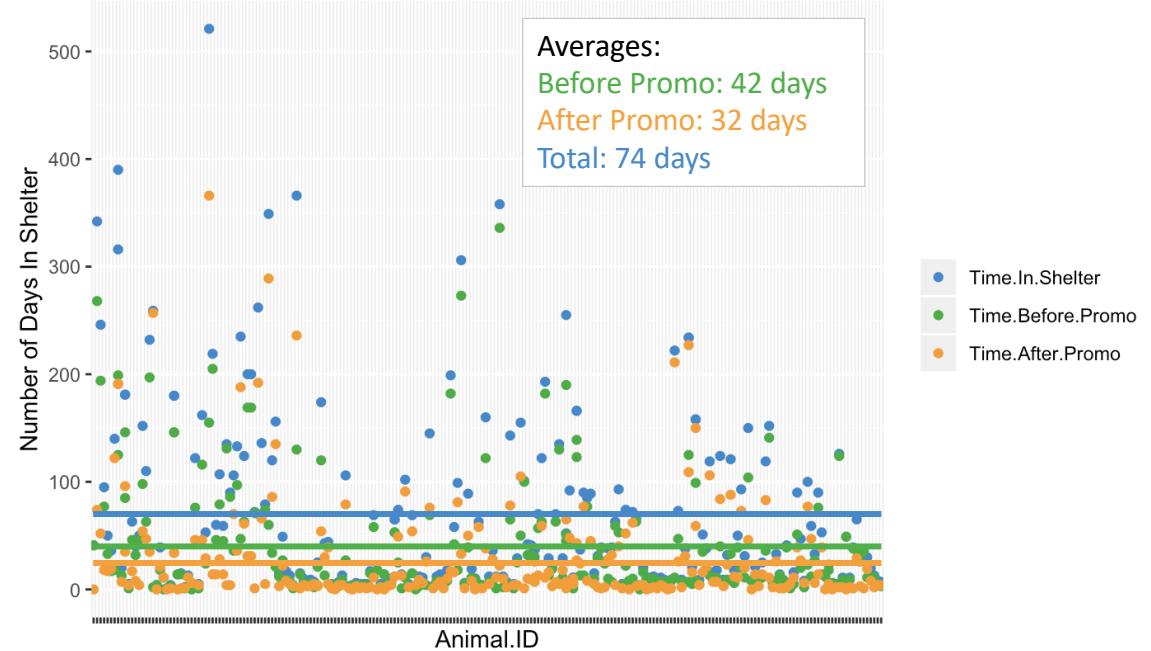


2



Social media speeds up adoption

Time In Shelter: Before and After Instagram Promotions

[Overview](#)[Exploratory Data Analysis](#)[Findings](#)[Predictions](#)[Future Work](#)



3

Fixed dogs more likely to go to homes

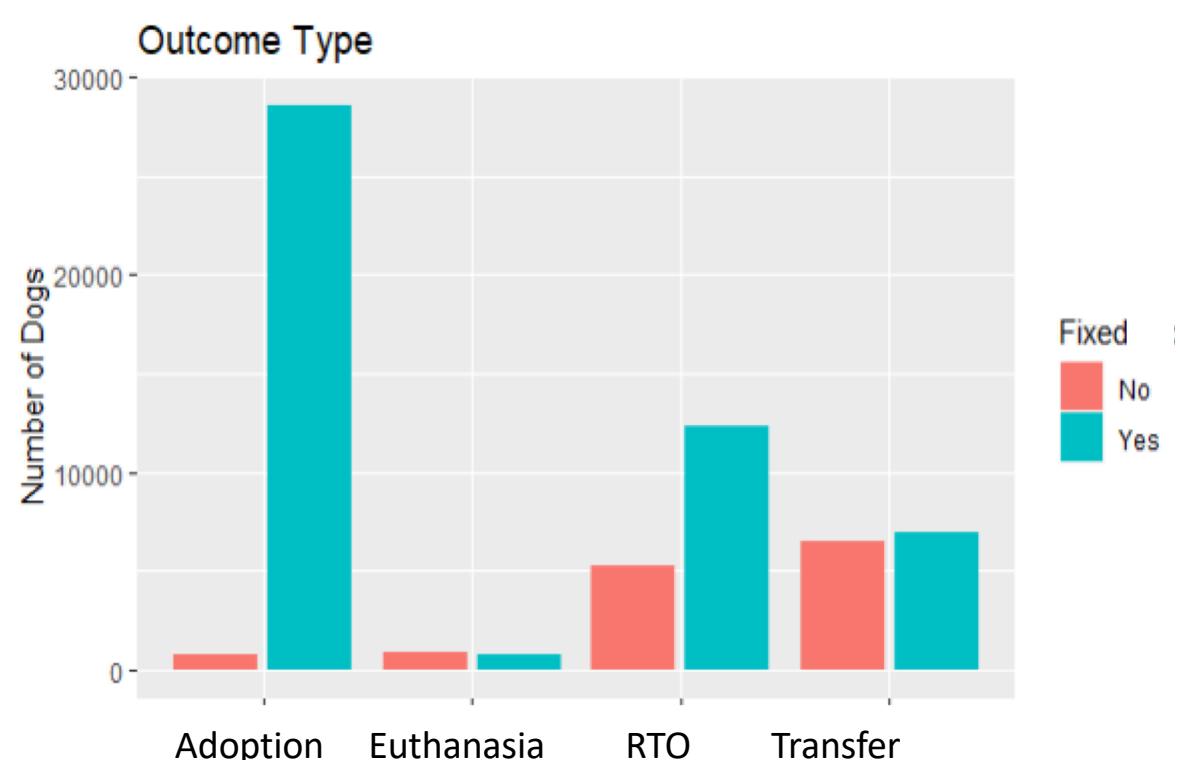
Fixed prior to shelter	37.34%
Not fixed	21.74%
Fixed in shelter	40.92%



Dogs fixed by AAC:

65.30% of unfixed dogs

40.92% of all dogs



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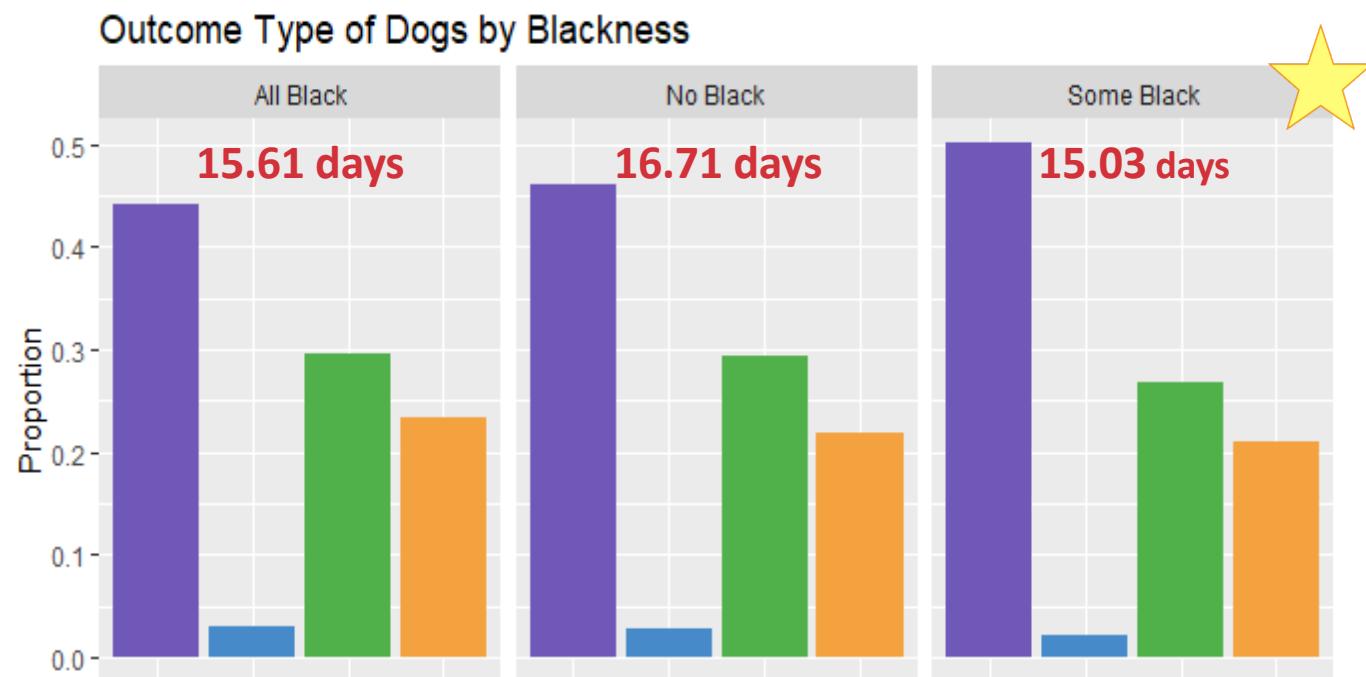


3

No “black dog syndrome” in Austin

Average Time
in Shelter:

- Adoption
- Euthanasia
- Return to Owner
- Transfer



Citation: 8

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3

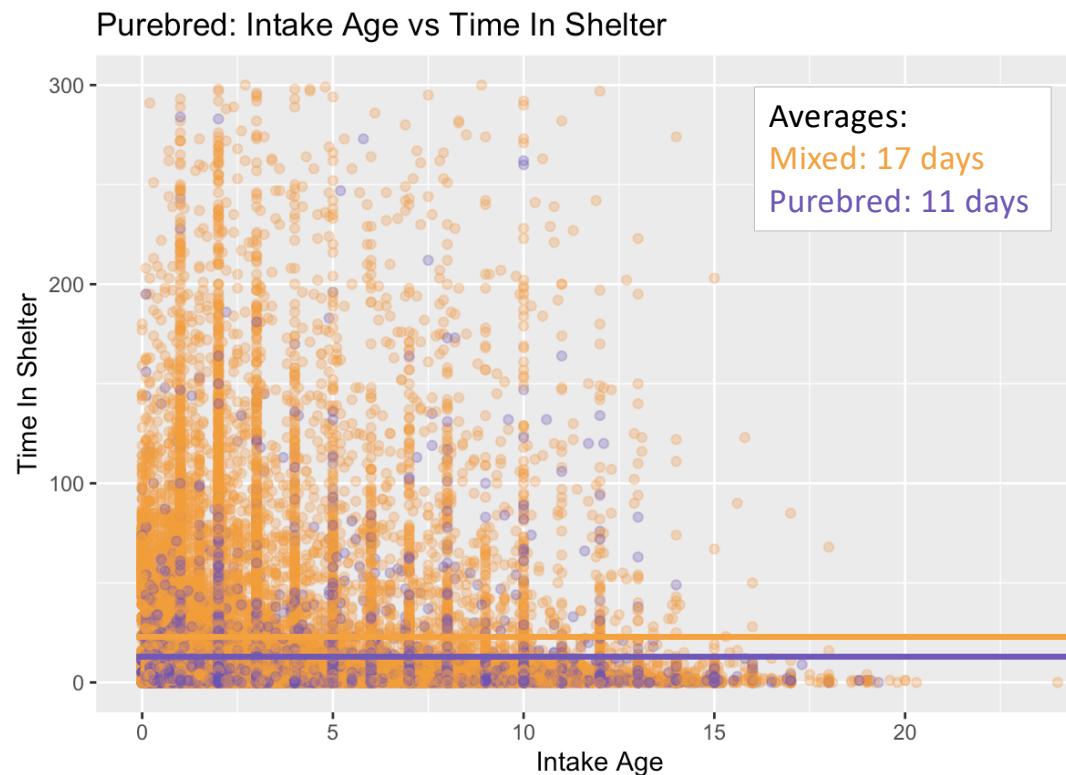
Purebred dogs find homes faster

Purebred:

Dog whose Breed designation does not contain "/" or "Mixed"
Accounts for 10% of dogs

Issue:

Studies show that dog morphology is usually misidentified by shelter staff



Citations: 9-11

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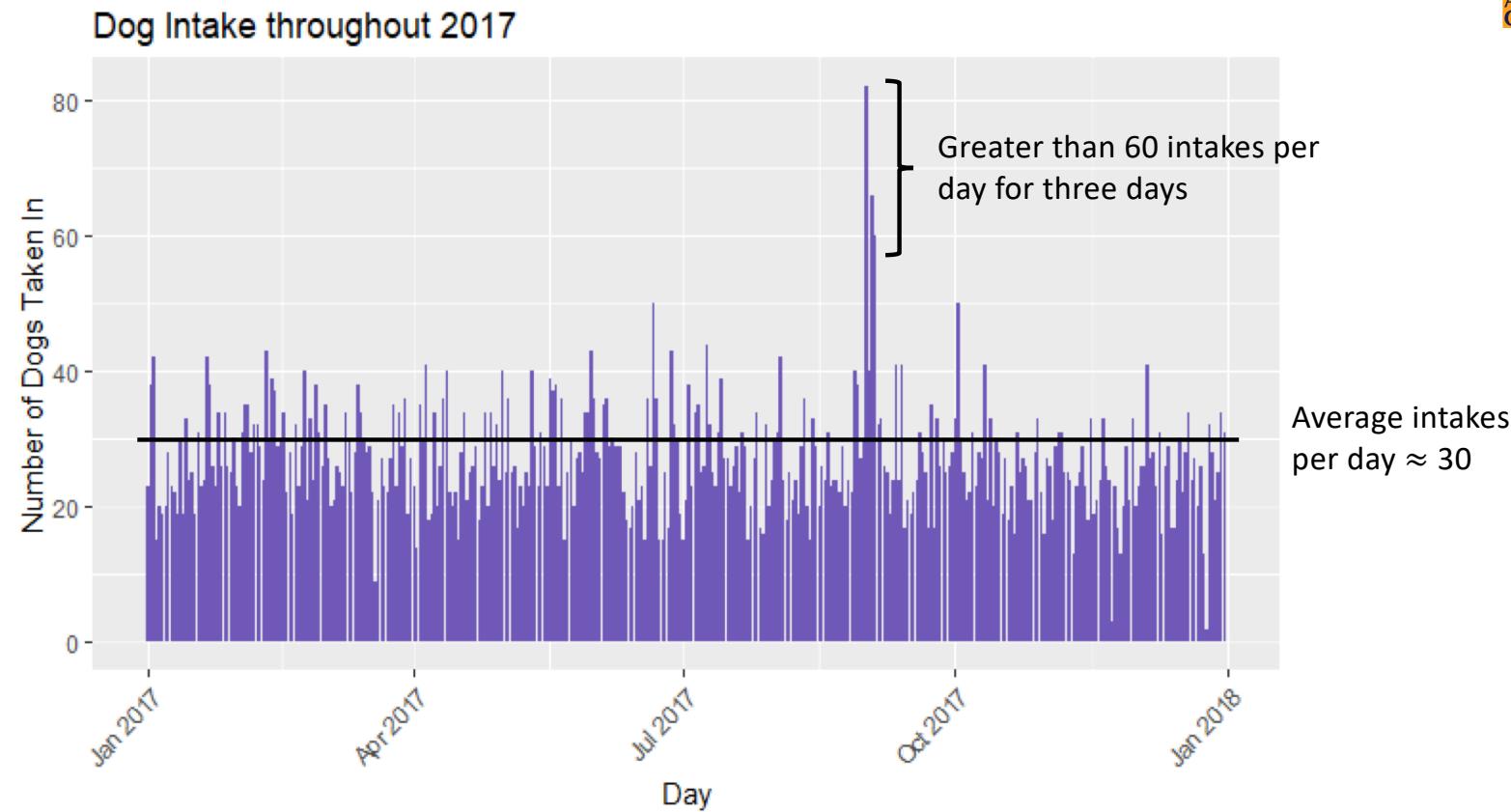
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4

Hurricane Harvey hit hard



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Predictions

Machine learning efforts

Issues

The love between humans and dogs can't be predicted



- Machine learning **methods** to predict adoption
 1. Cross validation
 2. Bagging
- Features:
 - Intake features: sex, age, intake type, intake condition
 - Engineered features: pitbull, purebred
- **66%** accuracy

Data is missing features like cuteness, social ability, vocalizing, activity level, and **personal preference!**

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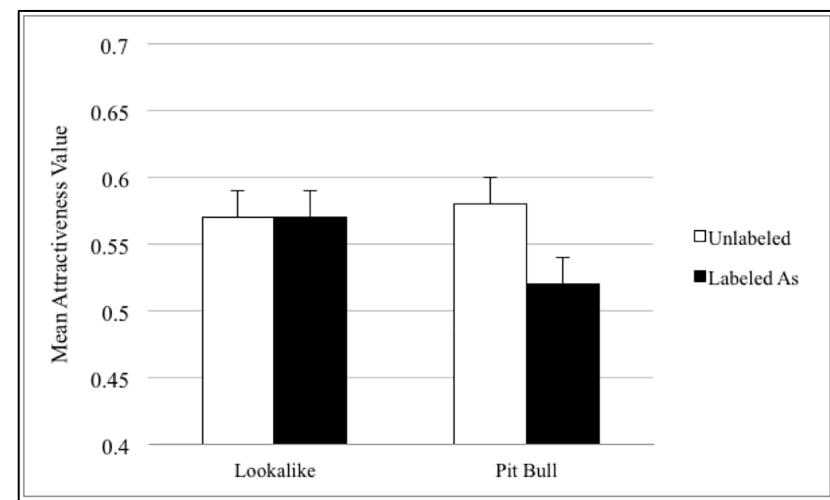
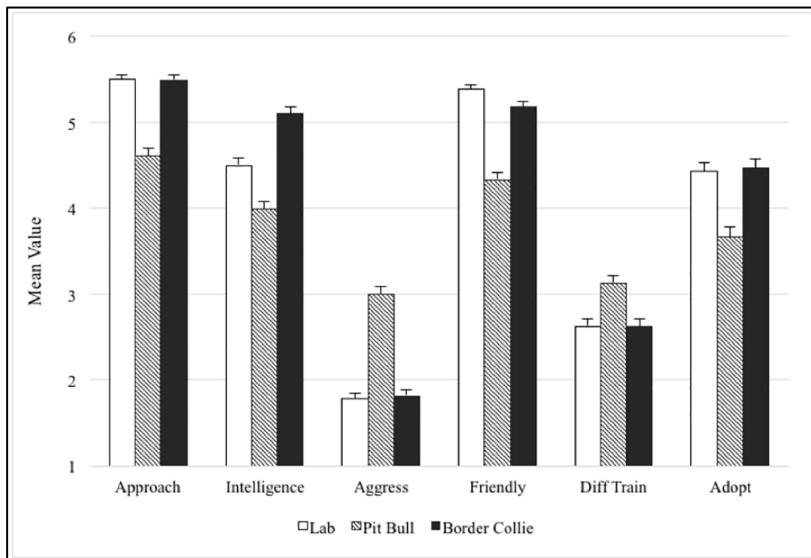
Future Work



Future work



Dogs labeled “Pit Bull” are dispreferred



- Blind studies show that labeling a dog “Pit Bull” lengthens time in shelter, hurts perceptions
- Pit bulls twice as likely to be euthanized at AAC

Citations: 9-11

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Other worthwhile topics include...

- Cost-value analysis: how much does fixing a dog cost, versus how much does it save in shelter resources?
- Age analysis: do shelters care for older dogs the same, and how do outcomes differ?
- Size analysis: do smaller dogs go to homes, and larger dogs to farms? What demographic groups want to adopt dogs at each size?

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Thank you!



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Citations

Summary Statistics:

1. IBISWorld Industry Overview: <https://clients1.ibisworld.com/reports/us/industry/ataglance.aspx?indid=5794>
2. Pet Ownership Statistics: <https://www.aspca.org/animal-homelessness/shelter-intake-and-surrender/pet-statistics>
3. Euthanasia Rate Falling: <https://www.nytimes.com/2019/09/03/upshot/why-euthanasia-rates-at-animal-shelters-have-plummeted.html>
4. Dog Owners Prefer Shelter Adoptions: Bir, C., Olynk Widmar, N., & Croney, C. (2018). Exploring Social Desirability Bias in Perceptions of Dog Adoption: All's Well that Ends Well? Or Does the Method of Adoption Matter?. *Animals : an open access journal from MDPI*, 8(9), 154. doi:10.3390/ani8090154

No Kill:

5. Definition: <http://www.austintexas.gov/blog/no-kill-austin>
6. Volunteer Quotes: <https://www.kut.org/post/austin-city-council-loves-its-no-kill-animal-shelter-volunteers-say-its-un可持续>
7. Issues: <https://www.austinchronicle.com/news/2019-02-08/austin-animal-center-strains-to-maintain-its-no-kill-status/>

Characteristics:

8. Black Dog Syndrome: <https://www.gopetplan.com/blogpost/black-dog-syndrome>
9. Breed Labels Affect Time in Shelter: Gunter LM, Barber RT, Wynne CDL (2016) What's in a Name? Effect of Breed Perceptions & Labeling on Attractiveness, Adoptions & Length of Stay for Pit-Bull-Type Dogs. PLoS ONE 11(3): e0146857. <https://doi.org/10.1371/journal.pone.0146857>
10. Shelter Staff Very Bad at Identifying Dog Breed: <https://www.sciencedirect.com/science/article/pii/S109002331500310X#bb0010>
11. Study: Morphology Determines Length of Stay: <https://www.tandfonline.com/doi/figure/10.1080/10888705.2013.740967?scroll=top&needAccess=true>

Another Data Scientist's Findings:

12. Analysis of AAC Data: <http://houndmanor.com/2016/10/18/austin-open-data-outcomes-draft/>