Animal Shelter Adoption Rate Analysis

Statistical Data Analysis

Summary

Most of the comparisons in this analysis were between categorical variables (e.g., dog breed), so I used t-tests and bootstrap analyses to identify significant differences between categories in terms of adoption times.

1. Common Trends in Adoption Times

1a. Animal type

I ran an ANOVA to look for significant differences between adoption times for the 4 animal categories: dogs, cats, birds, and other (rabbits, etc.). I found that there was a significant difference between these categories, so to investigate further, I created a function to run pairwise t-tests between all 4 categories and between each category and the "rest" of the data. I found that cats consistently and statistically have the longest adoption times, followed by dogs, birds, then other. I included a heatmap of p-values for the pairwise test.

1b. Dog breed

I used t-tests and a bootstrap analysis to identify breeds with significantly different adoption times. While many breeds did, of the four most common breeds (Labrador Retriever, Chihuahua, Pit Bull, and German Shepherd), Labs and Pit Bulls did have significantly longer adoption times.

1c. Dog breed group (AKC)

I used additional bootstrapping to determine which breed groups had significantly longer adoption times. Working, Herding, Sporting, and Miscellaneous group dogs had significantly longer times, with Sporting having the highest adoption times. Notably, Labs fall into this group, so I assume that this is in part due to how they are by far one of the most common breeds in the shelter.

1d. Mixed breed v. purebreed

I ran a t-test for this analysis and found that mixed breed dogs have a significantly longer adoption time than purebred dogs. I used a t-test and bootstrap to confirm statistical significance.

1e. Dog age

There was not an effect of increasing dog age resulting in longer adoption times; in fact, I observed the opposite. The youngest dog group had the longest adoption times, and I would speculate that this is actually an effect of this group having the greatest volume of dogs compared to the other age groups by far. I used a bootstrap for statistical significance.

1f. Black dog syndrome

I found that black dogs do not have significantly longer adoption times at this shelter. In fact, they have a slightly *shorter* adoption time on average. The breeds that did have longer adoption times are often associated with specific breeds - e.g., blue brindle is commonly found in Pit Bulls. I used both a t-test and a bootstrap to confirm statistical significance.

1g. Coat color composition

Aside from specifically testing black dog syndrome, I looked at coat color composition (single color v. multicolor). I used a bootstrap analysis to confirm statistical significance.

2. Trends in Dogs with Long Adoption Times

I largely repeated the tests I completed above for this group of dogs with long adoption times (the longest 5% of adoption times). I did add another bootstrap to create a 95% confidence interval to demonstrate that the probability that a dog in this group is a Pit Bull is likely ~31-32%.

3. Common Trends in Adoption Times

3c. Day of Week

Here, I looked at significant differences in adoption rates by day of week. I used a bootstrap to show statistical significance of higher adoption rates on the weekends and lower rates in the late-week (Wednesday-Friday).