Waupaca Humane Spay and Neuter Analysis

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Introduction

The purpose of this project is to analyze data from the Waupaca Humane society. The analysis will support a grant request for Spaying and Neutering free roaming cats and pets of low income families.





Overview

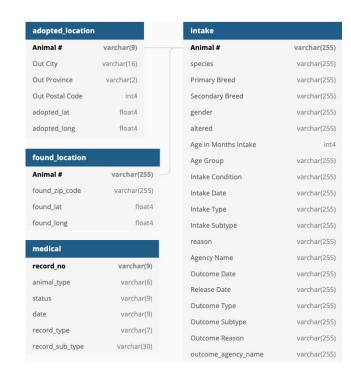
- Data cleansing and storing
- General information and trends
- Spay and neuter analysis
- Spay and neuter predictions

Every Row is a Wet Nose



Data

- Provided with 6 Excel files including medical and intake data over a time span of 3 years
- Performed preliminary cleaning and data organization in Excel
- Performed additional data cleansing with Python to ensure data met our model and dashboards needs
- Designed relational base
- Created database to store data hosted on Amazon RDS
- Connected database to machine learning model



Waupaca Humane Serves the Community's Animal Population

HSWC Dashboards



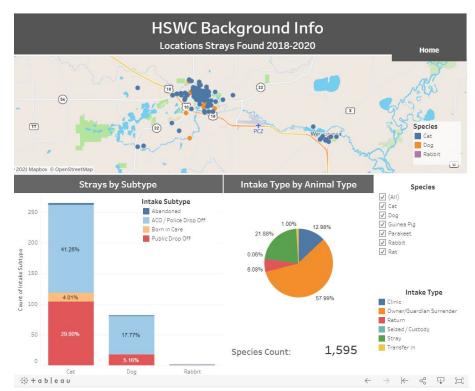
Spay and Neuter Analysis for Humane Society of Waupaca County

- Background Stats
- Spay & Neuter Info
- Projected Spay & Neuter Needs



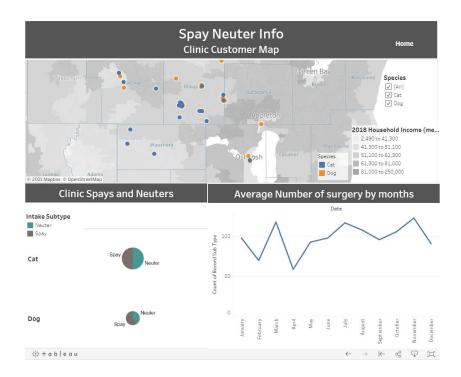
HSWC Background Info

- Map of areas served by the Waupaca Humane Society with locations stray animals were found (2018-2020)
- Percentage of intake types by species
- Comparison of Stray intake by subtype for cats vs dogs
- Overall percentages of intake types for all animals



Spay and Neuter Dashboards

- Map of Waupaca
 Humane Society Clinic
 patient with income level
 overly
- Percentage of surgeries performed by species
- Surgeries performed overtime



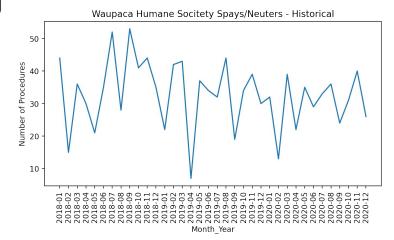
Dashboard Demo

HSWC Dashboard

Waupaca Humane seeks funding to continue Spay and Neuter Services to Low Income families and Free Roaming Cats



- ARIMA (AutoRegressive Integrated Moving Average) Model.
 - Plot of cleaned data for initial visualization.



Choice of ML model - ARIMA

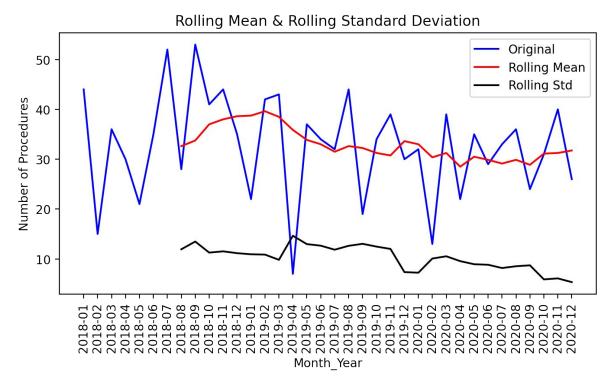
- Limitations/Benefits
 - Outliers can have a large effect on the forecast and they can't be filtered out easily.
 - Univariate only one series being looked at. Can
 have a large time series and it is easy to handle.
 - Simple enough to not overfit.

Data Manipulation - ARIMA

- Features and Engineering
 - Main Features: Date and record_sub_type (spay/neuter)
 - Engineering that needed be completed:
 - Extracting M/Y from M/D/Y format
 - Count of the spay/neuter procedures performed
- Split of Test/Train
 - Data series was split into test/train groups of 75% Train and 25% Test:
 - X = counts.values
 - size = int(len(X) * 0.75)
 - train, test = X[0:size], X[size:len(X)]

Stationary Data Check

Rolling Statistics method Used 8 period roll



Stationary Data Check

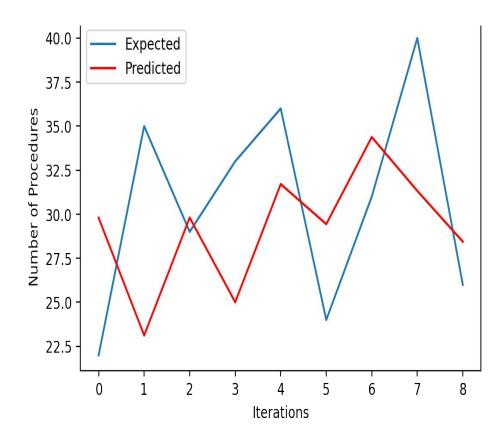
Augmented Dickey-Fuller (ADF) statistical check

- Desired results:
 - Low p-value
 - 1%, 5% and 10% critical values CIs are close to the ADF.

ADF Statistic: -4.523442265864301 p-value: 0.00017832531117933361 Critical Values:

> 1%: -3.639224104416853 5%: -2.9512301791166293 10%: -2.614446989619377

Validation of Model



Final ARIMA Projection

HSWC Dashboard

Conclusion

Outcomes:

- Continued need to Waupaca to perform these surgeries
 - Waupaca will perform about 30 surgeries a month for the next 3 years
 - Clear need for spay and neuter services for cats
 - Data Supports ability to perform surgeries

Recommendations:

Additional analysis on seasonality

What would we do differently?

- More Data
- A relationship between intake tables and medical tables