Section A: Project Recommendation

Problem Summary

Animal control departments across the country face the same issue: too many stray or abandoned dogs, many of whom are long term residents with a low chance of being adopted. The city of Philadelphia alone had approximately 5,200 intake dogs in 2019 alone. Unfortunately, while adoption rates have improved over the last decade, around 7% of these dogs were euthanized in the previous year.

Stella's Shelter is a no-kill shelter that strives to find homes for all dogs in Philadelphia. We also have the problem of too many long-term dogs residing in our shelters and foster system. Potential adopters are often seeking younger and pure-breed dogs, leaving older dogs and "mutts" in the system indefinitely. Additionally, we have numerous dogs, about 30% of intake, who either surrendered by the owner or returned due to behavioral and incompatible issues. Returned dogs are a substantial financial constraint on our limited budget. It also limits how many dogs we can take in from kill shelters and the city animal control. Stella's Choice, a web-based personality matching service, can help increase the adoption rate for these dogs by increasing the visibility and value of these lesser-desired dogs as well as help match dogs that fit with the adopter's lifestyle, increasing the retention rate.

Application Benefits

Currently, Stella's Shelter website has search functionality but no recommendation system. Creating a recommendation system based on user input will help increase the adoption rate across the board, and we plan on giving increased visibility to less adoptable dogs.

The website will help to increase the likelihood that mixed breeds will be adopted. The recommendation will also be able to help match breed behaviors to the adopter lifestyle. A better behavioral match will help increase the retention rate of adopters and decrease returns. We will also predict how likely a dog will remain in the shelter for more than 30 days and promote them.

As stated before, the strategic benefit is an increase in our adoption rate and retention rate. Both rates increasing has many additional benefits. Firstly, the maintenance costs of keeping a dog, such as food and medical expenses, will transfer to the adopters. Most of the dogs that remain in our shelter are usually older and mixed breed dogs. There are substantial veterinary costs associated with older dogs. Finding a home will help decrease veterinary costs. There are also administrative costs with using our foster system and the discounted financial support we provide fosters—the less time a dog spends in our system, the lower the maintenance cost and budgetary constraints.

Increasing our adoption rate draws in more money into our operations budget. As a non-profit organization, we rely on donations and adoption fees. An increase in adoptions will bring in more money. Also, we will have more room in our shelters and foster system. An increase in the operational budget, a decrease in cost, and additional space mean we can increase the number of dogs we can take in from the city and other kill shelters in the tristate, reducing euthanasia. These align with our shelter's business goals and mission statement.

Application Description

Our development team will produce a web application solution writing in Python and using the Django framework. We will use several HTML, CSS, and JavaScript frameworks to facilitate production. At the front end, we will provide a clear interface for the user to select specific behavior attributes that align with their lifestyle. Top breed recommendations will be displayed, and a list of adoptable dogs will be in tabular format.

When the shelter gets a new dog, they will update the website through an admin page and fill in attributes associated with the dog. The program will then predict, using these values, whether it will remain in the shelter for less than or more than 30 days. We will use this determination to promote dogs that are at risk.

With the user-selected attributes, the algorithm will then recommend several breeds that match. Then utilizing the breed recommendation, the website will present adoptable dogs that match the top-recommended breeds. We will promote and highlight dogs that we predict will stay more than 30 days on this list. An interface will give our shelter the capability to update available dogs. The interface will have a login feature for security reasons.

On the completion of development, the application will launch on our Amazon Web Services (AWS) instance.

Data Description

We are using two datasets to form the basis of our application. The first is a set of breed attributes that we will use to match an adopter with a list of compatible breeds. The dataset used for breed recommendation will be a JSON file converted to a CSV file from Kaggle.com. The data lists dog breeds and specific behavioral attributes with a scale from one to five. As the data set incorporates cat breed information and other unnecessary information, it will go through a cleaning and normalizing process.

The second dataset consists of a list of available adoptable dogs and aids our application in calculating the predicted adoption speed of our dogs. The available adoptable dog data set will originate from Kaggle. This information is currently on a CSV file.

The admin can further manipulate the adoptable dog data by an interface, where they can add or remove dogs up for adoption.

Objectives and Hypotheses

The objective of the proposed solution is twofold. First, increase the adoption rate of dogs at high risk of not being adopted in the current system by identifying these animals and promoting them more aggressively. Secondly, improve the retention rate of all adoptions by gathering information about the adopter's preferences and lifestyle and suggesting breeds from that information. These two objectives consolidated will decrease our maintenance cost and increase our operational budget. A sub-objective is to generate an environment to encourage more adoptions and form emotional fondness for potential adopters to one of our adoptable dogs.

We hypothesize that incorporating this adoption matching tool will provide useful and accurate recommendations and predict how long a dog will stay in the shelter. The algorithm and data will go through several iteration development and training to produce precise results to increase our retention rate.

Methodology

This project development will go through the Agile method. We envision this project as iterative progress, developing on previous builds, particularly in regards to our data-handling algorithms. Using Agile, we can use feedback from stakeholders to improve the recommendation system. Finally, we can implement our website and integrate it into our main site in a shorter time frame. The time constraint is an essential factor as historical data indicate a higher intake in our shelter in late summer.

The following are the project's phases in Agile implementation:

1. Requirement - Gather and determine requirements for the current iteration
2. Development - Design and develop sites features based on the accumulated requirements
3. Testing - Quality assurance testing covering internal and external training, interface and usability, and black-box testing. Includes documentation development.
4. Delivery - Validate, integrate and deliver a working product
5. Feedback - Gather customer and or stakeholder feedback for revision and refinement in the next iteration cycle

Funding Requirement

The overall estimate of the project is $25,000. However, we are negotiating with our development firm for a diminished rate, which they have accommodated us before since we are a non-profit. We also have a corporate sponsorship with Pet Supply Inc. We can negotiate with them to take most of the financial burden. There will be no licensing cost since we will be using free open source frameworks. No additional maintenance cost required since our previous website maintenance budget includes the hosting fees required.

Stakeholders Impact

Other than Stella's Shelter, the key stakeholder is the potential adopters. The website's success depends on attracting more adopters to our website and give them exceptional recommendations on the breed and current dogs available for adoption. The adopter's satisfaction will drive more people to adopt, through word of mouth or social media.

Other stakeholders include our shelters, sister rescue programs, and the city's animal control. The completion of this program will help the group's mission statements and business goal of saving as many dogs as possible.

Finally, a potential stakeholder with significant influence over the project is Pet Supply Inc. if they decide to go ahead with the sponsorship. They will have some terms and requirements in the design process. This project's success will help them drive their sales and potentially create a positive outlook on their corporation.

Data Precautions

There are no concerns about potential protected data. The only data we are applying for the algorithm breed behavior information and adoptable dogs' records. Future information accumulated from users includes their feedback, interactions, and approval of the breed recommended. No sensitive or private data collected during user interaction and the lifespan of this website. Once a user selects a dog, the site redirects to our main website, which manages private data required for the adoption process as directed by standards and regulations.

Developer's Expertise

The developer firm we are preparing to work with is Ciro-Luna Agency. They built our current adoption site, which was successful and met all our previous requirements with a significant discount. The two developers on staff who were our principal contact developers have several years of experience developing and possess relevant degrees. One developer covers the frontend requirements, and the other the backend development. Additionally, these two developers and many of their staff have adopted directly from our shelter prior and have a similar passion for helping dogs.