FurEver: Pet Adoption Platform

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Abstract—In its most recent report, the State of Pet Homeless- ness Index [1] found that there are approximately 62 million crore stray dogs and 9.1 million street cats in India and around 68% of the population report spotting a stray cat at least once a week, while approximately 77% of the population report seeing a stray dog with the same frequency.If more people adopted pets rather than purchasing them, the number of euthanized animals could significantly decrease. We set out to develop a solution called "FurEver" with these issues in mind. Every animal in a shelter hopes to find a forever home. However, the shelter frequently houses bully breeds like pitbulls, animals with health issues, and certain black dogs for extended periods of time. Shelters face a difficult emotional and financial situation as a result of this. There was a need for creative solutions to promote pet adoption with a blend of technology for an easy adoption process due to the overwhelming number of abandoned pets and the severe lack of resources to find every pet a forever home.By increasing adoption rates of long-term shelter residents, "FurEver" aims to alleviate emotional and financial strain for employees and owners of animal shelters. In addition, it assists customers by matching them with a companion animal that best complements their personality and lifestyle from a vast selection. We want to create a one-stop solution for the benefit of our "pawtners" by bridging the gap between adopters, animal shelters (NGOs), and individuals who want to put their pets up for adoption.

Keywords—Pet adoption web-application,stray pet adoption, Indies' adoption platform , online animal rescue and re- homing Service , customized pet adoption , pet adoption with machine learning

I. INTRODUCTION

The goal of FurEver is to quickly locate and adopt pets. Visitors can browse pets with full details of different species and age groups. Users can register for an account and view top picks. Users of the service can also speak with the pet's owner, which is useful for learning more about a pet. All a user needs to do to advertise a pet for adoption is upload the critter's information and photo. Using this web-app made it easier to advertise pets for adoption online. FurEver aims to aid in the adoption of under-adopted dogs. In order to prevent prejudice based on traits like age and breed, the system matches prospective adopters with canines who are compatible with their lifestyle and personalities. The software, which acts as a catalyst for the adoption process, instead emphasises canine personality to help users find the animal that is actually right for them. Under-adopted animals will be promoted to the top of the matching pool by the platform using a rating

system for improved visibility. FurEver addresses the issue of under-adoption experienced by stakeholders in animal shelters as well as the unmet customer requirement for a dog adoption search engine that uses customer personality to make matches (lowering paradox of choice). While adopters have the freedom to select a pet other than those that are recommended to them.

A. Motivation

The issue of pet homelessness in India remains a pervasive problem, with a significant number of animals living on the streets and struggling to find care and protection. Despite the growing number of individuals who express a desire to adopt these animals, many face obstacles such as limited time and difficulty in accessing shelters. However, with the rise of technological advancements in various domains, it is our responsibility to leverage these developments for the betterment of society. Given the large number of homeless pets in India (also known as Indies), it is imperative that we encourage the adoption of these animals rather than continuing to purchase pets from breeders. Homeless animals, who have often experienced abuse and neglect on the streets, deserve the same love and care as any other animal. Additionally, animal shelters frequently have limited space, making it challenging to accommodate all the animals in need. Therefore, the objective of this platform is to promote the adoption of homeless animals and alleviate the burden on shelters, allowing them to provide care to more animals, including those who are sick and disabled.

II. PROBLEM STATEMENT

Potential adopters face the challenge of the distance between animal shelters and their residences, coupled with the difficulty of navigating the available websites. It can be time-consuming and cumbersome for adopters to visit multiple shelters individ- ually in search of a pet. FurEver provides a convenient solution by displaying all the pets available for adoption from different shelters on a single platform, accessible from the comfort of their homes. Many existing apps offer only basic databases with limited information about the pets available for adoption. This process is often time-consuming and requires adopters to conduct extensive research, fill out lengthy forms, and engage in email and phone correspondence without any significant support. Based on interviews with recent dog adopters, they

all reported similar issues with the online adoption process, including a lack of transparency, lengthy forms, and limited support after adoption. Although robust filtering options are available, there is often a lack of personalization or sorting features. Moreover, once the user closes the web-application, all the filtering settings are lost, requiring the user to repeat the entire process from scratch. There is no standardization across animal shelters in terms of the information they provide about pets available for adoption. This inconsistency can makes it difficult for potential adopters to compare pets across different shelters.In recent times, pets are often put up for adoption through social media posts by shelters, NGOs, and even content creators to increase awareness. However, in many cases, these posts fail to reach the intended audience, resulting in fewer adoptions. Currently, there are only a few functional platforms available that cater to this cause, and even they are not very efficient in achieving the desired outcomes.

III. LITERATURE REVIEW

The JSP based Pet Adoption system, as described in [2], consists of four main modules: user handling, pet handling, pet adoption, and pet statistics. These modules are developed using various technologies including Eclipse, MySql, SSM framework, bootstrap framework, and various plug-ins. One of the key features of this system is the use of a modal box in the bootstrap framework to minimize the number of JSP pages. Additionally, a pure CSS plug-in is used for the waterfall stream layout when browsing pets. In the pet statistics module, the Echarts plug-in is used to create visually appealing and intuitive charts. This module also provides the option for administrators to download images locally. The system also includes a user login feature that determines the user's identity and permissions, allowing access to the appropriate pages. A remember password feature and two-factor authentication further enhance the user-friendliness of the system. [3] This study proposes a blockchain-based adoption and fostering system, named BAdopt, which aims to address the current issues faced by animal shelters by creating a secure and trustworthy software. The system is designed to maintain transparent and unalterable records on the blockchain, ensuring that no authority is involved in the process. BAdopt seeks to provide practical solutions for the undisclosed problems that existing web-based shelter applications fail to address. The prototype for BAdopt was implemented using the Ethereum platform, Solidity language, Truffle framework, Ganache test environment, web3.js library, and Metamask extension, en- suring the system's reliability and robustness. [4] As online shopping becomes increasingly prevalent, animal shelters have an opportunity to leverage websites to showcase adoptable pets and increase adoption rates. To address this gap, this study conducted a user needs analysis to identify the types of information that potential adopters, specifically those in- terested in cats or dogs, seek when searching for a new pet. The study involved 26 participants who were asked to rank different behavioral and physical

characteristics based on their importance and to identify their top five overall characteristics. The results indicated that cat adopters valued personality and behavior traits more highly, whereas dog adopters placed greater importance on physical characteristics. These findings underscore the importance of understanding the needs of potential adopters to provide them with relevant and valuable information on online pet adoption profiles. The insights from this study were used to develop pet profiles that align with adopters' needs and preferences in our website, ultimately helping them find the right pet for their home.

[5] This study forecasts the duration of each animal's stay in shelters, various critical features, such as animal type (dog, cat, etc.), age, gender, breed, animal size, and shelter location, were considered. Several models, such as logistic regression, artificial neural network, gradient boosting, and random forest algorithms, were developed to predict the length of stay. To assess the models' performance, precision, recall, and F1 score were employed as performance metrics. According to the study results, the gradient boosting algorithm provided the best overall performance, as indicated by its highest precision, recall, and F1 score. Furthermore, the investigation revealed that dog age (puppy, super senior), multicolor, and large and small size were crucial predictor variables after examining the findings more closely. The results of this study can be applied to predict and minimize the duration of animals' stay in shelters and to avoid euthanization. Future research could focus on identifying the shelter locations that are most likely to result in the animal's adoption. The suggested two-phase approach can assist rescue shelters in achieving the optimal solution by balancing adoption speed and relocation costs.

[6] The primary objective of the research was to investigate pet adoption in Cebu City, Philippines. To obtain data, the researchers employed the descriptive developmental method. The system developed for the study consisted of modules with specific functionality, which were developed using the incremental developmental methodology. The researchers had to follow a systematic process to successfully apply all the necessary features that were planned. The Incremental Model was utilized during the testing phase of the study, which quickly identified potential problems and risks. Through this method, researchers could address issues during the iteration of the system process, ensuring the system's success. To gather data, the researchers administered two sets of questionnaires, one focused on system procedures and functionalities, and the other on system user acceptance. The study's participants included pet owners, adopters, and animal shelters.The data collected from the study were subjected to statistical treat- ments, including frequency, simple percentage, and weighted mean, during the data analysis.

IV. PROPOSED SOLUTION

- To ensure the suitability of potential adopters, a small questionnaire will be implemented as a must-have re- quirement.
- The adoption process will be streamlined, starting from finding the perfect pet to applying for adoption and receiving acceptance or rejection from shelters.
- A comprehensive database of dogs and cats, along with their personality traits, will be scrapped to help adopters find their best match based on their specific requirements and living environment.
- The web-app will guide users through the entire adoption process, including easy appointment booking, pre- and post-visit recommendations, and post-adoption support.
- After successful adoption, the adopter can generate a unique QR code for their pet, which can be printed on their tags. This feature will also be available for already adopted pets.
- Shelters will be required to provide details about the total number of animals in their care, which animals are available for adoption, their breeds, and any relevant certifications or awards.
- Each animal available for adoption will have its own individual details, including estimated age, vaccination status, gender, and overall personality, in keywords to match with adopters' preferences.
- Adopters are given the ability to provide their location information, which allows them to customize their search radius for dogs available for adoption at nearby shelter homes according to their preferences.

- Figure 1 above presents the activity diagram which show- cases the flow of activities within the system, highlighting the key steps involved in the pet adoption process and how users can interact with the platform to achieve their goals.
- Figure 2 below, on the other hand, is a block diagram that provides a visual representation of the system's archi- tecture. The diagram illustrates the various components of the system and how they work together to enable the adoption process. Together, these two diagrams offer a comprehensive view of FurEver's functionality and structure.
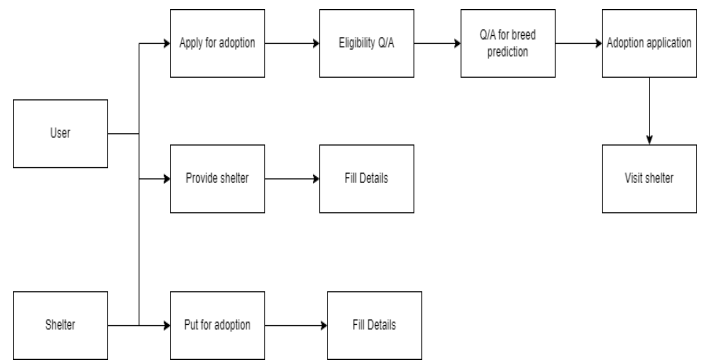

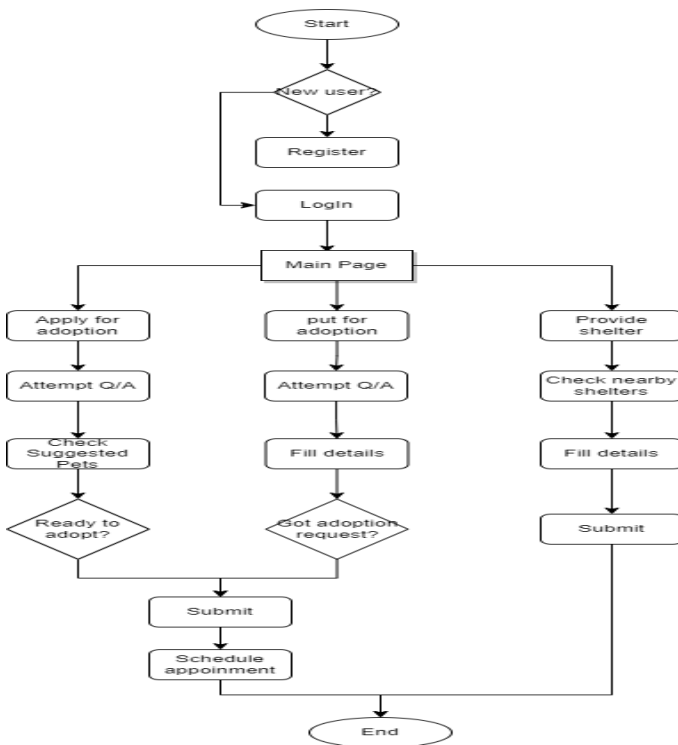Fig. 2. Block Diagram of the proposed solution

V. IMPLEMENTATION/METHODOLOGY

- Our system for recommending dogs utilizes web scraping to gather data on dog traits from sources like the Ameri- can Kennel Club, including factors such as temperament and shedding value.
- By assigning popularity values to each breed, we provide collaborative filtering recommendations that allow users to filter traits based on their preferences.
- Additionally, we use a combination of Euclidean dis- tances and cosine similarities in collaborative-based fil- tering to suggest breeds with traits similar to those of the user's chosen breed. This enables users to filter based on their specific lifestyle needs, such as choosing a less active dog for a busier lifestyle or a smaller dog for limited living space.
- The front interface of our system allows users, including adopters and shelterers, to define live location boundaries on a map.
- Adopters can provide their location information and ad- just their desired maximum distance to search for dogs available for adoption at nearby shelterer homes.
- By overlapping the boundaries of adopter and shelterer markers on the map, our system helps to connect adopters with the right dog for their needs.
- Relevant details such as the adopter's phone number and address are also included. We use Leaflet to implement this functionality in our system.

Fig. 1. Activity Diagram of the proposed solution

- By utilizing techniques such as singular value decomposi- tion, the below algorithm is able to analyze large datasets of user ratings and dog breed characteristics to generate highly personalized recommendations.

Algorithm 1: Dog Recommendation System

Input: List of User Ratings U, List of Dog Breeds D

Output: Top-N Recommended Dog Breeds

Step 1: Calculate the Similarity Matrix S based on the User Ratings;

Step 2: Calculate the Weighted Similarity Matrix W using the Similarity Matrix S and the User Ratings U;

Step 3: Calculate the Predicted Ratings Matrix $\hat{U}$ using the Weighted Similarity Matrix W and the User Ratings U;

Step 4: Calculate the Residuals Matrix R using the User Ratings U and the Predicted Ratings Matrix $\hat{U}$;

Step 5: Calculate the Singular Value Decomposition (SVD) of the Residuals Matrix R into U_R, Σ_R, V_R^T; **Step 6:** Truncate the SVD to obtain the Reduced SVD of the Residuals Matrix $\hat{R}$ using the top-k singular values and singular vectors, denoted as $U_{\hat{R}}$, $\Sigma_{\hat{R}}$, $V_{\hat{R}}^T$;

Step 7: Calculate the Low-Rank Approximation Matrix P using the Reduced SVD of the Residuals Matrix $\hat{R}$ and the Predicted Ratings Matrix $\hat{U}$;

Step 8: Calculate the Recommended Dog Breeds for each User by sorting the rows of the Low-Rank Approximation Matrix P in descending order and selecting the top-N Dog Breeds for each User; **Step 9:** Return the Top-N Recommended Dog Breeds for all Users;

VI. CONCLUSION

- Overall, the development of FurEver has shown that technology can be used to address the problem of stray animals and promote animal welfare.

- The successful development of FurEver underscores the importance of collaboration between technology experts and animal welfare advocates to create impactful solutions.

- As the prototype is further refined and tested, it has the potential to be scaled up and implemented in other communities facing similar challenges.

- Ultimately, the development of FurEver is a testament to the power of technology to create positive change and improve the lives of both animals and humans.

- As the web-app is developed further, it could potentially incorporate features such as lost and found animal alerts, resources for pet owners, and opportunities to connect with local veterinarians and other pet-related services. Overall, the successful development of the FurEver proto- type and ongoing collaboration with local shelters demon- strate that the ideation stage is complete and our team

is fully committed to advancing the development of this much-needed solution.

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