Pawster Care: An Android-based Pet Cruelty Reporting and Adoption Application with Recommender System

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ABSTRACT

This paper describes the development of Pawster Care mobile application. This app allows Davao City Veterinary Office, private organizations and private owners in searching for their pets a potential adopter and finding a new home. Moreover, this study aimed to help implement Republic Act No. 8485, Section 6, that forbids any person to commit pet cruelty acts, by providing pet cruelty reporting module. The app has been developed for the Android platform. The researchers performed agile scrum throughout the management and development of the software. Also, the researchers utilized Item-based Collaborative Filtering implementing Pearson Correlation and K- Nearest Neighbor Algorithm to produce a list of recommended pets for adoption for each user. The app described in this work was tested by a representative from the Davao City Veterinary Office, pet owners, and potential pet adopters. Results from this study show that the app can help the agency or private individuals find for their pet a potential adopter. Moreover, app user can easily report pet cruelty. The app can be further improved by adding the following features: real- time chat, location auto-complete when submitting a report, and improve the prediction accuracy of recommender systems using other data mining techniques.

Keywords: mobile development, pet cruelty reporting, pet adoption app, and recommender system

INTRODUCTION

Animals are being neglected daily by their owners. In England and Wales, a total of 9,069 abandoned animals were rescued by The Royal Society for the Prevention of Cruelty to Animals (RSPCA) in 2015 (Anders, 2016). Their records showed that on average, every hour one animal is abandoned. Probable reasons for pet abandonment are the following: pet owner is moving out and cannot take the pet, new landlord does not allow pet, the pet owner is on holiday, or pets lost its novelty (Towell, 2018). Public and private rescue group invest time to save these animals in distress. In the 2015, Davao City has a total of 1,504 dogs impounded

based on the data from the Davao City Veterinarian's Office (Labrador, 2015). The agency is calling for responsible pet-ownership to reduce stray dogs and control rabies incidence.

The researchers aim to develop a pet adoption Android-based application with a recommender system to help owners in finding the right adopter for their pets. The app also features a pet cruelty reporting module, wherein concerned citizen can submit a report on witnessed pet cruelty incident. Also, having this feature is in support of local pet owners, animal advocates, a public and private agency such as Davao City Veterinary Office and Animal Rescue Rehabilitation & Fostering (ARFF). The app also allows pet-for-adoption posting to make the process of match-finding of adopters and pets easier.

Moreover, the Davao City Veterinary Office is assigned to be the administrator of the application. A web-based administrator application is created to keep track of the records of the adopted pets and manage users of the app. It features a reporting module such as the pets rating and adopted pets. Pets listed in the app who received low ratings alert the administrator to place them for more rehabilitation time.

A potential pet adopter can use the app to view and rate the profile of pets-for-adoption. Also, they can filter pet-profiles according to its type and breed. It makes their pet searching experience quick and easy. To further customize the user's pet-finding-experience, the app is created with recommender systems. This technique provides potential adopters or users suggested pets from the app list that they might like based on their pet history preference and similar pet-ratings from other users.
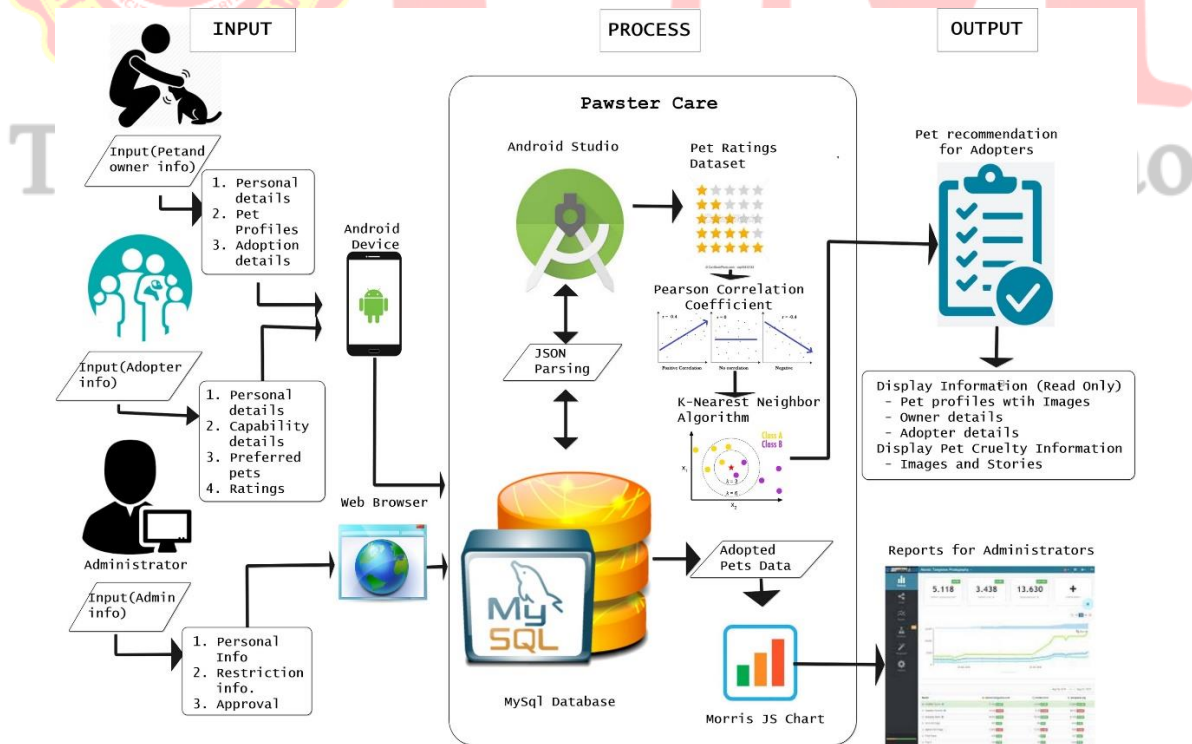

Figure 1. Conceptual Framework

The researchers aim to develop an Android-based pet adoption application with a recommender system and pet cruelty reporting module for the residents of Davao City. Specifically, it aims to develop the following: (1) a web application that allows an administrator to manage pet profiles and user accounts, (2) To develop a mobile application that features pet-for-adoption and pet cruelty reporting modules, (3) manage user's data using web-hosted MySQL database, (4) reporting module for the administrator using Morris Chart JS, and (5) a pet recommendation module using Item-based Collaborative Filtering technique implementing Pearson Correlation Coefficient to correlate the ratings of pets given by the users (adopters and owners) and K-Nearest Neighbor Algorithm to find the closest similarity scores to recommend pets to a potential adopter.

Figure 1 shows the conceptual framework of the solution. The application allows users (pet owner, pet adopter, and administrator) to store the account credentials and profile through the app using Android Studio for the mobile app and PHP and CodeIgniter Framework for the web app for the administrator. The app collects the following user data: name, address, email address, and contact number. Alternatively, the mobile app user can log-on to using their Facebook account credentials. The solution implemented a MySQL hosted database to store and manage the collected data. Moreover, records of pets-for-adoption, adoption request, submitted pet cruelty report, and pet ratings also stored on the same data storage.

To tailor-fit the user pet preference, a recommender system produced a list of suggested pets-for-adoption using Pearson Correlation Coefficient. A mobile user rated a list of pets initially to build his/her preference. Pet ratings provided by the said user is correlated with other users' pet ratings to produce a set of similar pets which were not yet rated by the former, based on the computed similarity score index. Then, the K-Nearest Neighbor Algorithm using Euclidean Distance Formula is implemented to compare the distance of the pet's rating similarity scores and classify the number of adopters who are most similar to the former. The mobile app will show a list of recommended pets-for-adoption. Moreover, the mobile app provides a module that allows the user to submit a pet-cruelty report. The system administrator can view all reports via the web application using Morris JS Chart.

MATERIALS AND METHODS

This study used the software development life cycle (SDLC) methodology to establish tasks executed at each phase in the software construction process. It is a complete plan outlining how to design, develop, and test mobile and web apps. This study employed the agile scrum methodology to define the tasks performed in the development of the apps. Figure 2 shows the diagram of the agile model.

To create the initial prototypes for the mobile and web app, the researchers gathered information about the current situation of pet adoption and cruelty in Davao City. The researchers employed an interview as a data-gathering method to collect data among the following stakeholders: City Veterinary Office, pet owners, and potential pet adopters. The researchers obtained the process flow in adopting the pets housed at Davao City Dog Pound and the crisis with regards to pet cruelty, abandonment, and adoption. The stakeholders were able to define their must-have, and nice-to-have requirements such as (1) pet-cruelty reporting for abused and maltreated pets, (2) be able to post ads about a pet-for-adoption, and (3) pet-finder and matching feature among others.
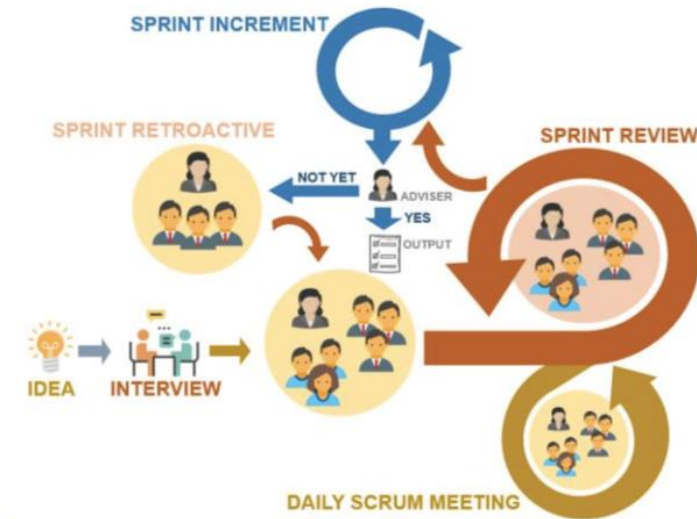
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Figure 2. Agile Scrum Methodology

The tables 1 and 2 are the complete list of functionalities identified as functional requirements by the stakeholders. Having these into consideration, the researchers created a working prototype to model the solution. Then, the researchers identified the roles of each member of the team and the product owner. The team also discussed the priority of each functionality required by the stakeholders. As a result, the team was able to produce a product backlog. Afterward, the team continued to sprint planning. The team decided that the length of each sprint is two weeks. Then, the team chose the specific tasks from the product backlog to the sprint backlog. These tasks are expected to be completed within two weeks.

Lastly, a sprint retrospective meeting was conducted to reflect on what went right and what did not go well. The team also discussed the challenges that they encountered within the sprint and uncompleted tasks. These tasks are now forwarded to the next sprint.

RESULTS AND DISCUSSION

To ensure the quality of the developed software, the researchers conducted various testing activities as provided below:

Android Compatibility Test Results
The researchers installed the application on different Android mobile devices with different operating system (OS) versions. Results showed that the mobile app is compatible with Android OS version Lollipop to Oreo. All of the functionality of the mobile app was working, and no design issues found during testing.

Table 1: Mobile App – Functional Requirement	
Function	**Description**
Sign up	• Create a user account, he/she needs to register first. • Need to add his/her basic information
Sign up with Facebook	• Create a user account, he/she needs to log-in first to his/her Facebook in the same device and click the Continue with Facebook • Need to approve that the app will connect to his/her Facebook
Log-in	• Can login using username and password or using Facebook account credentials
Rate Pet	• Can rate any potential to adopt • Initial pet ratings will be used to build initial list of recommended pets-to-adopt
(Anders, 2016) Favorite Pet	• Can favorite pets and review
Pet Cruelty Reporting	• Can submit photo and narrative of pet-cruelty incident
Adopt a Pet	• Can submit adoption request of a pet one at a time
Notification	• Notify user of pet-adoption transaction
View Pet for Adoption	• Can view list of pets-for-adoption
User Profile	• Can view, edit and update his/her information.

Table 2: Web App – Functional Requirement	
Function	**Description**
Login	• After signing up, admin can view website dashboard
Create new admin	• Admin can add new admin but needed to be verified first by the super admin to have access.
View Users	• Admin can view all registered users • Allowed to update user status if they are screened or not yet; blocked or un-blocked user
View Pets	• Admin can view all pets for adoption. • Also, they can also add their own list of pets for adoption.
View Reports	• Admin can view pet cruelty reports and transaction reports

Mobile Device Screen Resolution Test Results

Using the Android mobile devices with different screen size and resolution, the researchers found out that the app works best for screens with the following resolutions: 1,44 x 2,560 pixels, 1,080 x 1,920 pixels, and 800 x 1,280 pixels. The app ran smoothly with no User Interface/User Experience (UI/UX) and functionality issues.

Web Browser Compatibility Test Results

The web app works best with the latest Mozilla Firefox, Google Chrome, and Microsoft Edge browser. Result of the testing showed that the application had run smoothly and with no design issues using the specified browser.

Alpha and Beta Testing Results

The researchers conducted Alpha testing, which focused on the feedback of the adviser of the researchers. The adviser conducted software testing before the release of the final product. Both the mobile and web application tested, and no issues found. Then, the Beta testing was conducted to real users and stakeholders to validate the functions and features of the system. There were three identified beta testers, and no issues found.

CONCLUSION AND RECOMMENDATIONS

This study developed a pet-adoption and cruelty reporting Android-based mobile application with a recommender system using Android Studio. Also, a web-based administrator app is built to monitor pet ratings and manage user accounts using PHP and CodeIgniter Framework. First, we conducted several testing to ensure that the functional requirements are working as expected, and system requirements are achieved.

For future work, the following are the recommendations: (1) improve the app by creating a cross-platform application that can be installed both on Android and iOS mobile devices, (2) use dynamic personalized recommendation algorithm to improve accuracy and efficiency of the recommender system further, and (3) include real-time chat feature, single-page functionality, and automatic suggestion or detection of the user's location while submitting a pet cruelty report.

ACKNOWLEDGEMENT

REFERENCES

Anders, C. J. (2016, July 12). A Pet Is Abandoned Every Single Hour In The Summer. The Dodo. https://www.thedodo.com/abandoned-pets-summer-1917692034.html

Labrador, K. M. G. (2015, May 24). Davao City now has less stray dogs. Retrieved September 12, 2019, from Sunstar website: https://www.sunstar.com.ph//article/10456

Towell, L. (2018, September 4). PETA Prime: Why People Abandon Animals. Retrieved September 12, 2019, from PETA Prime website: https://prime.peta.org/2018/09/why-people-abandon-animals/