A Paradigm for Connecting Pet Owners, Veterinarians and Pharmacies

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Abstract—**The practical problems in the day to day lives of the people with pets are often ignored in the emerging era of technology, the use of technology is being limited to focus on the ease of us, people. Magazines, articles containing information about pets get published but none focus on addressing the practical problems. In the practical scenario, people face issues like finding other pet owners to get a pal for theirs, finding a nearby vet, locating pharmacies or shops to get various stuff for their pets.**

This research paper involves the use of technology for the development of an application- Paww's, a mobile application which will run on both android and iOS, will help people find solutions to the above problems in a click. The application will help them find other pet owners in their vicinity using the 'near me' function. They will be able to connect directly with a vet, chat and discuss about the ailment of their pet. Not all pharmacies are authorized to keep the medicines fit for consumption by animals, only a few of them are authorized and hence it is difficult for people to look out for such pharmacies. Therefore such pharmacies will be listed on the application and it will help the users to find the relevant medicines for their pets and the specific shops which offer accessories and other things related to the pets will be listed as well, for people to directly contact them and order or can visit the shop themselves. And for people who are unaware of their dog's breed, Paww's presents a way out by incorporating *Deep Learning* in the project and providing a feature wherein the user shall have to point the camera to his/her pet and the software will identify the breed for them.

Index Terms—**Technology, pet owners, breed, iOS application, android application**

I. INTRODUCTION
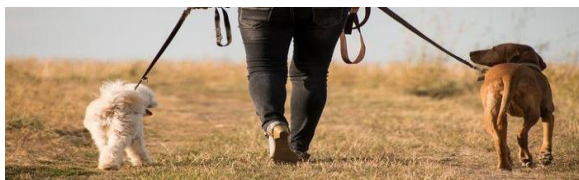
Lives in metropolitan cities are so fast moving that people sometimes overlook the attention that is required by their little pets. It is seen that the relationship with pets is both very widespread and very intense, often leading to strong attachment between owners or caregivers and animals and to a treatment of these pets as family members or even children[5]. Even this being an established fact, people even if they take pets as their family members, often get busy in their daily routines and chores and this leads to ignorance towards their pets, and studies have indicated that negligence towards pets by their owners or caregivers have led to behavioral problems emerging in pets[6]. Behavioral problems are a common cause of the disruption of human- animal bond and can result in pet relinquishment, abandonment and euthanasia[17].

It is also seen that pets living in homes experience poor welfare and quality of life[21].

The disruption in proper QOL for pets is due to several reasons, the below mentioned analysis of the survey done in order to recognize people's real life practical problems that occur to them, and lead to ignorance towards their pets by them:
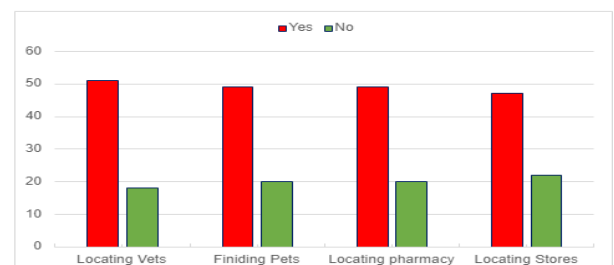

Fig. 1 Public survey on Practical problems

Some common problems** listed in the above graph are-
Locating veterinarians.
Finding friends for their pets like other dogs, cats.
Locating pharmacies
and stores nearby their localities.

**The problems listed in the survey are based on the real life problems faced by people such as:

1. The ones moving to new localities or cities.
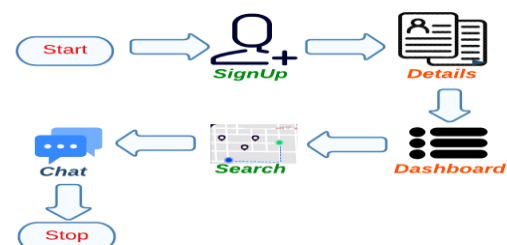2. People bound in containment zones during the pandemic 'Covid-19'.
3.

Fig. 2 Demonstrates the flow of the application

II. RELATED WORK

Several people have tried to acknowledge the issues faced by the people, and have addressed a few aspects of the same.

A. Pinder

(A pet website styled after human dating app Tinder, allows owners to find pals for their pets, the New York Post reported.)[2020] A website for pets founded and created by Kevin Botero where no humans are allowed, allowing the owners to find pals for their pets. Pinder was in an open beta phase after it had its soft launch in Sept 2020 [4]. But currently it is on hold since Tinder put them down (https://pinderpets.com).The application provides the facility to bring together the pet parents with a right swipe much like in tinder, and where there's a match, owners can chat with each other on different social media platforms like Facebook, Instagram, or TikTok..

B. Tindog

A magazine created to cater the needs of people only with pets as dogs and cats. Julien Muller, Founder & CEO of this app [13] . It only provides articles over topics like nutrition, health, dog breed, shelters etc, that too only in the United States (https://tindog.co).

C. Dig

Created for people who "live a dog-forward lifestyle" and want to romantically connect and find their pawfect match with someone of a similar mindset .Founded by New Orleans sisters Casey and Leigh Isaacson, the idea for a dog person's dating app was born after Casey went on a date in New York with someone who wouldn't let her dog into their apartment.Dig present users with five potential dates every day, and then they indicate whether they "dig," "really dig," or "pass" on the matches.Once two people 'dig" each other, Dig suggests fun, dog-friendly date ideas for the perfect first date. It connects people with dogs, who are looking out for a romantic inclination for other similar people with dogs.

When joining the dating site, users can indicate whether they are a "dog owner" already or simply a "dog lover" and list a series of preferences to match them with their ideal, dog-loving partner.

D. Tabby

With the same concept as Dig, is a dating application for cat-lovers, it helps find people their purrfect match.

E. DRPETSAPP

India's first telemedicine platform,developed in 2019, dedicated to Animal Health Care . It enables Pet Parents and Cattle owners to consult with Veterinary Doctors online on chat and call at their convenience of time and place. Ask questions about your pet's health, nutrition, behavior, or any other topic, and obtain trusted answers from verified veterinarians and other pet experts. Dr Pets App is an honest attempt to provide real time

& excellent treatment to animals and an effort to save money and time of pet owners by removing the hassle of transporting Animals to the clinics by connecting them to online veterinary doctors.

III. PROPOSED WORK

A. The goal of this work is to ease the life of the people with pets, by delivering the essential needs to them at their disposal, by using the technology to create an application where one would find all the necessary requirements for keeping a pet fulfilled.

B. This project will bring a ease in the life of the pets, the segment of the society which seldom gets overlooked, and will ensure a standard quality of living for them by easing the lives of their owners or caregivers.

C. This chain of thought has targeted people with both iOS and android devices and will bring all the pet parents together on one single platform.------

D. The project shall include a prior survey as well which will be done in order to get the details of the veterinarians[1], pharmacies[10], stores etc and upon their consent, they will be listed in the application.

E. Lastly, the application also incorporates the use of machine learning to serve to those people who are unaware of the breeds of their pets, but recognizing it for them.
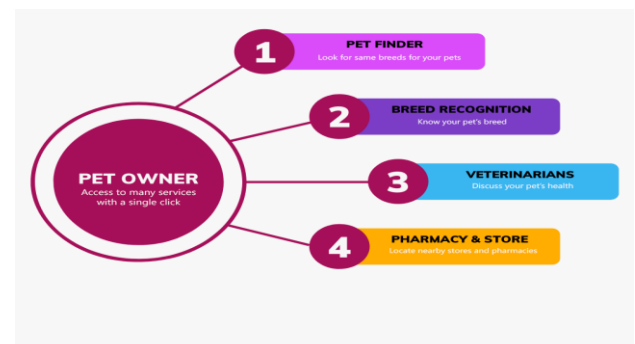
Fig. 3 Shows the services being offered.

IV. METHODOLOGY

A. Public Survey/Suggestion Survey

Different people have different opinions about keeping a pet, and thus have varying requirements, depending upon their needs. Various data sets are available across the internet, or forms are circulated which are duly filled by the people and their inputs in the form of suggestions their needs are collected.

B. Registering the user

The user will have the option to register on the application according to his need, or what he/she is whether a pet owner or a pharmacist or a veterinarian[1], accordingly the application will

furnish their feed by sorting the data by the parameters provided by the user such as age,breed and gender of their pet.

C. The user dashboard

The pet owner will have his feed and dashboard filled with other pet owners with whom he/she can connect, the veterinarians[2][1]whom they can contact directly or book an appointment with in the chat box, or they can even view the stores or pharmacies which are nearby them[10].

D. The Nearby Function

The application will capture the user's geolocation with the help of the GPS of the mobile phone, and various other details like the pin code and address, and will make use of the haversine formula[12] in order to calculate the minimum distance between other users, pharmacies and veterinarians.

E. Pharmacies And Veterinarians

The pharmacies and the veterinarians will be displayed with the list of people who will contact them, and accordingly they will be able to connect and serve them according to their needs.

F. Breed Recognition

The feature to recognize the breed of the pet, mostly dogs will be available for those people who are unaware of their dogs breed, this feature will be accomplished by incorporating deep learning, wherein the image captured by the camera will be processed by the ml algorithm, like [11][7] has done using the CNN and the images are classified into various classes of animals.
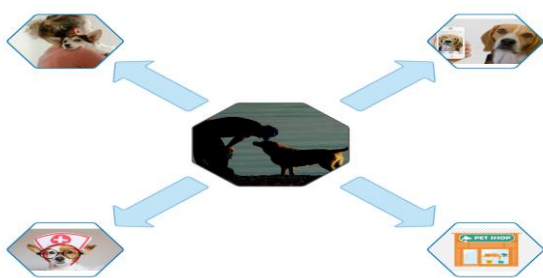

Fig. 4 represents all the services to which the user will have access to
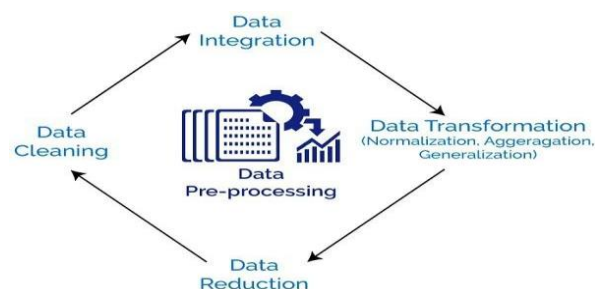

Fig 5 Data pre-processing is a technique that is used to improve the quality of the data before applied mining, so that data will lead to high quality mining result.
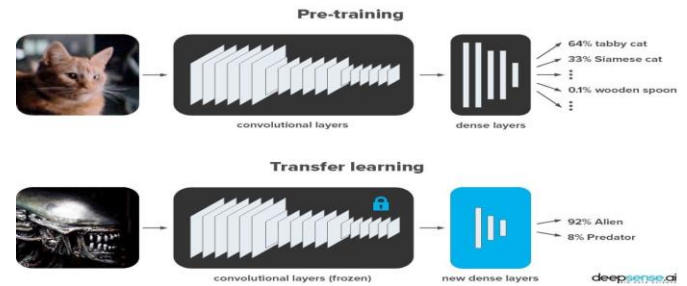

Fig 6 Demo of Pre-training and Transfer learning

V. ALGORITHMS

A. Support Vector Machine

Support Vector Machine (SVM) is an administered AI calculation which can be utilized for both grouping and relapse difficulties. Nonetheless, it is generally utilized in order issues. In this calculation, we plot every information as a point in n-dimensional space (where n is the number of highlights you have) with the worth of each element being the worth of a specific arrangement. At that point, we perform grouping by tracking down the hyper- plane that separates the two classes quite well (take a gender at the underneath preview). Support Vectors are essentially the coordinates of individual perception. Support Vector Machine is a boondocks which best isolates the two classes (hyper-plane/ line). All the more officially, a help vector machine builds a hyper plane or set of hyperplanes in a high-or endless dimensional space, which can be utilized for grouping, relapse, or different errands like anomalies location. Instinctively, a decent partition is accomplished by the hyperplane that has the biggest distance to the closest preparing information point of any class (alleged practical edge), since overall the bigger the edge the lower the speculation blunders of the classifier. Though the first issue might be expressed in a limited dimensional space, it frequently happens that the sets to separate are not directly distinct around there. Consequently, it was suggested that the first limited dimensional space be planned into a much higher-dimensional space, apparently making the detachment simpler around there.

B. Haversine Formula

Central angle Haversine[15] can be computed, between two points with r as radius of earth, d as the distance between two points, ϕ_1, ϕ_2 is latitude of two points and λ_1, λ_2 is longitude of two points respectively,as:

$$\text{haversin}\left(\frac{d}{r}\right) = \text{haversin}(\phi_2 - \phi_1) + \cos(\phi_1)\cos(\phi_2)\,\text{haversin}(\lambda_2 - \lambda_1)$$

LAW OF HAVERSINE:

To derive law of Haversine one needs to start the calculation with spherical law of cosine i.e

cos a = cos b * cos c + sin b * sin c * cos A

One can derive Haversine formula to calculate distance between two as:

$A=\sin^2(\Delta latDifference/2)+\cos(lat1).\cos(lt2).\sin^2(\Delta lonDifference/2)$

$c = 2.atan2(\sqrt{a}, \sqrt{(1-a)})$

$d = R.c$

where,

ΔlatDifference = lat1 – lat2 (difference of latitude)

ΔlonDifference = lon1 – lon2 (difference of longitude)

R is radius of earth i.e 6371 KM or 3961 miles

and **d** is the distance computed between two points.

C. Euclidean distance formula

Euclidean distance is the distance between two points in Euclidean space. Euclidean space was originally devised by the Greek mathematician Euclid around 300 B.C.E. to study the relationships between angles and distances. This system of geometry is still in use today and is the one that high school students study most often. The Euclidean distance formula, as its name suggests, gives the distance between two points (or) the straight line distance. Let us assume that (x1,y1)and (x2,y2) are two points in a two-dimensional plane. Here is the Euclidean distance formula.

VI. ARCHITECTURE

The architecture of our work is shown in Figure 7. The user signs up as a pet parent, a vet or as a pharmacy and proceeds accordingly, the pet parents then have the options to choose from other pet parents, pharmacies or contact directly a veterinarian.

Fig 7 Application Architecture

VII. RESULTS

Upon running the application the user will come across the following user interface, the user will have the option to register according to who he/she is, either as a pharmacist to list his pharmacy on our application, or as a veterinarian, or as a simple user who is here to utilize the features of the application.

Figure 8. Depicts a glimpse of the data-set of the survey that was conducted in order to take the opinion of the people with pets, about how they feel about their current situation, and their suggestion to the suggested remedy of an application.

Figure 9. Denotes the dashboard of the application, where the user will decide who he/she wants to register as.

Figure 10. Depicts the registration page of the application, where the user will register as a pet parent and will fill in all the necessary required details.

Figure 11. Depicts the nearby location feature of the application, where the user will look for other pet parents like himself to connect with.

Figure 12. Demonstrates how the user will capture the image of his/her pet in order to recognise their breed. This feature is specially for those who are unaware of their dog's breed.
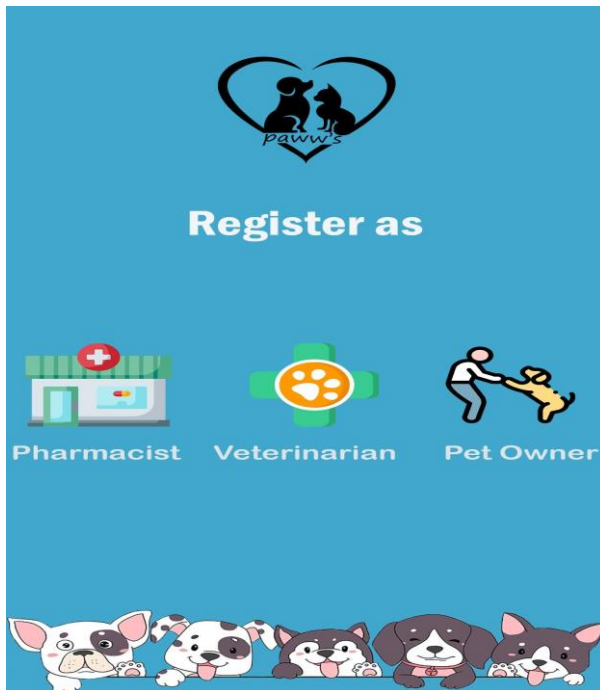
Fig 8. Data-set

Fig. 9 The front Dashboard of the application

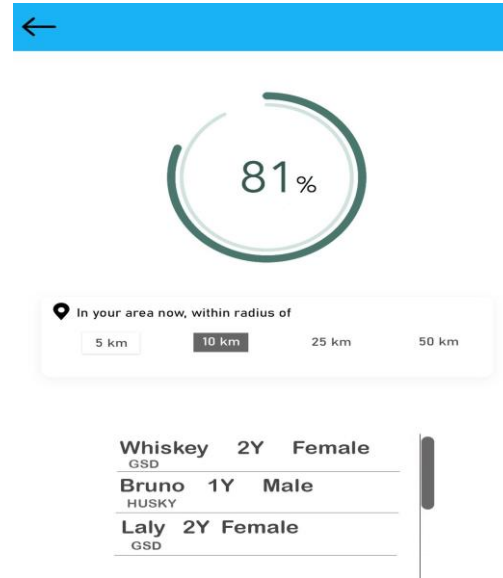Fig. 10 Registration page of the application

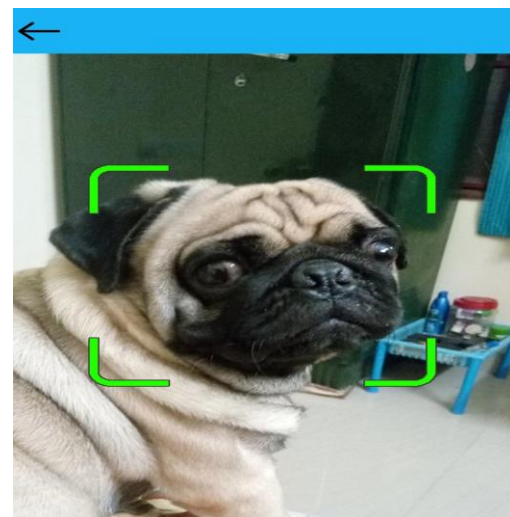Fig. 11 Looking for other users in the nearby vicinity

Fig. 12 Breed recognition

VIII. FUTURE SCOPE

"Paww's" in future will become a sensation targeting the youth. As majority of the pet parents now-a-days are teens or in their mid 30-40(s). An application like this will become viral and will come handy to a lot of people.

There already are a lot many applications in existence which address some parts of the problems faced by people, like the DrPetsApp which connects people with vets, but this is the only function of that application, people usually like all their issues being addressed at one stop. We look for a place or an application which has it all. Be it an e-commerce application like Amazon, or a ticket booking platform like makemytrip or many others like these, people like it when they get everything covered under one roof. Paww's will enhance the reach of the privately practicing veterinarians, by connecting them to the crowd they need.

Paww's can generate revenue in future by collaboration and

integration with different brands, or by commissioning in the form of liaisoning. Thus it will be a brand one day.

IX. FUTURE WORK

The scope of expansion is immense, a lot many features will be incorporated in the near future, expanding the scope of the entire application. The features will include elements like as follows:

A. A chat bot to answer the queries of people in the absence of the veterinarian[3]. The bot will take in the symptoms in the form of input, and will analyze them and suggest them with the most probable medicine. At the time of an emergency when none of the vets are available, the bot will be there for the user to enquire about the symptoms and give a suggestion regarding the same.

B. Collaboration with the trainers, adding additional features where people can get a trainer for their pet, will also be incorporated in the application, expanding the scope of the project, and providing the user with a new feature.

C. Generation of revenue in the form of commission from the pharmacies, and enabling home deliveries, will contribute to the expansion and developing of the brand name of the product.

D. Collaborating with the NGO(s) that work for the betterment of the animals of the street, and shelters which work for the rescue of animals, will be incorporated in the application, thus not limiting the application for the homely pets and covering the other often neglected and overlooked section of the society.

X. CONCLUSION

Now a days, with the increasing hustle in people's lives, everyone wants convenience, and to refrain one from visiting different websites and wandering the internet in search of answers to their queries related to their little family members, we provide you with Paww's, an all in one incorporated application which answers to all the needs, like connecting with other pet owners, finding play pals for your buddies. Contacting the veterinarian in case of a medical emergency, looking for pharmacies and shops in order to look for medication or other stuff for your pets. Paww's is a complete package containing all the libraries of answers to all the practical problems in day to day lives of our pets.

Several features exist but are not accumulated in one place,the user has to wander and visit different websites and look for different magazines like TinDog etc, in order to look for information regarding pets. An application like Paww's where everything is present under one roof will not only make the lives of the pets easier but also will provide convenience to the pet owners and contribute to the betterment of the pet section of the society. The use of technology is after-all for the advancement and betterment of everyone, not just humans.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

The entire research that was conducted and the data analyzed was done conducted and done by Adhyan Gupta and Anushka Shukla.The entire paper was also written by them. And with that conclusion , all authors had approved the final version.

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