Enhanced Stray Animal Care Using Machine Learning: A Comprehensive Approach

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Abstract- *In urban environments, the management and welfare of stray animals, particularly dogs, present significant challenges. This paper introduces a novel solution via an Android application that utilizes Convolutional Neural Networks (CNN) to streamline reporting, searching for, and adopting stray animals. The application enhances community involvement in animal welfare initiatives and provides an efficient platform for managing stray animals. By leveraging machine learning, the system can classify and manage animal data with high accuracy, facilitating quicker reunions of lost pets with their owners and increasing adoption rates. The proposed system demonstrates economic and operational feasibility, ensuring minimal development costs and efficient performance. Initial results show a significant improvement in the reporting and management of stray animals, highlighting the potential of this technology to transform community-driven animal welfare efforts.*

I. INTRODUCTION

The increasing number of stray animals, particularly dogs, in urban areas presents numerous challenges for animal welfare and community health. Traditional methods of managing stray animals, such as manual reporting, sheltering, and adoption processes, are often inefficient, resource-intensive, and slow. These methods fail to fully engage the community and utilize available technology to address the problem effectively.

The Smart Stray Animal Management System (SSAMS) aims to overcome these challenges by leveraging advancements in machine learning, specifically Convolutional Neural Networks (CNN), to create an efficient and user-friendly platform for managing stray animals. This Android application allows users to easily report sightings of stray animals, search for lost pets, and facilitate the adoption process.

SSAMS's primary objective is to streamline the management of stray animals, thereby improving their welfare and increasing community involvement in animal care initiatives. By using CNNs for image classification, the application can accurately identify and categorize stray animals based on user-uploaded photos. This technological approach ensures higher accuracy and faster processing times compared to traditional methods.

Furthermore, the application integrates various functionalities within a mobile platform, making it accessible and convenient for users. The system architecture is designed to support scalability and future enhancements, ensuring that it can adapt to the evolving needs of animal welfare efforts.

II. LITERATURE SURVEY

Title:
Piku Prototype: Designing a Mobile Application for Community Cats

Author:
Kaustubh Salgaonkar, Sumitra Padmanabhan.

Description:

This application prototype aims to enhance stray pet adoption by promoting the "Adopt Don't Shop" policy, focusing specifically on stray cats. It facilitates connections between rescuers and foster caregivers, increasing awareness and support for stray cats through a user-friendly interface.

Analysis:

While Piku Prototype addresses the adoption process for cats, it lacks a comprehensive reporting and management system for other stray animals and does not incorporate advanced machine learning techniques

Title:
Convolutional Neural Network for Target Face Detection using Single-trial EEG Signal
Author:
Haofei Wang, Bertram E. Shi, Yiwen Wang
Description:

This study explores the use of CNNs for face detection using EEG signals in Brain-Computer Interfaces (BCIs). It compares the performance of CNNs with Support Vector Machines (SVMs) for single-trial EEG signal classification.

Analysis:

This research highlights the versatility and effectiveness of CNNs in various applications, providing a basis for their use in animal image classification within SSAMS.

Title:

An Enhanced Animal Species Classification and Prediction Engine using CNN

Author:

Kanaga Priya P, Vaishnavi T, Selvakumar N, Ramesh Kalyan G, Reethika A.

Description:

The paper discusses the use of CNNs for animal species classification, employing techniques like image preprocessing, feature extraction, and transfer learning to achieve high accuracy.

Analysis:

This study demonstrates the potential of CNNs in accurately classifying animal species, supporting the feasibility of using CNNs in SSAMS for classifying stray animals.

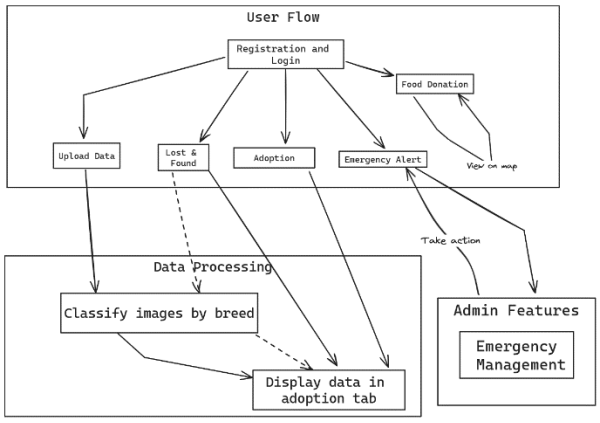
III. OBJECTIVE

The primary objective of the Smart Stray Animal Management System is to develop a user-friendly Android application that leverages Convolutional Neural Networks (CNN) to streamline the reporting, searching, and adoption of stray animals, particularly dogs. The system aims to enhance animal welfare by increasing community involvement and providing efficient management tools.

Key objectives include developing an intuitive mobile interface for easy reporting of stray animals, utilizing CNNs for accurate animal classification based on user-uploaded images, and creating a centralized database for streamlined reporting. The application also aims to enhance search and adoption processes with detailed animal profiles and efficient filtering options.

The system is designed to promote community engagement through awareness campaigns. Additionally, it supports scalability for future enhancements, including advanced machine learning algorithms and expanded functionalities. Overall, the project aims to improve stray animal welfare through a community-driven, technologically advanced solution.

IV. METHODOLOGY



System Architecture

1. User Flow:

- Users register or log in to the platform.
- They can upload animal data, view animals available for adoption, report lost pets, send emergency alerts, and check a map for food donation locations.

2. Data Processing:

- Uploaded animal images are classified by breed using a machine learning model.
- Classified data is stored and displayed in the adoption tab, helping users find and adopt stray animals.

3. Lost & Found:

- Users upload images of lost pets, and the system matches these images with existing data to help locate the lost pets based on breed classification.

4. Emergency Alert System:

- Users report emergencies by uploading photos and descriptions, which are sent to the admin.
- Admins view and manage these emergency alerts to take necessary actions.

5. Food Donation Mapping:

- Users can view a map showing locations of stray animals to identify areas for food donation, facilitated by the Google Maps API.

V. PROPOSED SYSTEM

The Smart Stray Animal Management System offers a comprehensive and user-friendly Android application designed to manage stray animals. It leverages Convolutional Neural Networks (CNN) for efficient animal data classification, facilitating the processes of reporting, searching, and adoption. Users register on the app with essential details, ensuring secure access.

The system allows users to report stray animals by uploading images and providing information such as location. This data is stored in a centralized Firebase database for real-time management. The CNN model, built using TensorFlow and Keras, processes these images to accurately classify and identify the animals based on image features.

Users can search for reported stray animals using filters like location and animal type. Detailed animal profiles, including images and descriptions, are displayed to facilitate adoptions. The app's interface, developed with Kotlin and Java, ensures ease of use for reporting, searching, and adopting animals.

The System aims to enhance animal welfare by offering a structured platform for reporting and adopting stray animals, leading to better care and increased adoption rates.

VI. RESULT

The Smart Stray Animal Management System (SSAMS) provides a user-friendly interface for managing stray animals. The application allows users to report stray animals, search for lost pets, and facilitate adoptions. Below are screenshots illustrating key features of the application.

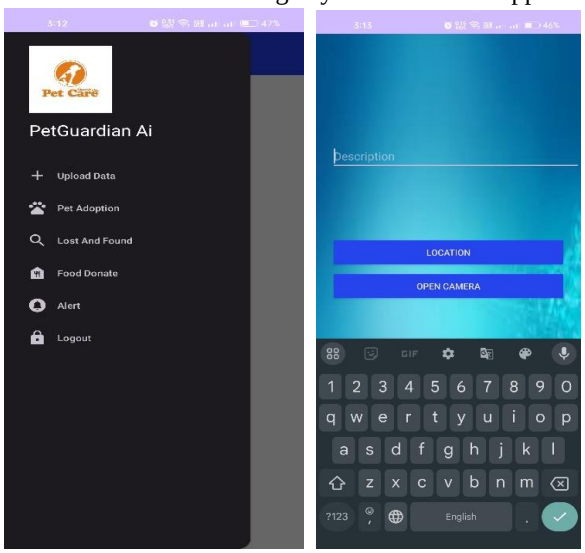


Figure 1: Home Page & Upload Data Interface

Figure 1 shows the home page and the data upload screen, which allows users to input information about stray animals they encounter. This feature is crucial for maintaining an up-to-date database of stray animals in the community.

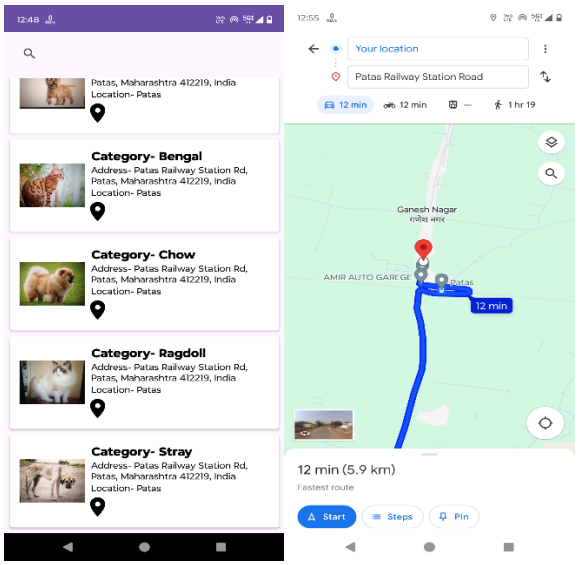


Figure 2: Adoption Tab & Location of Pet

The first part of Figure 2 shows the list of animals available for adoption, where users can view detailed profiles of each animal. The second part of Figure 2 demonstrates the Google Maps integration, which guides users from their current location to the location of a stray animal.

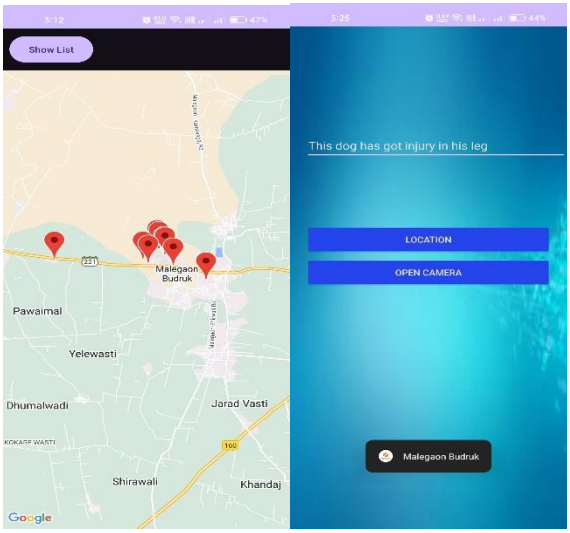


Figure 3: Food Donation Map & Emergency Alert interface

The first part of Figure 3 shows a map indicating the locations of stray animals nearby, which assists users in identifying areas where food donations can be done. The second part of Figure 3 illustrates the emergency alert interface, where users can upload an image and description of

an animal in danger, sending an alert to the admin for immediate action.

CONCLUSION

The Smart Stray Animal Management System is a comprehensive solution that utilizes an Android application powered by Convolutional Neural Networks (CNN) to streamline reporting, finding, and adopting stray animals. It emphasizes community involvement and prompt reporting, facilitating quicker adoptions and reunions with lost pets. Additionally, the app serves as a platform for education and awareness about responsible pet ownership and integrates seamlessly with local resources such as animal shelters and veterinary clinics. In essence, it represents a holistic approach to modernizing urban animal welfare practices, fostering empathy and proactive participation in improving the welfare of stray animals.

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