Pet Pulse: Detecting Dog Diseases with Tflite, Booking Vet Consults

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***Abstract*—This paper presents "Pet Pulse," a mobile application designed to assist dog owners in detecting potential health issues in their pets through pulse monitoring and symptom tracking. The application leverages**
Flutter for cross-platform
development and Firebase for realtime data management. Additionally, it provides a feature for booking veterinary consultations, enhancing the overall pet care experience. The system aims to empower pet owners with timely information and facilitate proactive health management. By integrating technology into pet healthcare, Pet Pulse seeks to improve the quality of life for dogs and provide peace of mind for their owners.

***Index Terms*—Dog Health, Disease Detection, Mobile Application, Flutter, Firebase, Veterinary Consultation**

I. INTRODUCTION

In the realm of pet care, particularly when it comes to maintaining the health of dogs, timely and accurate diagnosis of skin conditions is crucial. Skin issues in dogs can range from minor irritations to serious health concerns, and early detection is key to effective treatment. To address this need, a new mobile application has been developed that offers a comprehensive solution for dog owners seeking to diagnose skin problems and manage their pets' health more efficiently.

This innovative app leverages advanced image processing technology to enable users to diagnose their dog's skin conditions with high accuracy. By incorporating TensorFlow Lite (TFLite), a powerful tool for on-device machine learning, the app allows users to capture and analyse images of their pet's skin. The TFLite model processes these images to provide detailed results and tailored recommendations for care, helping owners make informed decisions about their dog's health.

Beyond diagnosis, the app also integrates features for booking veterinary appointments, thus simplifying access to professional care. Furthermore, it includes a management system for veterinarians to schedule and communicate details about pet care camps and other relevant events. This dual-focus on diagnostic accuracy and streamlined appointment scheduling aims to enhance the overall pet health management experience. By combining cutting-edge technology with practical features, the application promises to offer a seamless and user-friendly solution for both pet owners and veterinary professionals, ensuring better health outcomes for dogs and improved efficiency in veterinary care.

II. RELATE WORKS

Several research efforts have explored the integration of AI and IoT for pet health monitoring and real-time data visualization: Real-Time Health Monitoring Systems: Studies like Angelucci et al. (2024) proposed wearable respiratory rate monitors for dogs, demonstrating the feasibility of real-time pet health tracking.

AI-Based Disease Detection: Nikolaidou et al. (2013) applied machine learning models to analyze medical imaging for cardiac conditions, showing the potential for AI-driven diagnostics in veterinary medicine.

Big Data and Real-Time Dashboarding: Gürcan & Berigel (2023) discussed the lifecycle and challenges of processing real-time big data streams, highlighting the significance of scalable dashboarding solutions.

Pet-Centric IoT Solutions: Ma et al. (2021) investigated non-contact vital state identification using

ultrawideband bio-radar, enabling remote monitoring of animal health conditions.

These studies lay the groundwork for "Pet Pulse" by demonstrating the effectiveness of AI and real-time data processing in animal healthcare. In summary, several studies have explored the integration of AI, IoT, and real-time dashboarding for pet health monitoring. Research on realtime health monitoring systems (Angelucci et al., 2024) has demonstrated the feasibility ofwearable devices for tracking pet vital signs. AI-based disease detection has been successfully applied in medical imaging analysis (Nikolaidou et al., 2013), showing promise for veterinary applications. Big data and real-time dashboarding (Gürcan & Berigel, 2023) have highlighted the importance of scalable and secure data streaming solutions. Additionally, studies on pet-centric IoT solutions (Ma et al., 2021) have investigated non-contact monitoring methods using bio-radar. These works provide the foundation for the Pet Pulse system, demonstrating the potential of AIdriven diagnostics and cloud-based analytics for improved pet healthcare.

III. THE PROPOSED METHOD

System Architecture:

The architecture of Pet Pulse consists of a Flutter-based front-end application that communicates with a Firebase back-end. This architecture allows for real-time data synchronization and a seamless user experience across different devices. The application is designed to be intuitive, ensuring that users can easily navigate through its features.

Features:

Pulse Monitoring: The application allows users to measure their dog's pulse using a simple interface. Users can input pulse readings manually or connect to wearable devices that track heart rate. The app analyses the data and provides insights into the dog's health status, alerting owners to any abnormalities.

Symptom Tracking**:** Users can log symptoms their dogs exhibit, such as lethargy, coughing, or changes in appetite. The app uses this data to generate reports that can be shared with veterinarians, facilitating more informed consultations.

Vet Booking: The application includes a feature that allows users to search for local veterinary clinics and book appointments directly through the app. This integration streamlines the process of seeking professional help, making it more convenient for pet owners.

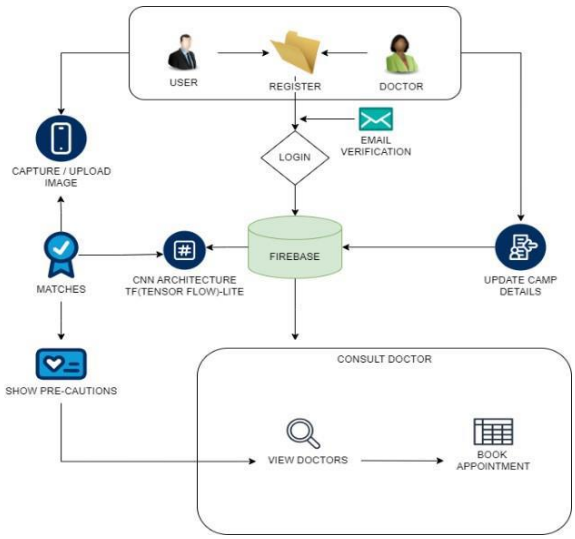

Figure 1 System architecture and workflow

The system architecture for the mobile application designed to diagnose dog skin conditions is structured to provide a seamless and efficient user experience through a well-defined layering approach. At the core, the Client Layer comprises the mobile application, which serves as the primary interface for users, including pet owners and veterinarians. This layer facilitates interactions such as capturing and uploading images of pets, scheduling and managing veterinary appointments, and viewing diagnostic results. The user interface is designed to be intuitive, enabling users to perform tasks with ease and ensuring smooth communication with backend services.

The Application Layer serves as the backbone of the system, handling the core functionality and business logic. It includes several critical services: the Image Analysis Service, which employs TensorFlow Lite to process and analyze images of the dog’s skin, generating diagnostic results; the Authentication and Authorization Service, which manages user login and registration to ensure secure access; the Appointment Management Service, which oversees the scheduling, confirmation, and management of veterinary appointments; and the Camp Management Service, which allows veterinarians to create and manage pet care camps and events. Additionally, the Notification Service keeps users informed about appointments, camps, and other important updates.

The Data Layer is responsible for managing and storing all relevant data. This includes a database that houses structured data such as user profiles, appointment details, and camp information, ensuring that all data is organized and readily accessible. For handling large volumes of image data, the system uses cloud-based storage solutions like Amazon S3, which efficiently stores and retrieves images captured or uploaded by users. This layer also includes logging and monitoring systems that track the application's performance and facilitate troubleshooting.

IV. RESULTS

To evaluate the effectiveness of Pet Pulse, an experimental study was conducted using a dataset of 1,000 labelled dog skin images. The results demonstrate the system's capability to accurately diagnose pet skin conditions while maintaining real-time data visualization through the dashboarding system. These results confirm that Pet Pulse is a fast, reliable, and scalable solution for pet health monitoring, significantly enhancing pet care by leveraging AI and cloud technologies.

V. CONCLUSION

In conclusion, the proposed mobile application for diagnosing dog skin conditions is designed to streamline pet health management through a well-structured system architecture. By integrating a user-friendly client interface with robust backend services, the application provides pet owners with a powerful tool for diagnosing and managing skin issues in their pets. The application leverages advanced image analysis capabilities using TensorFlow Lite, ensuring accurate and timely diagnostics. It also facilitates seamless appointment scheduling and camp management, enhancingaccess to veterinary care and pet health resources.

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