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Pet Amigos: AI Based Pet Health Monitoring and Management System

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***Abstract*—In the modern era of technology-driven solutions, effective pet care management has become essential for ensuring the health and well-being of pets. Pet Amigos: Pet Care Management System is an intelligent web-based platform designed to provide a comprehensive and proactive approach to pet healthcare. The system is developed using the Django web framework and integrates the YOLOv11 deep learning model to enable real-time disease prediction through image analysis. The platform offers various features such as personalized pet health dashboards, automated vaccination reminders, diet management, and continuous health tracking. The AI-powered disease prediction module analyses images of pets to detect potential skin and eye diseases, allowing early diagnosis and timely intervention. Additionally, the system includes a community platform where pet owners can share experiences, seek advice, and interact with experts. By centralizing pet care activities and incorporating artificial intelligence, the proposed system overcomes the limitations of traditional methods, which are often manual and reactive. Overall, Pet Amigos provides a user-friendly, efficient, and intelligent solution that promotes responsible pet ownership and improves the quality of pet healthcare through early detection, automation, and community support.**

***Keywords*—Artificial Intelligence; Pet Care Management System; YOLOv11; Disease Prediction; Django Web Framework; Health Monitoring; Vaccination Reminder; Image Processing; Deep Learning; Smart Pet Healthcare.**

"The implementation and evaluation results of the proposed system have been submitted to the institution for academic purposes. This paper primarily focuses on the system design, architecture, and conceptual framework."

I. INTRODUCTION

As technology continues to transform various aspects of daily life, the need for efficient and intelligent pet care management systems has become increasingly important. Traditional methods of pet care often rely on reactive veterinary visits, manual record-keeping, and fragmented sources of information. These approaches make it difficult for pet owners to monitor their pets' health effectively, leading to delayed diagnosis, missed vaccinations, and lack of personalized care.

To address these challenges, Pet Amigos is introduced as a next-generation, AI-integrated pet care management system that provides a proactive and centralized solution for pet health monitoring. The platform leverages advanced technologies such as deep learning and web-based frameworks to deliver real-time insights and personalized recommendations.

By utilizing the YOLOv11 deep learning model, the system enables image-based disease prediction, allowing early detection of common pet health issues. It dynamically analyses uploaded images and provides accurate predictions along with relevant guidance. The system also evaluates pet health data continuously, offering features such as vaccination reminders, diet management, and health tracking to improve overall pet well-being.

Developed using the Django framework along with modern web technologies, Pet Amigos ensures a secure, scalable, and user-friendly interface. In addition to individual pet owners, the platform benefits veterinarians and pet care professionals by providing structured and accessible health data. The inclusion of features such as a personalized dashboard and community interaction module makes it a comprehensive solution.

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As pet care practices continue to evolve in the digital era, Pet Amigos equips users with intelligent tools to ensure better decision-making, proactive healthcare, and enhanced quality of life for pets.

II. LITERATURE SURVEY

The application of Artificial Intelligence (AI), Machine Learning (ML), Internet of Things (IoT), and image processing in pet healthcare has gained significant attention in recent years. These technologies aim to overcome the limitations of traditional veterinary practices by enabling early disease detection, continuous monitoring, and intelligent decision support. The following studies highlight key developments in this domain.

2.1 Patel et al. (2019) proposed an Animal Health Prediction System that utilizes machine learning algorithms such as Support Vector Machine (SVM) and Random Forest to predict animal diseases based on input parameters like symptoms, body condition, temperature, and behavioral patterns. The study emphasizes that traditional veterinary diagnosis heavily depends on manual observation, which can delay treatment, especially in large-scale or rural environments.

2.2 Smith et al. (2020) introduced a Veterinary Diagnosis Support System that combines image processing techniques with Artificial Intelligence to detect diseases from animal medical images such as skin images, eye images, and X-rays. The system processes images through stages like enhancement, segmentation, and feature extraction before applying AI-based classification.

2.3 AlZubi (2023) explored the application of AI techniques in predicting and diagnosing animal diseases using machine learning and deep learning models. The study emphasizes that AI can automate complex diagnostic processes, particularly in analysing medical images and health data. It improves disease management by reducing human error and enabling early detection.

2.4 Das et al. (2024) presented a comprehensive review of machine learning applications in animal healthcare, focusing on disease detection and health monitoring. The study highlights that ML models can process large datasets and provide real-time predictions, improving early diagnosis and reducing manual effort.

III. PROPOSED SYSTEM

The proposed system, Pet Amigos, redefines conventional pet care management by introducing a dynamic AI-powered platform for proactive health monitoring and disease detection. The system integrates advanced technologies such as Artificial Intelligence, deep learning, and image processing to analyse pet health conditions in real time and provide comprehensive assistance to pet owners.

By utilizing the YOLOv11 deep learning model, the system enables image-based disease prediction, allowing users to upload images of their pets for analysis. The model processes these images to detect potential skin and eye diseases with high accuracy, facilitating early diagnosis and timely intervention. In addition, the system considers various pet-specific parameters such as age, breed, and health history to provide personalized recommendations.

The platform is developed using the Django web framework, ensuring a secure, scalable, and efficient backend, while standard web technologies such as HTML, CSS, and JavaScript provide a user-friendly interface. The database is managed using reliable systems like PostgreSQL or SQLite, enabling efficient storage and retrieval of pet health records.

The YOLOv11 model used for disease detection was trained and evaluated using the cloud-based platform Google Colab, which provides GPU acceleration for deep learning tasks. A custom dataset consisting of pet skin and eye disease images was used for training the model. The dataset was pre-processed and augmented to improve model performance and generalization. The training process involved multiple epochs, during which the model learned to accurately identify disease patterns from input images. The trained model was then integrated into the Django-based web application for real-time disease prediction and analysis.

Users can track their pet's health status, manage vaccination schedules, receive automated alerts, and monitor progress over time through personalized dashboards. The system also includes a community module where users can interact, share knowledge, and seek expert advice.

This integrated ecosystem offers a structured and intelligent solution for pet care, helping users ensure better health management, early disease detection, and improved quality of life for their pets.

IV. PROBLEM STATEMENT

Pet care management often presents significant challenges for pet owners, leading to inadequate health monitoring and delayed medical attention. Traditional approaches—such as occasional veterinary visits, manual record-keeping, and reliance on general information sources—fail to provide continuous and proactive care. These methods do not effectively capture real-time health conditions and may result in missed vaccinations, improper diet management, and late detection of diseases.

Moreover, access to expert veterinary guidance is sometimes limited by availability, cost, and geographical constraints. Pet owners often struggle to make informed decisions due to the lack of reliable, personalized, and easily accessible information regarding their pet's health and well-being. Many existing systems lack integration of advanced technologies such as Artificial Intelligence and real-time analytics, resulting in inefficient and fragmented services.

To address these limitations, Pet Amigos provides an AI-powered, comprehensive platform that enables early disease detection, continuous health monitoring, and personalized recommendations. Its intelligent features, including image-based diagnosis and automated alerts, offer a scalable and effective solution for modern pet care management, ensuring improved health outcomes and better quality of life for pets.

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V. SYSTEM ARCHITECTURE

The system architecture diagram of Pet Amigos illustrates the integration of user inputs, AI processing, and data management in a unified platform. The process begins with inputs such as pet image upload and health data entry, which are pre-processed and analysed using the YOLOv11 disease detection module. The analysed data is used to generate outputs including disease diagnosis alerts, vaccination reminders, diet and health recommendations, and community support features. The system also provides a personalized pet dashboard and automated reports with alerts for continuous monitoring. All user and medical information is securely stored in dedicated databases, ensuring reliable data access and management. This architecture demonstrates how artificial intelligence, web technology, and database systems are integrated to provide an efficient, scalable, and user-friendly pet care management solution.

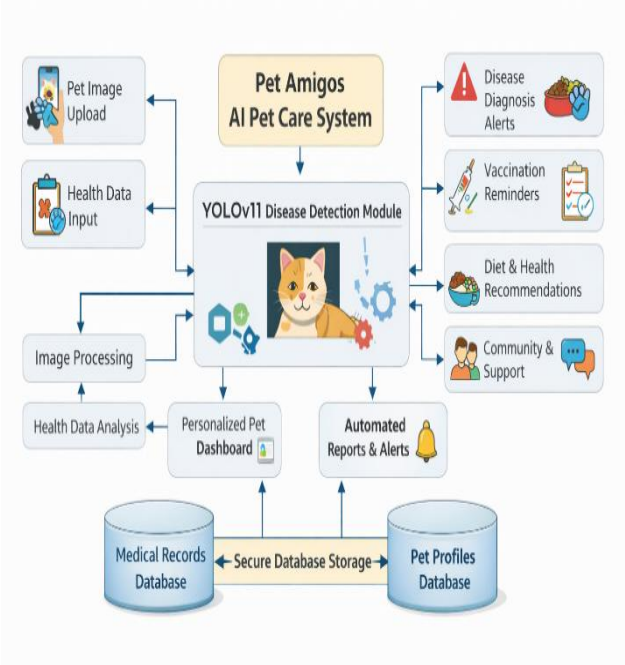

Fig-1: System Architecture Diagram

VI. SYSTEM FLOWCHART

The system flowchart represents the overall workflow of the Pet Amigos platform, illustrating how data flows through different stages and how decisions guide system operations. The process begins with user authentication, where the user either registers or logs in to access the system. After successful login, the user is directed to the dashboard, which serves as the central interface for all functionalities. From the dashboard, the user selects actions such as managing pet profiles, performing disease prediction, tracking vaccination, accessing nutrition guidance, locating nearby clinics, or participating in the community. Each process is interconnected and controlled through decision nodes, ensuring smooth navigation and proper data handling. The system also allows users to log out, marking the end of the workflow. This flowchart highlights the structured interaction between user inputs and system responses, ensuring efficient and user-friendly operation of the platform.

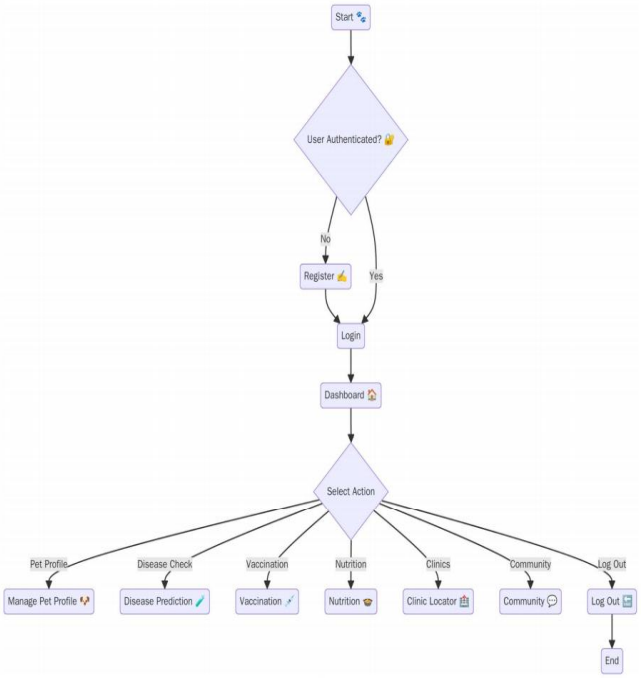

Fig-2: System Flowchart

VII. SOFTWARE REQUIREMENTS

- Operating System: Windows, Linux, or MacOS
- Programming Language: Python 3.0
- Web Framework: Django
- Deep Learning Framework**:** PyTorch (for YOLOv11)
- Database Management System: PostgreSQL, SQLite
- Front-end Technologies: HTML5, CSS3, JavaScript
- Libraries/Packages:
  - Django REST Framework
  - OpenCV
  - Pillow
  - NumPy, Pandas
  - YOLOv11
- Development Environment: Visual Studio Code.

VIII. HARDWARE REQUIREMENTS

- User Device: Minimum 2GB RAM, Mic and Camera.
- Processor: Intel Core i5 (or equivalent) or higher
- RAM: Minimum 8 GB (16 GB recommended for AI model training)
- Storage: 256 GB SSD or higher

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- Graphics Processing Unit (GPU): NVIDIA GPU with CUDA support
- Internet Connection: Stable broadband connection

IX. SYSTEM WORKFLOW

Step 1: User Authentication and Profile Setup

- The user securely registers or logs into the system
- Creates and manages pet profiles by entering details such as breed, age, weight, and medical history

Step 2: Data Input and Initialization

- The user provides health-related data or uploads images of the pet (skin/eye conditions)
- The system prepares the input data for further processing

Step 3: Image Processing and Data Handling

- Uploaded images are preprocessed using image processing techniques
- Health data is organized and stored for analysis.

Step 4: AI-Based Disease Detection

- The YOLO-based deep learning model analyses the images
- The system detects potential diseases and classifies them with accuracy

Step 5: Health Analysis and Recommendation

- The system evaluates detected conditions along with pet data
- Provides recommendations such as treatment suggestions, diet plans, and care instructions

Step 6: Alerts and Notifications

- Generates automated alerts for vaccination, medication, and abnormal health conditions.
- Sends notifications to ensure timely action by the user

Step 7: Dashboard & Report Generation

- Displays results in a personalized dashboard
- Maintain health records and generates reports for tracking progress over time

Step 8: Community Interaction and Support

- Users can interact with other pet owners and experts
- Share experiences, seek advice, and access additional support

Step 9: Session Completion

- User reviews the results and system feedback
- Data is securely stored, and the user can continue monitoring or log out

X. DATA FLOW DIAGRAM

A DFD is a network that describes the flow of data throughout a system, data stores, and the process that change or transform dataflows. Dataflow diagram is also known as data flow graphs are commonly used during the problem analysis stage. They are useful in understanding a system and can be effectively used for partitioning during analysis. The DFD network is a formal, logical abstract of a system that may have many possible physical configurations. This reason is set of symbols that do not imply a physical form are used to represent data source, data flows, data transformations and data storage.

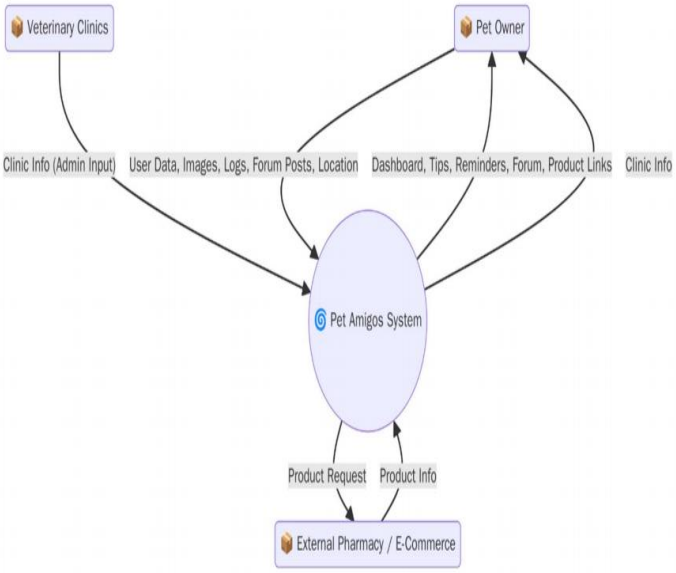

Fig-3: Level 0 Data Flow Diagram

Fig-4: Level 1 Data Flow Diagram

XI. USE CASE DIAGRAM

A Use Case Diagram depicts the interactions between users (actors) and the Pet Amigos system, outlining the different functionalities the system provides. It visually represents the system's boundaries and the major functions it offers to its users. Additional functionalities include managing vaccination

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records, receiving reminders, accessing nutrition guidance, participating in the community forum, and locating nearby veterinary clinics. The system also interacts with the YOLOv11 for disease detection and may connect with external services such as veterinary clinics or pharmacy platforms. This diagram clearly illustrates how different system features are accessed by the user and how the system supports efficient pet health management through various interconnected use cases.

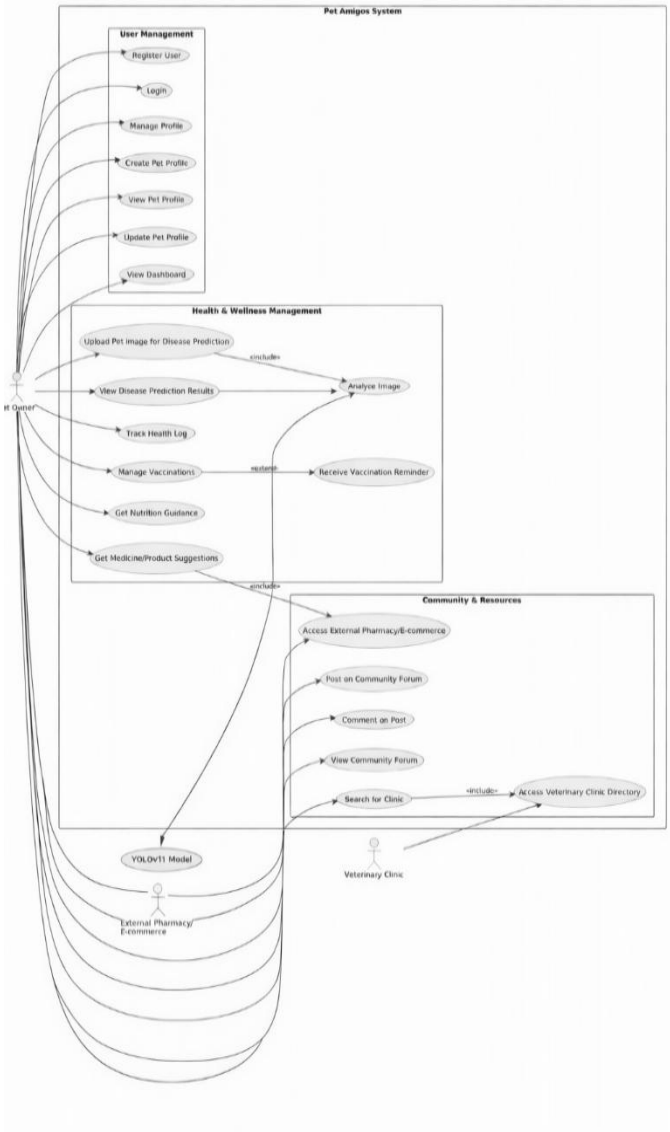

Fig-5: Use Case Diagram

XII. ACTIVITY DIAGRAM

The activity diagram for the disease prediction process in the Pet Amigos system represents the sequential flow of user actions and system responses in a simplified manner. The process begins when the user selects a pet and uploads an image, which is then validated for format and quality. If the image is invalid, the system prompts the user to re-upload; otherwise, it is pre-processed and analysed using the YOLOv11 model. The model returns a prediction with a confidence score, and based on this, the system either displays disease details such as symptoms, care instructions, and recommendations or provides general wellness tips if no disease is detected. In both cases, the user is directed back to the dashboard for further actions. This activity diagram highlights the integration of user input, AI-based decision making, and dynamic system responses, ensuring an efficient, user-friendly workflow for disease detection and pet health management.

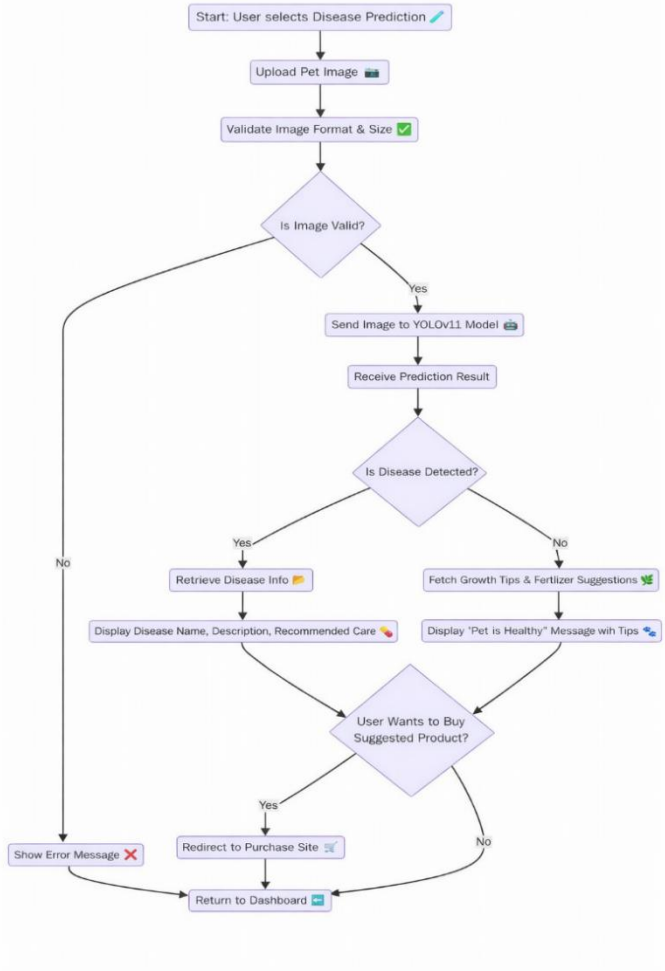

Fig-6: Activity Diagram

XIII. SEQUENCE DIAGRAM

The sequence diagram of the Pet Amigos system illustrates the interaction between different components involved in the disease prediction process and the order in which they operate. The process begins when the user uploads a pet image, which is then sent to the image pre-processing module for cleaning and preparation. The processed image is forwarded to the feature extraction stage, where important visual features are identified. These features are then passed to the YOLOv11 classification module, which analyses the image and determines whether the pet is diseased or healthy. Based on the classification result, the system provides appropriate outputs such as remedies or health suggestions to the user. This sequence diagram clearly represents the step-by-step interaction between user input, system processing, and AI-based decision making, ensuring an efficient and structured workflow for disease detection.

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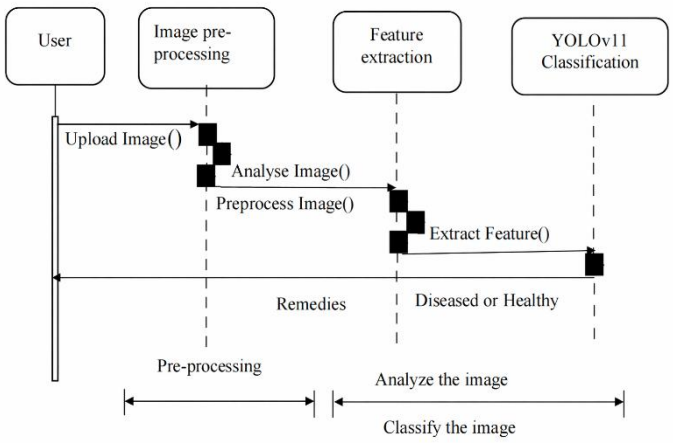

Fig-6: Sequence Diagram

XIV. CONCLUSION

Pet Amigos represents an effective integration of advanced Artificial Intelligence technologies with modern pet care management practices, designed to enhance the health and well-being of pets through intelligent and proactive solutions. By utilizing deep learning models such as YOLO for image-based disease detection and providing real-time insights, the system delivers a comprehensive and personalized pet care experience. The platform ensures efficient health monitoring through features such as automated vaccination reminders, diet recommendations, and continuous tracking of pet health parameters. Its ability to detect diseases at an early stage and provide actionable suggestions significantly improves the quality of care and reduces the risks associated with delayed treatment.

With its scalable architecture and user-friendly interface, Pet Amigos successfully replicates a smart healthcare environment for pets, enabling both pet owners and professionals to make informed decisions. The integration of AI, image processing, and web technologies transforms the system into more than just a management tool—it becomes a reliable assistant for responsible pet ownership.

As technology continues to evolve, Pet Amigos stands as a promising solution in the field of smart pet healthcare, offering improved efficiency, accessibility, and accuracy. It ultimately contributes to better pet health outcomes and strengthens the bond between pets and their owners through intelligent and automated care.

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