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GROUP ID TAF-2024-25J-017

AI-DRIVEN SOLUTIONS FOR COMPREHENSIVE CANINE HEALTHCARE

OUR TEAM

Presentations are tools that can be used as lectures, speeches, reports, and more.
It is mostly presented like before can be used as lectures, speeches, reports.

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INTRODUCTION

- The growing population of pet owners emphasizes the need for accessible, efficient, and cost-effective canine healthcare.
- Traditional veterinary services face challenges like limited availability, high costs, and time constraints.
- Introduction to an AI-based system aimed at revolutionizing canine healthcare by offering virtual consultations, nutrition management, exercise planning, and skin disease detection.

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RESEARCH QUESTION

How can we enhance the accessibility, personalization, and efficiency of veterinary care for canines?

Challenges:

- Limited availability of veterinary services.
- High costs associated with traditional veterinary care.
- Time-consuming processes for pet owners.

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MAIN OBJECTIVE

- To develop an AI-driven comprehensive healthcare system for canines that enhances accessibility, personalization, and efficiency in veterinary care.

SUB OBJECTIVES

- Develop a system for nutrition-related disease detection and management.
- Create a personalized nutritional advisor and activity planner.
- Develop a virtual vet assistant for remote consultations.
- Design an AI-based system for early detection of canine skin diseases.

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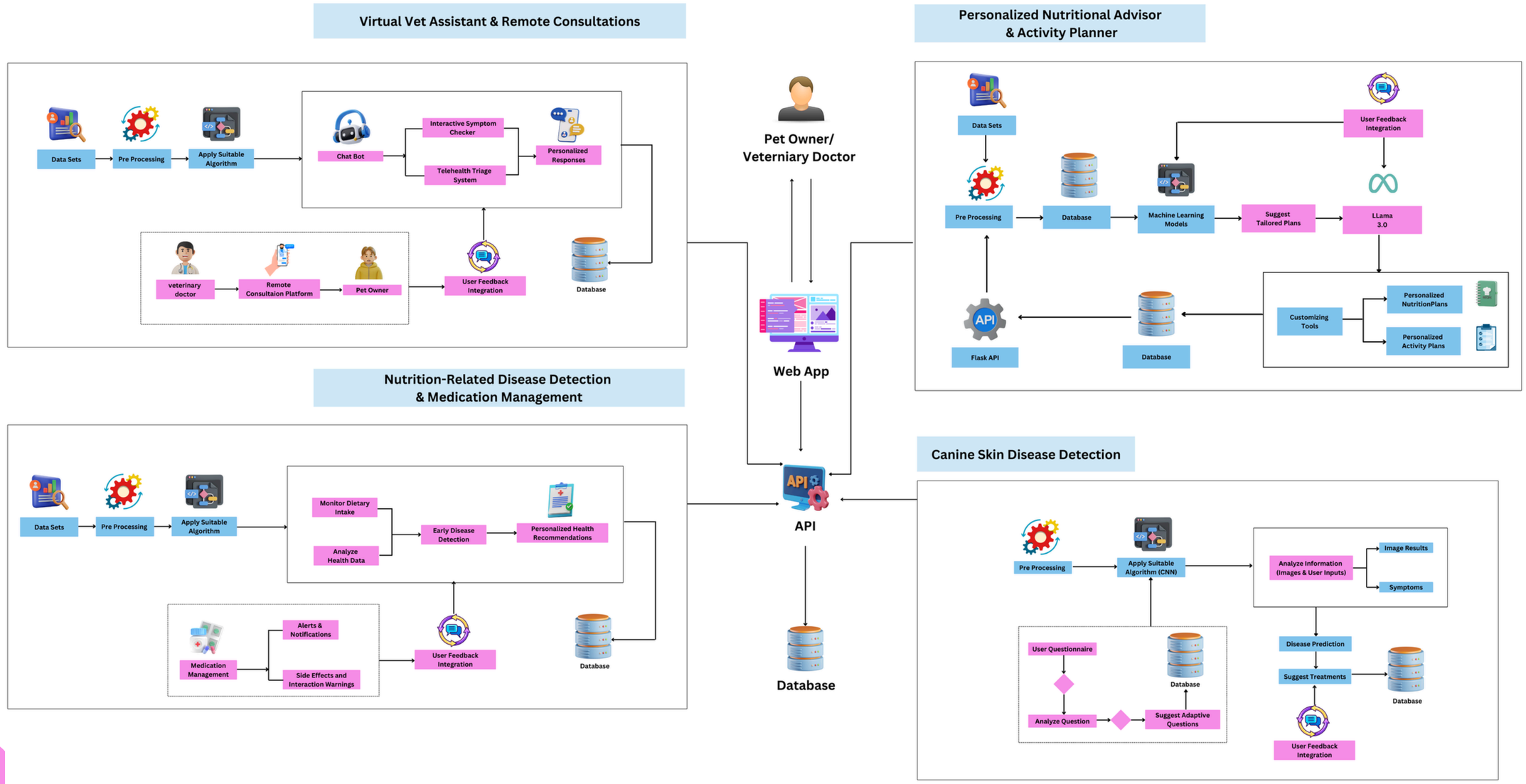
SYSTEM DIAGRAM



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COMPONENT 1

NUTRITION-RELATED DISEASE IDENTIFICATION & MEDICATION MANAGEMENT

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INTRODUCTION

This component is designed to identify nutrition-related diseases and manage medications for dogs effectively.This feature is integrated into a broader AI-powered system that detects and manages nutrition-related diseases, enabling pet owners to receive early warnings about potential health issues. This combined approach empowers dog owners to make informed decisions, ensuring better health outcomes for their pets.

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RESEARCH PROBLEM

How can a system that integrates real-time dietary monitoring, advanced data analytics, and comprehensive medication management effectively identify nutrition-related diseases and provide personalized treatment recommendations?

How can we overcome this?

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INTRODUCTION & BACKGROUND OF THE STUDY

- Nutrition-related diseases are common in dogs, significantly affecting their health and quality of life.
- Subtle signs of nutritional imbalances often go unnoticed by pet owners, leading to delayed treatment.
- Advances in AI and data analysis enable earlier and more accurate detection of nutrition-related diseases.
- There's a demand for a user-friendly tool that helps dog owners detect and manage nutritional health issues early on.
- Traditional veterinary exams may miss early-stage nutritional issues.

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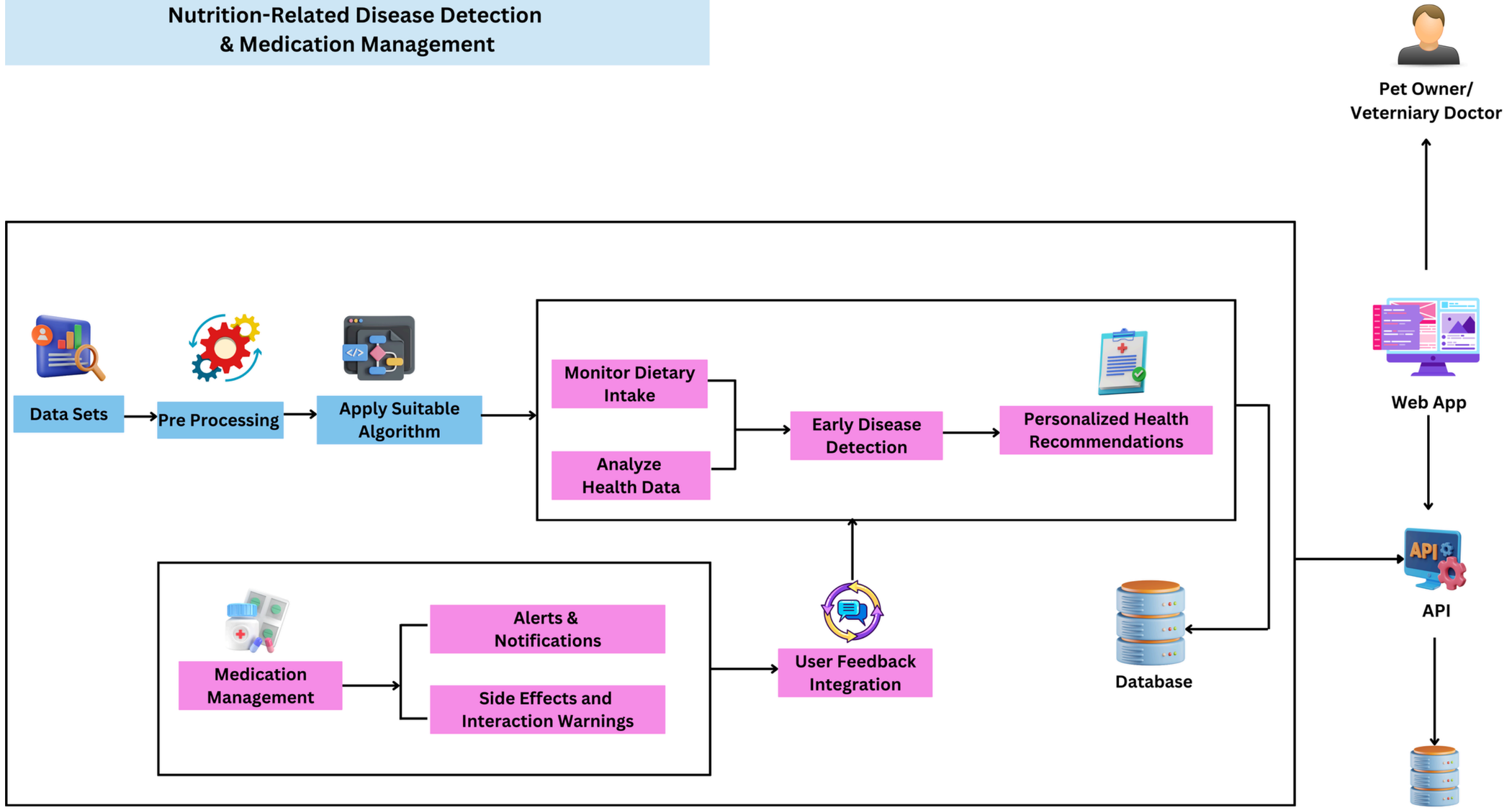
SPECIFIC OBJECTIVES

- **Examine Health Data:** Analyze health data to uncover links between diet and health conditions, and detect early signs of nutrition-related diseases.

- **Manage Medication:** Organize and ensure adherence to medication schedules, while providing alerts for potential side effects and drug interactions.

COMPONENT DIAGRAM

Nutrition-Related Disease Detection & Medication Management



USED TECHNOLOGIES

TECHNOLOGIES

- Pandas- For data loading, manipulation, and preprocessing.
- Numpy- For numerical operations, data reshaping, and repetition of samples.
- Seaborn and Matplotlib- For visualization (confusion matrix heatmap).
- Scikit-learn-For utilities, model training, and evaluation (e.g., RandomForestClassifier, VotingClassifier, classification_report, and confusion_matrix).
- XGBoos-Gradient boosting library (XGBClassifier) for creating powerful predictive models.
- Pickle-For saving and loading trained models

ALGORITHMS

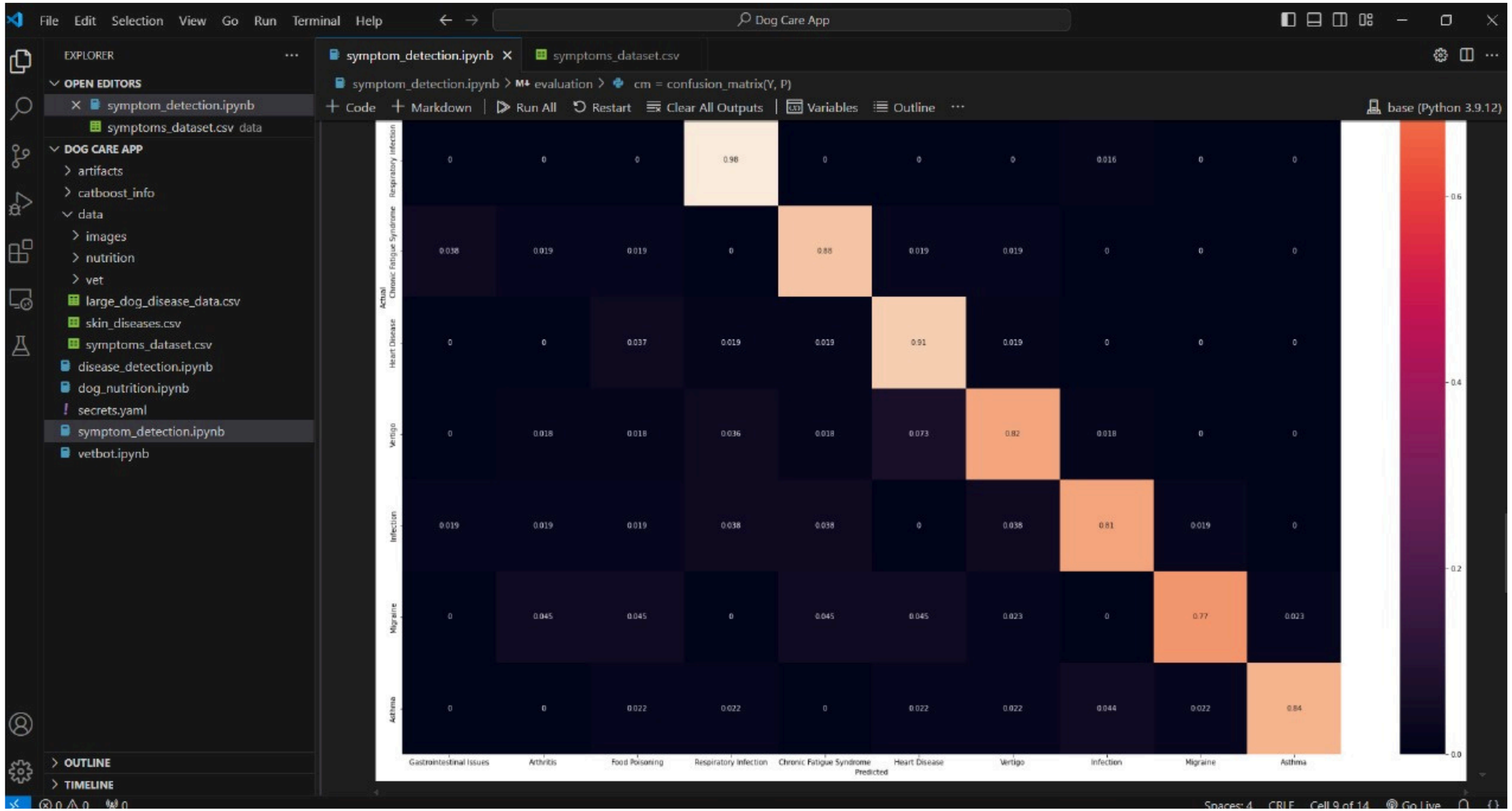
- Random Forest Classifier-An ensemble learning method based on decision trees, combining multiple trees for better performance.

- XGBoost (Extreme Gradient Boosting)-A high performance, scalable machine-learning algorithm based on gradient boosting decision trees.

- Voting Classifier (Ensemble Learning) Combines predictions from multiple classifiers (RandomForest and XGBoost) for improved accuracy using a majority voting approach

EVIDENCE OF COMPLETION

confusion matrix



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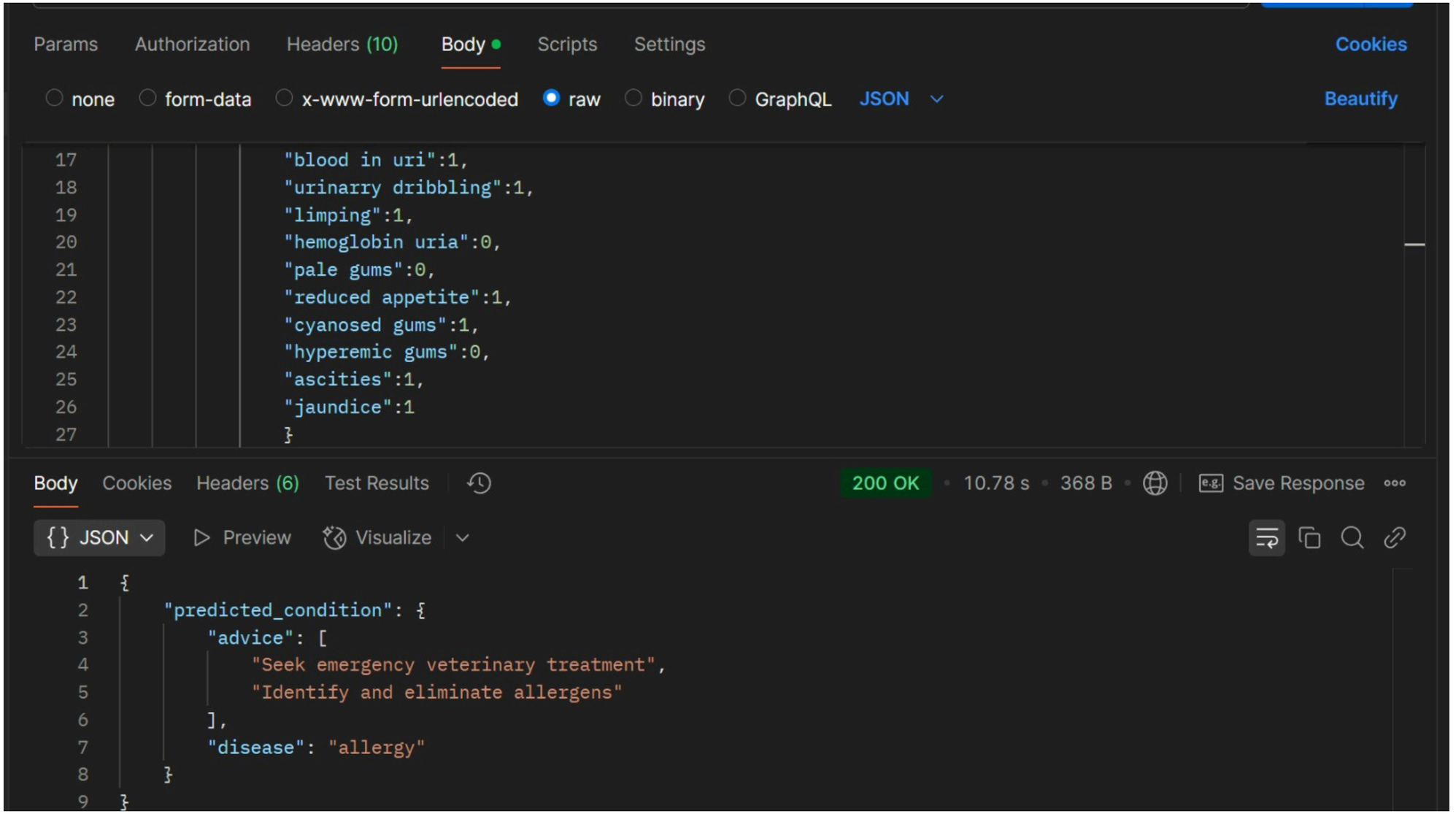

Params Authorization Headers (10) Body Scripts Settings Cookies

none form-data x-www-form-urlencoded raw binary GraphQL JSON Beautify

```
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Body Cookies Headers (6) Test Results 200 OK 10.78 s 368 B Save Response

{} JSON Preview Visualize

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3          "advice": [
4              "Seek emergency veterinary treatment",
5              "Identify and eliminate allergens"
6          ],
7          "disease": "allergy"
8      }
9  }
```

EVIDENCE OF COMPLETION

User Interfaces

Pet Health

Welcome, john!

- Dashboard
- Disease Detection
- Nutrition Planner
- Activity Planner
- Skin Disease Tool
- Chatbot
- Profile

Logout

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From recipe development to at-home preparation, we're providing you with the trusted resources you need to create quality, balanced meals for your dog or cat.

GET STARTED | CHECK HEALTH

Highly trusted by 20,000+ veterinarians

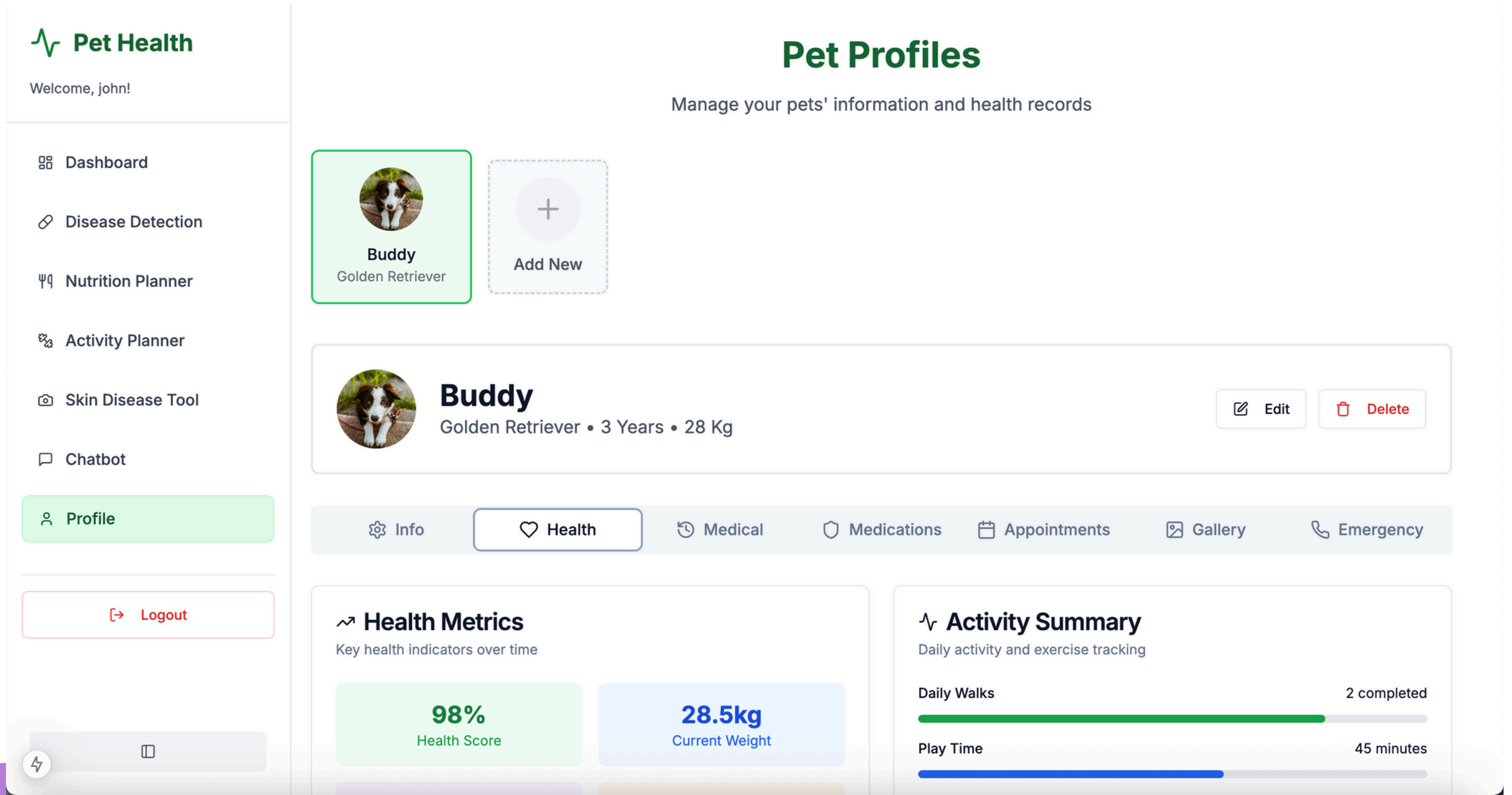
Build a balanced recipe

A powerful recipe generator for veterinarians and dog & cat lovers to find the perfect proportions of meat, veggies and more — tailored to your companion's needs.

System Settings

EVIDENCE OF COMPLETION

User Interfaces



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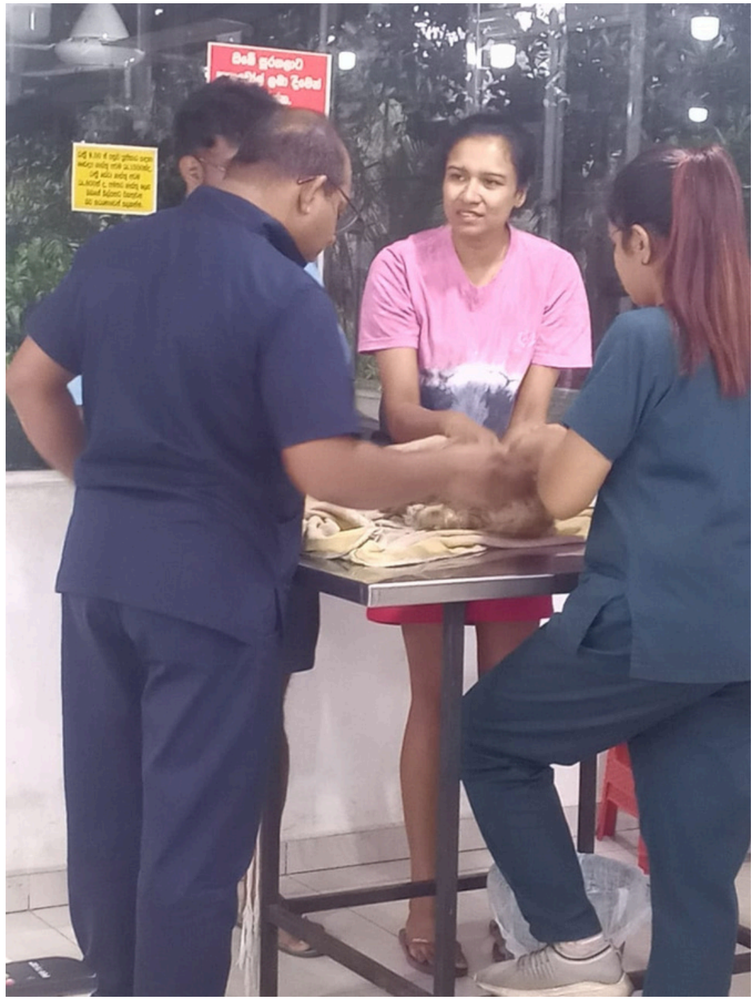

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COMPONENT 2

PERSONALIZED MEAL PLANS & ACTIVITY MANAGEMENT

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INTRODUCTION

The Personalized Nutritional Advisor & Activity Planner is designed to enhance canine health through tailored solutions. By leveraging real-time health data, this component customizes meal and activity plans to meet each canine's unique needs. It integrates allergy management, continuous feedback from veterinarians and users, and dynamic adjustments to provide comprehensive, optimized support for overall well-being.

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BACKGROUND OF THE COMPONENT

- Customizes meal and activity plans for canines based on real-time health data and individual needs.
- Integrates systems to identify and manage food allergies, ensuring safe nutrition.
- Utilizes feedback from veterinarians and users to refine and enhance recommendations.
- Aims to provide dynamic and effective support for canine health and well-being.

RESEARCH GAP

SYSTEM	Personalized plans Recommendations	Breed Specific Analysis	Multimodal Input (Nutritional Data, Health Records, etc.)	Continuous Feedback Incorporation
Balance.it	✗	✗	✗	✗
Rover	✓	✓	✗	✗
[3]	✗	✗	✗	✗
[4]	✓	✗	✗	✗
Proposed System	✓	✓	✓	✓

WOOF DOC

RESEARCH PROBLEM

How can a real-time Personalized Nutritional Advisor and Activity Planner be effectively developed to provide tailored meal plans and exercise routines for canines, while integrating real-time health monitoring, allergy management, and adaptive feedback to optimize overall well-being?

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RESEARCH QUESTIONS

- How can AI be used to create personalized meal plans and exercise routines for dogs?
- What mechanisms can be implemented to manage allergies and dietary restrictions?
- How can real-time health monitoring improve the effectiveness of these plans?
- What adaptive feedback methods can be integrated to continuously improve the dog’s health?

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MAIN OBJECTIVE

Develop a Personalized Nutritional Advisor & Activity Planner for canines that customizes meal plans and exercise routines, integrating real-time health data, allergy management, and continuous feedback for optimal well-being.

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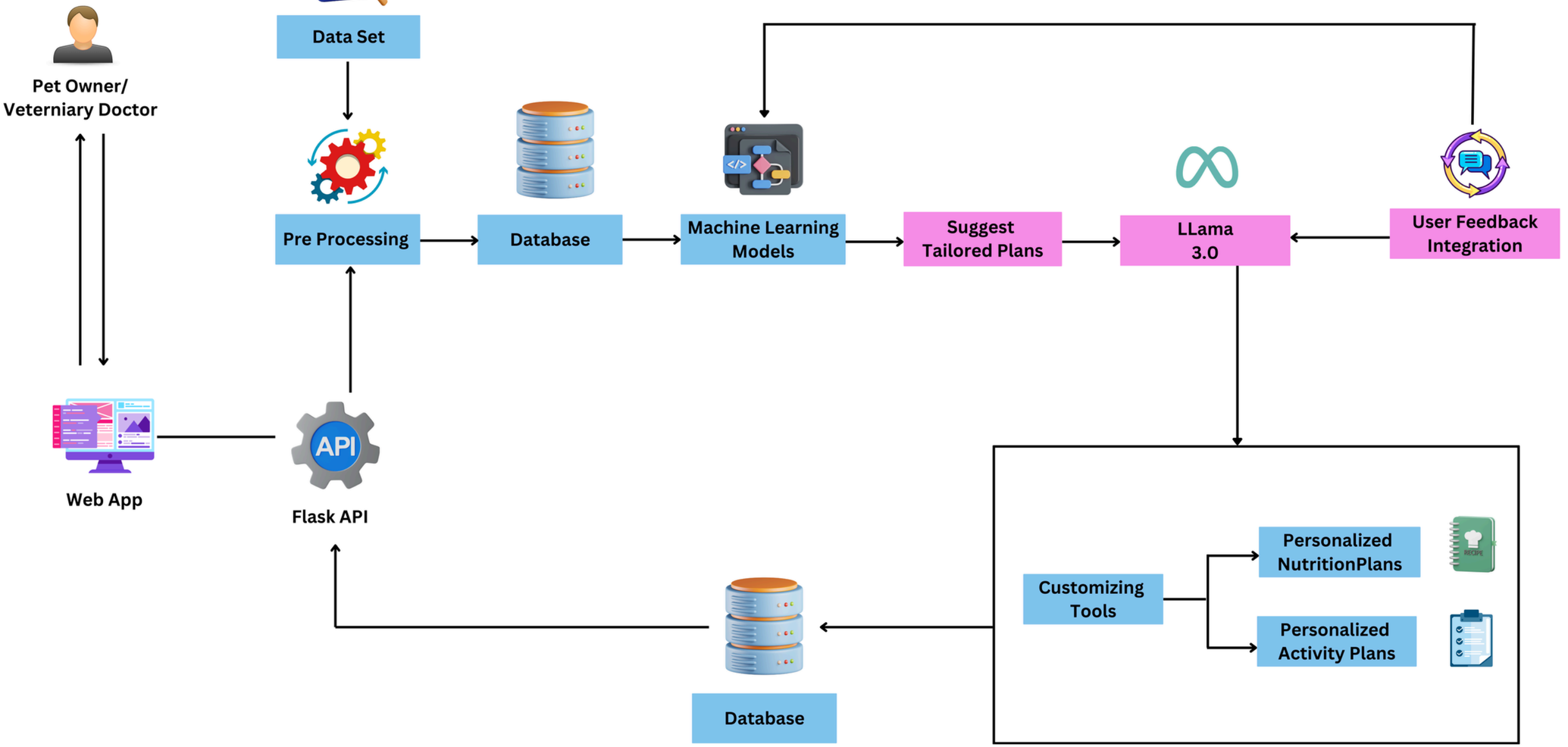
SUB OBJECTIVES

- **Customize Meal and Activity Plans:** Tailor diets and exercise routines for canines based on health data and individual needs.
- **Manage Allergies:** Identify and adjust for food allergies in meal plans.
- **Develop Interactive Tools:** Create tools for users to adjust meal plans and exercises.
- **Incorporate Feedback:** Use feedback from veterinarians and users to enhance recommendations.

COMPONENT DIAGRAM

Personalized Nutritional Advisor & Activity Planner



PLANNED TECHNOLOGIES

TECHNOLOGIES

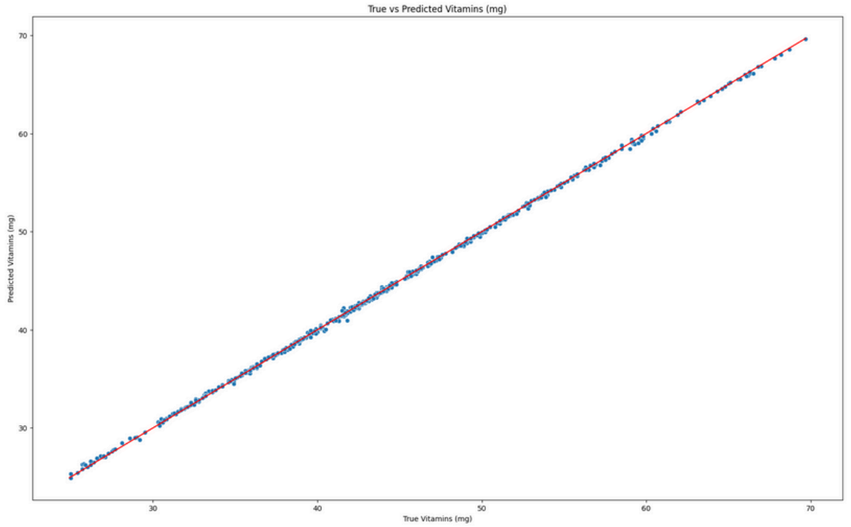
- Python Libraries (pandas, numpy, matplotlib, seaborn, pickle, requests, yaml)
- Machine Learning (CatBoostRegressor, MultiOutputRegressor)
- Natural Language Processing (Groq API, llama_index)
- Web Development (Next.js, React)

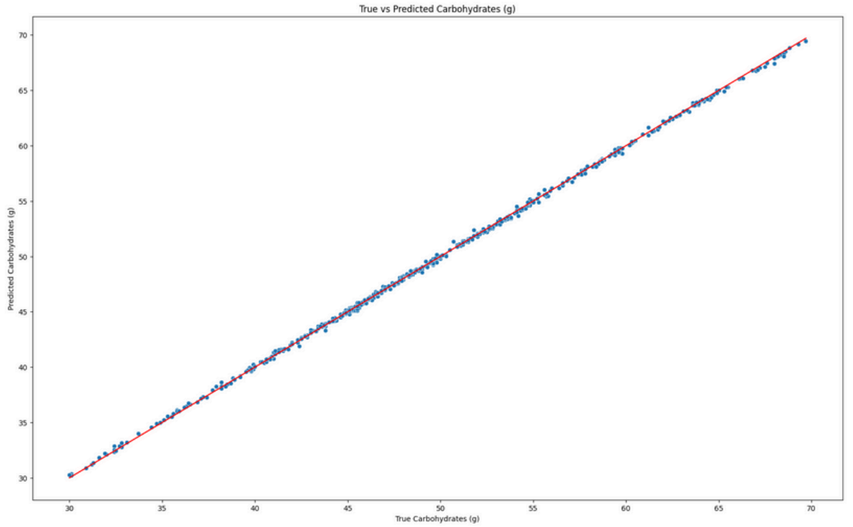
ALGORITHMS

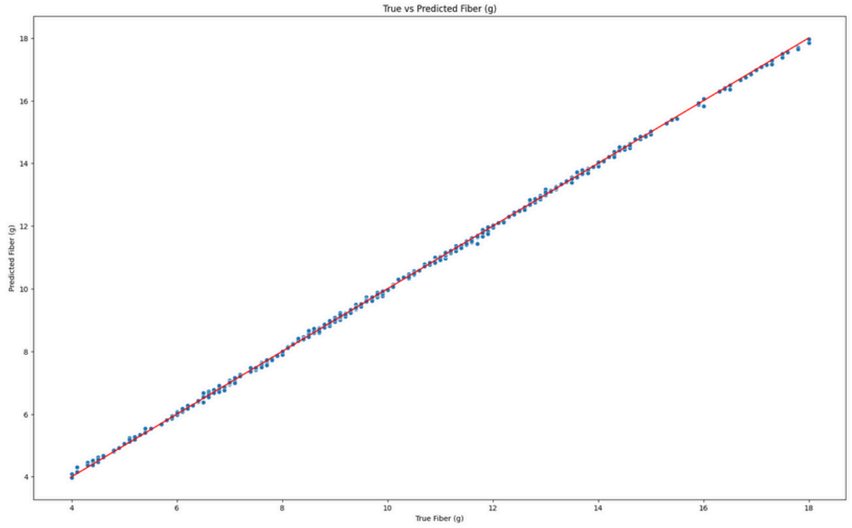
- Gradient Boosting (CatBoostRegressor) for predicting nutritional values.
- Multi-Output Regression for predicting multiple nutritional outputs simultaneously.
- Transformer Models (Groq API/GPT-3) for generating meal and exercise plans based on user input.

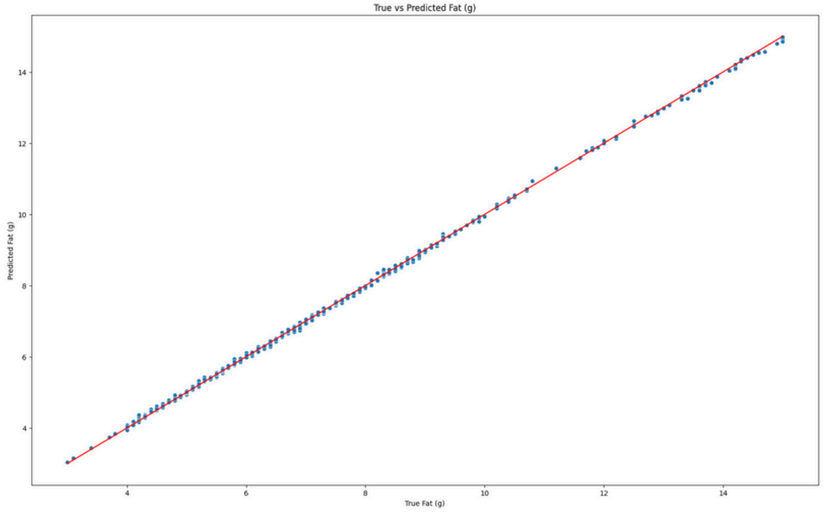
EVIDENCE OF COMPLETION

scatter plot









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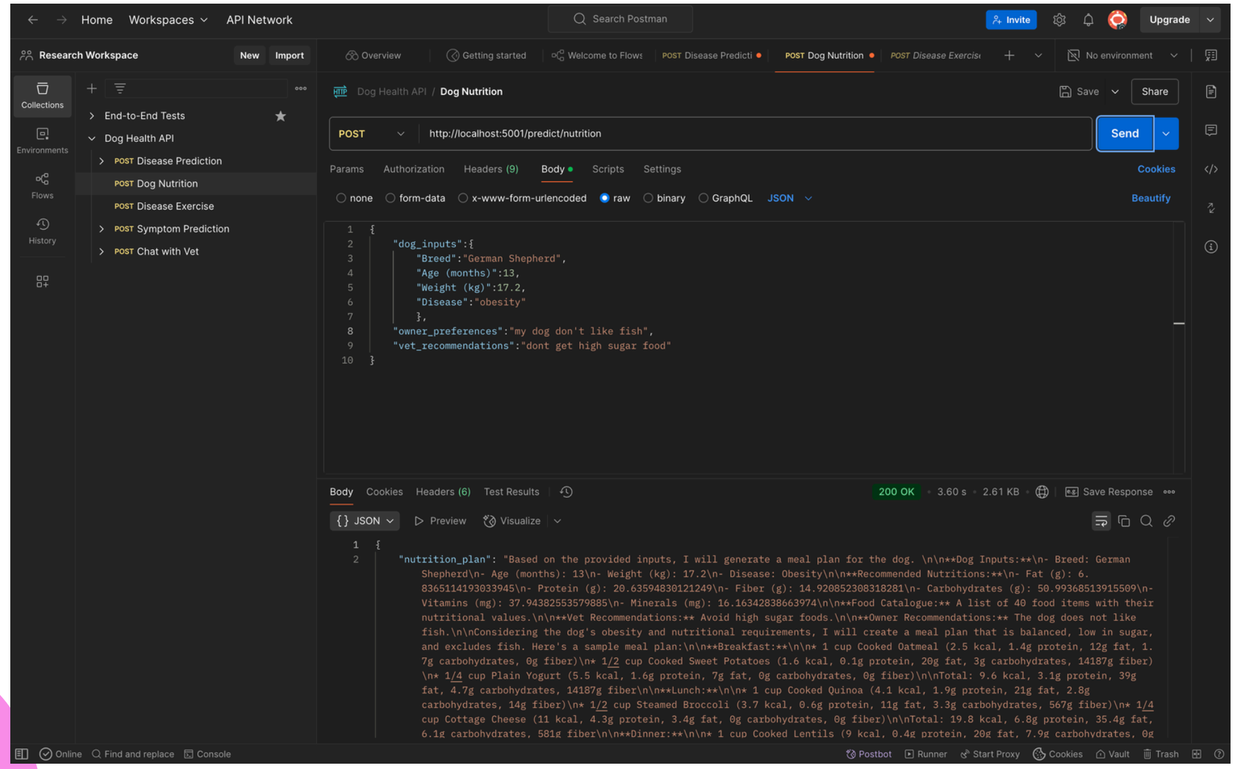

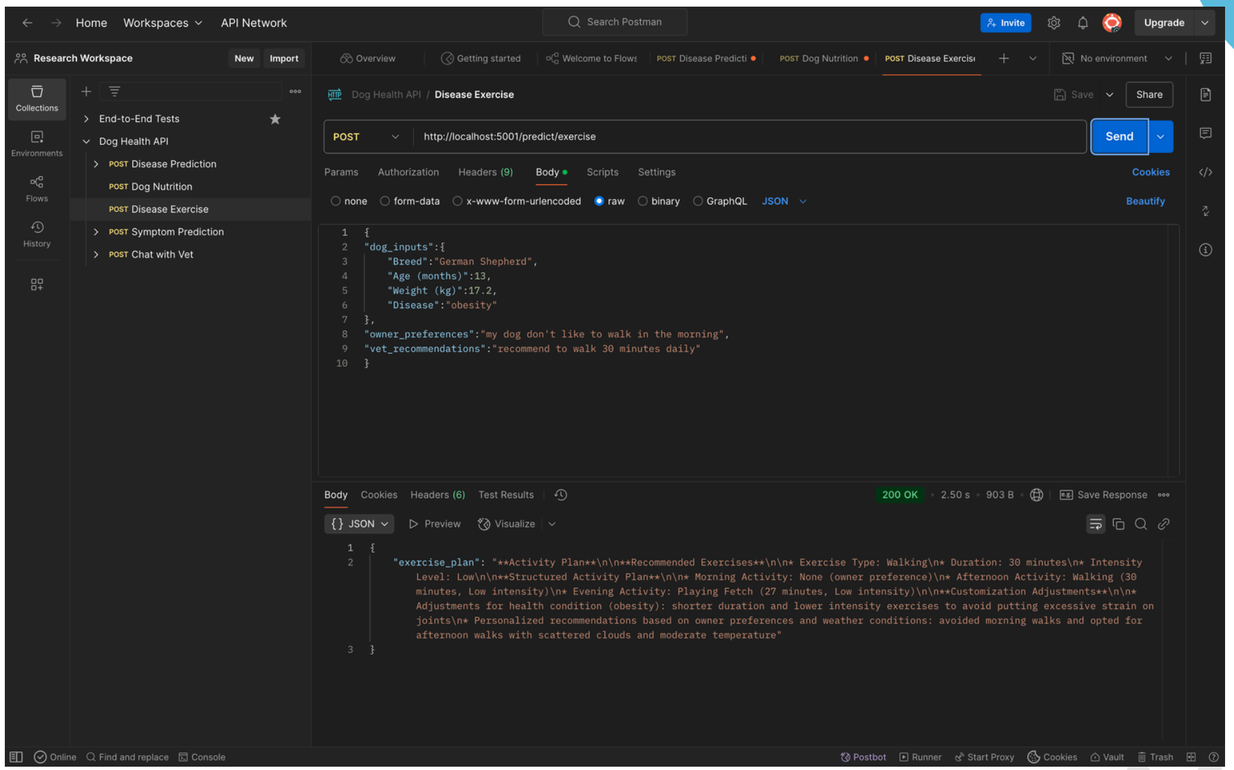

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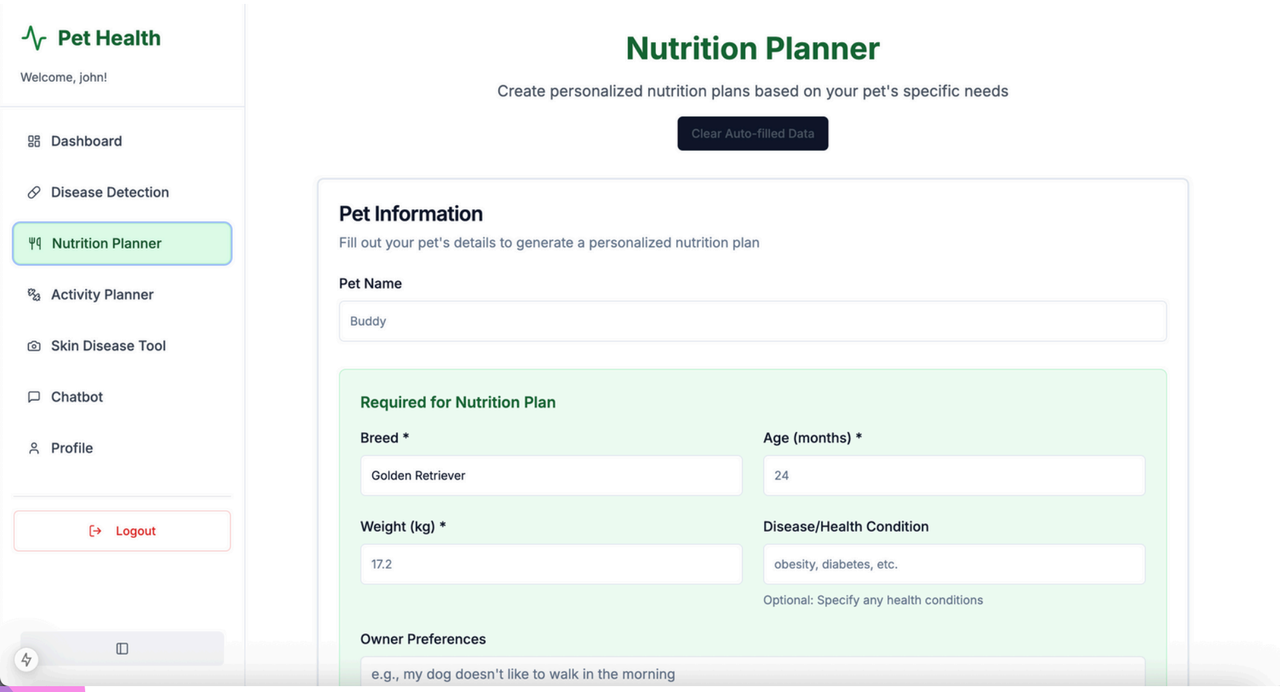
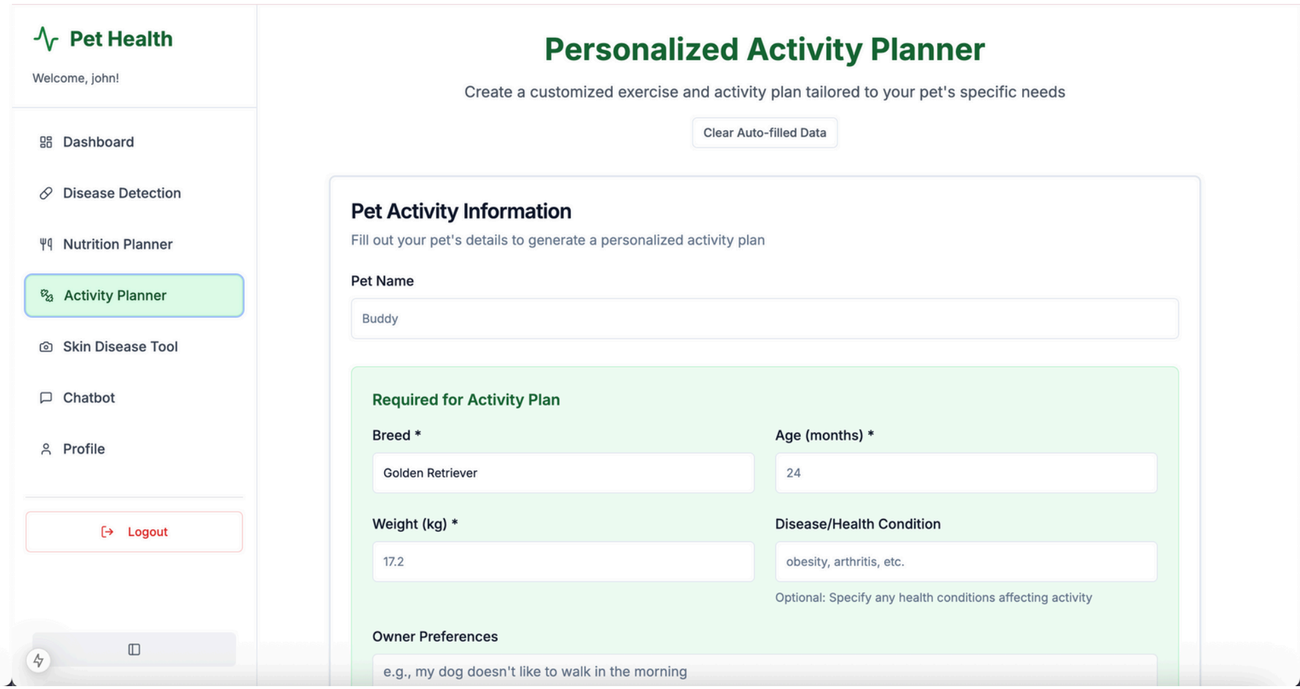
User Interfaces





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REQUIREMENTS

FUNCTIONAL REQUIREMENTS

- Personalized Meal Plans
- Allergy Management
- Interactive Meal Planning Tools
- Health Progress Monitoring
- Design Exercise Routines
- Exercise Plan Customization
- Reminders and Alerts
- Gather User and Veterinary Feedback to Continuous Improvement

SYSTEM REQUIREMENTS

- Software
- User End
- Developer End
- Hardware
- Mobiles

NON FUNCTIONAL REQUIREMENTS

- Scalability
- Security
- Usability
- Reliability
- Performance
- User-Friendly Interface

REFERENCES

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- R. Kumar, "Adaptive Feedback Systems in Healthcare," IEEE Transactions on Medical Imaging, vol. 40, no. 5, pp. 1234-1245, 2023.

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COMPONENT 3

VIRTUAL VET ASSISTANT & REMOTE CONSULTATION PLATFORM

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WOOF DOC

INTRODUCTION

This component focuses on creating an advanced Virtual Vet Assistant and Remote Consultation platform for canines. By integrating a specialized chatbot, telehealth triage system, interactive symptom checker, and remote consultation tools, it aims to deliver personalized and effective virtual veterinary care, improving both accessibility and accuracy for canine health management.

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BACKGROUND OF THE COMPONENT

- Traditional veterinary care involves time-consuming and geographically limited in-person visits.
- Technological advancements now enable effective remote veterinary services.
- This component aims to create a Virtual Vet Assistant and Remote Consultation platform for canines.
- It will integrate a chatbot, telehealth triage system, symptom checker, and consultation tools to enhance accessibility and efficiency.

WOOF DOC

RESEARCH GAP

SYSTEM	Multimodal Data Integration	AI-Driven Symptom Assessment	Longitudinal User Studies	Ethical Considerations & Data Privacy	Integration with Traditional Veterinary Care
[1]	✗	✗	✗	✗	✗
[2]	✗	✗	✗	✗	✗
[3]	✗	✗	✗	✗	✗
[4]	✓	✗	✗	✓	✗
Proposed System	✓	✓	✓	✓	✓

WOOF DOC

RESEARCH PROBLEM

The challenge of providing effective and personalized veterinary care remotely for canines, with a focus on accurate diagnosis, timely intervention, and tailored health recommendations through virtual platforms.

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RESEARCH QUESTIONS

- How can a virtual vet assistant be designed to provide tailored responses and recommendations for canines?
- What are the key features required for an effective telehealth triage system for canine health?
- How can an interactive symptom checker improve the accuracy of remote consultations for canines?
- What technologies and algorithms are most suitable for integrating these features into a cohesive platform?

WOOF DOC

MAIN OBJECTIVE

To develop an advanced Virtual Vet Assistant and Remote Consultation platform tailored specifically for canines, integrating a chatbot, telehealth triage system, interactive symptom checker, and real-time consultation tools to enhance accessibility, accuracy, and personalization in virtual veterinary care.

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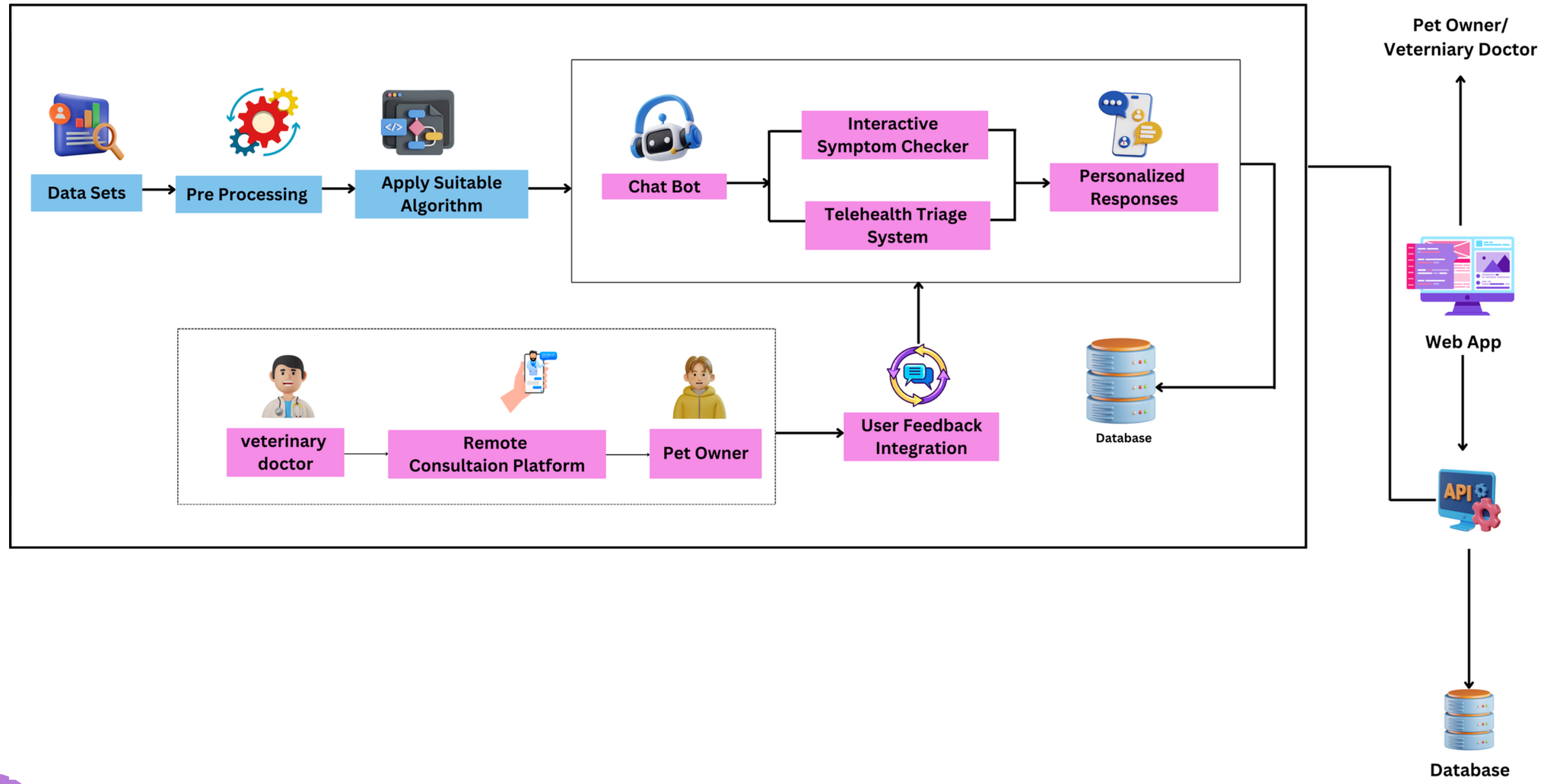
SUB OBJECTIVES

- **Develop a Virtual Vet Assistant:** Provide tailored responses and recommendations specifically for canines.
- **Create a Remote Consultation Platform:** Facilitate virtual veterinary consultations and interactions.
- **Integrate a Telehealth Triage System:** Assess and prioritize canine health issues remotely.
- **Enable Real-Time Consultations:** Incorporate feedback for continuous improvement and design an interactive symptom checker.

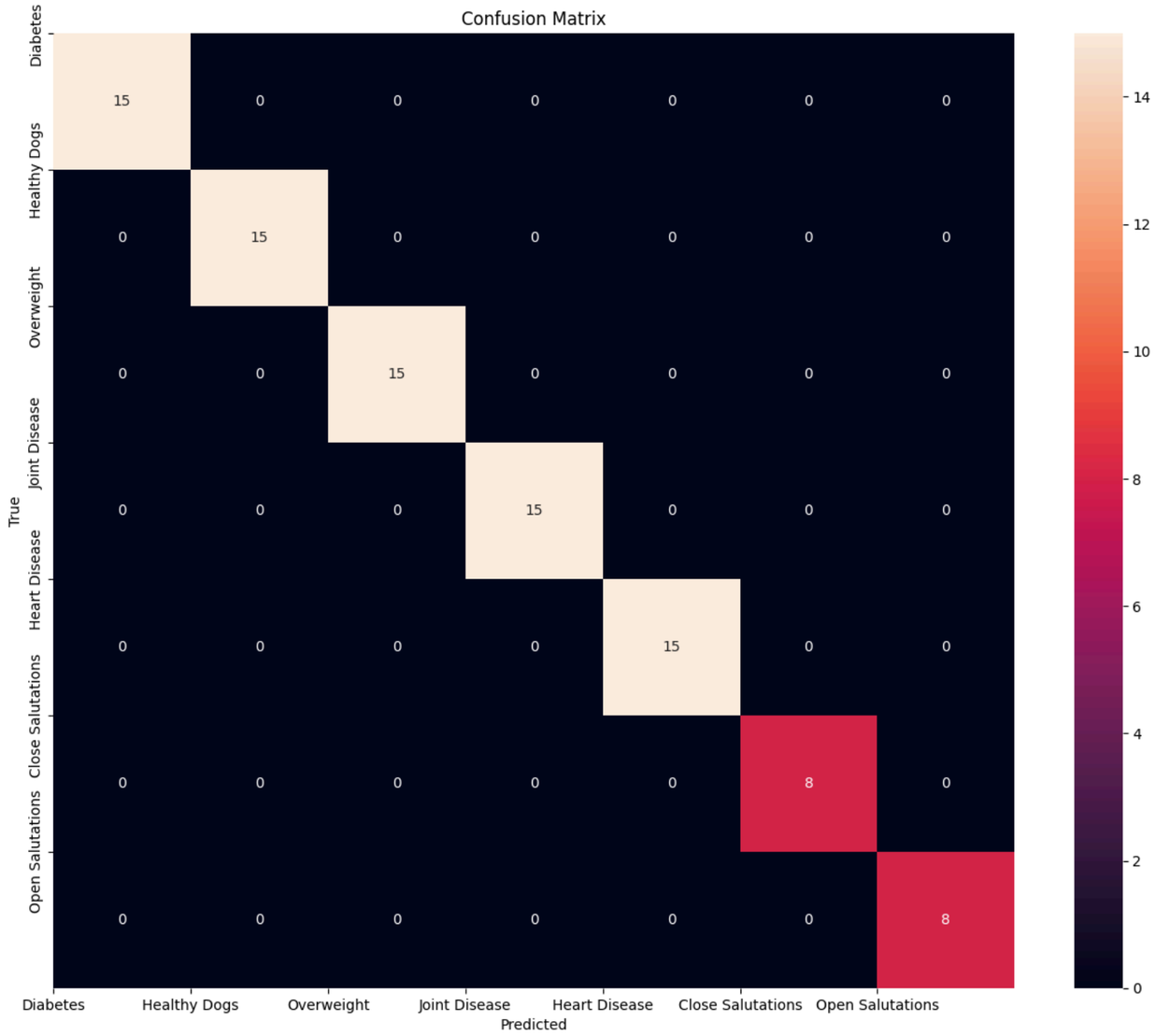
COMPONENT DIAGRAM

Virtual Vet Assistant & Remote Consultations



EVIDENCE OF COMPLETION

confusion matrix



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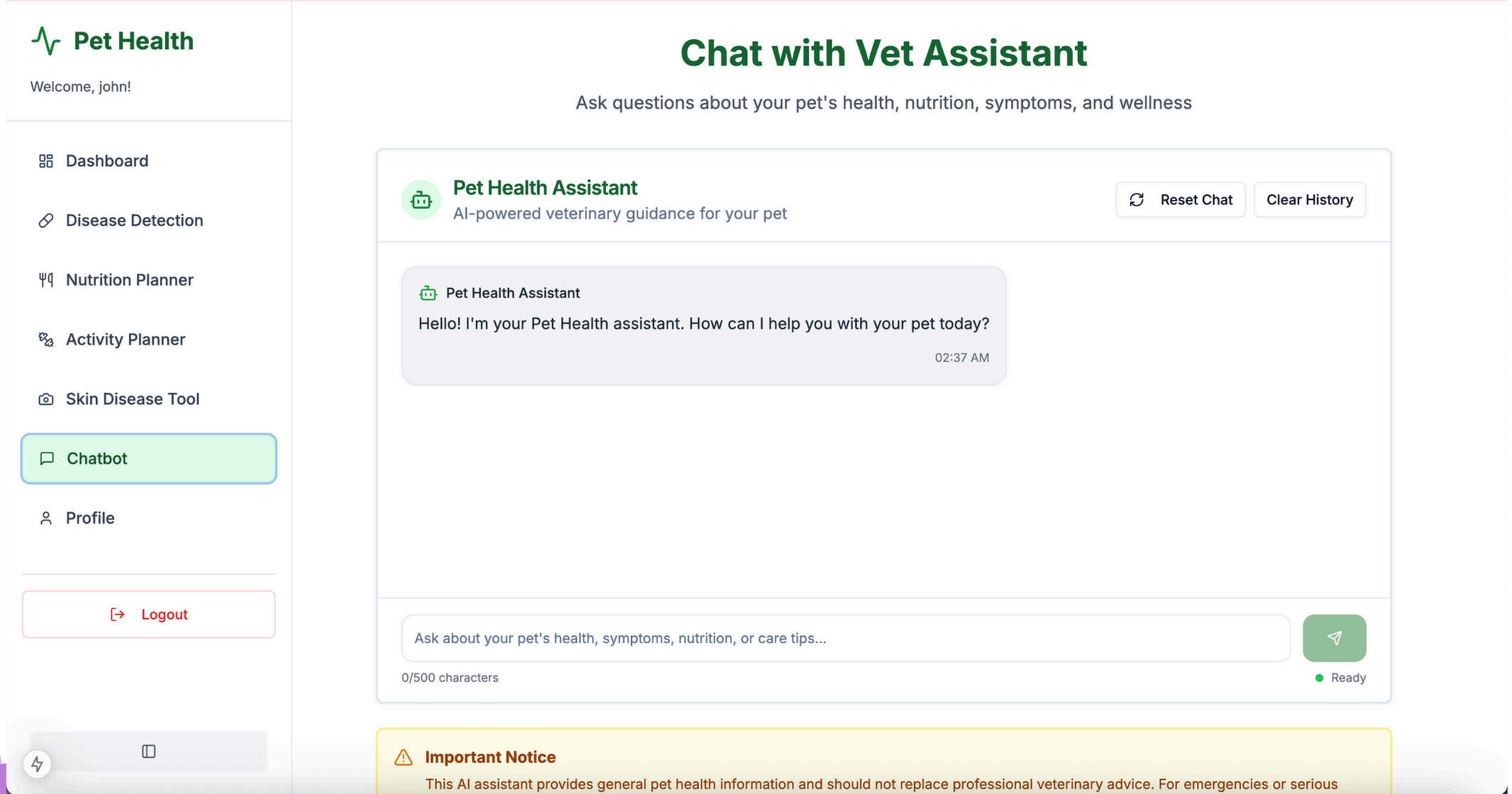
User Interfaces



PLANNED TECHNOLOGIES

TECHNOLOGIES

- Frontend - Flutter
- Backend - Python, Python related server-side Fast API
- Firebase Realtime Database/Firestore: For cloud-based data storage and real-time synchronization.
- Figma (UI/UX design)

ALGORITHMS

Decision Trees (Predict health conditions from symptoms)

NLP (Process user queries in natural language)

Neural Networks (Enhance symptom analysis with machine learning)

Rule-Based Systems (Implement basic symptom checking rules)

REQUIREMENTS

FUNCTIONAL REQUIREMENTS

- Chatbot Development
- Remote Consultation Platform
- Integration of Telehealth Triage System
- Enabling Virtual Consultations
- Veterinary Feedback Integration
- User Feedback and Continuous Improvement
- Interactive Symptom Checker

NON FUNCTIONAL REQUIREMENTS

- Scalability
- Security
- Usability
- Reliability
- Performance
- User-Friendly Interface

SYSTEM REQUIREMENTS

- Software
- User End
- Developer End
- Hardware
- Mobiles

REFERENCES

- J. Doe and M. White, "AI-Enabled Virtual Assistants in Veterinary Telehealth," IEEE Access, vol. 10, pp. 56789-56795, 2024.

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COMPONENT 4

CANINE SKIN DISEASE DETECTION & TREATMENT RECOMMENDATIONS

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WOOF DOC

INTRODUCTION

Effective detection and management of canine skin diseases are vital for dog health. Current methods struggle with symptom variability and lack personalized treatments. This project aims to improve diagnostics and treatment by using advanced image recognition and integrating ongoing health data, enhancing overall management of skin conditions.

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BACKGROUND OF THE COMPONENT

- Canine skin diseases are prevalent and can greatly affect a dog's overall health and well-being.
- Traditional diagnostic methods often rely on visual inspections, which can be imprecise and inconsistent.
- Advances in image recognition and machine learning offer enhanced accuracy for early detection of skin conditions.
- Integrating these technologies with ongoing health data enables more precise diagnoses and personalized treatments, improving upon current methods.

WOOF DOC

RESEARCH GAP

SYSTEM	Early Detection	Breed Specific Analysis	Multimodal Input (Nutritional Data, Health Records, etc.)	Personalized Treatment Recommendations
[1]	✗	✗	✗	✗
[2]	✗	✗	✗	✗
[3]	✗	✗	✗	✗
[4]	✓	✗	✗	✗
Proposed System	✓	✓	✓	✓

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RESEARCH PROBLEM

Detecting and managing canine skin diseases is challenging due to symptom variability and the need for personalized treatment. Existing systems lack integration of advanced image recognition and ongoing health data, limiting early disease detection and tailored treatment.

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RESEARCH QUESTIONS

- How can advanced image recognition technology improve accuracy in canine skin disease detection?
- Which algorithms are most effective for analyzing skin images and detecting diseases early?
- How can ongoing health data be integrated for personalized treatment recommendations?
- What methods ensure accurate diagnosis by cross-referencing skin symptoms with the dog's current health status?

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MAIN OBJECTIVE

Develop a system that uses advanced image recognition and integrates ongoing health data to deliver accurate diagnoses and personalized treatment recommendations for canine skin diseases.

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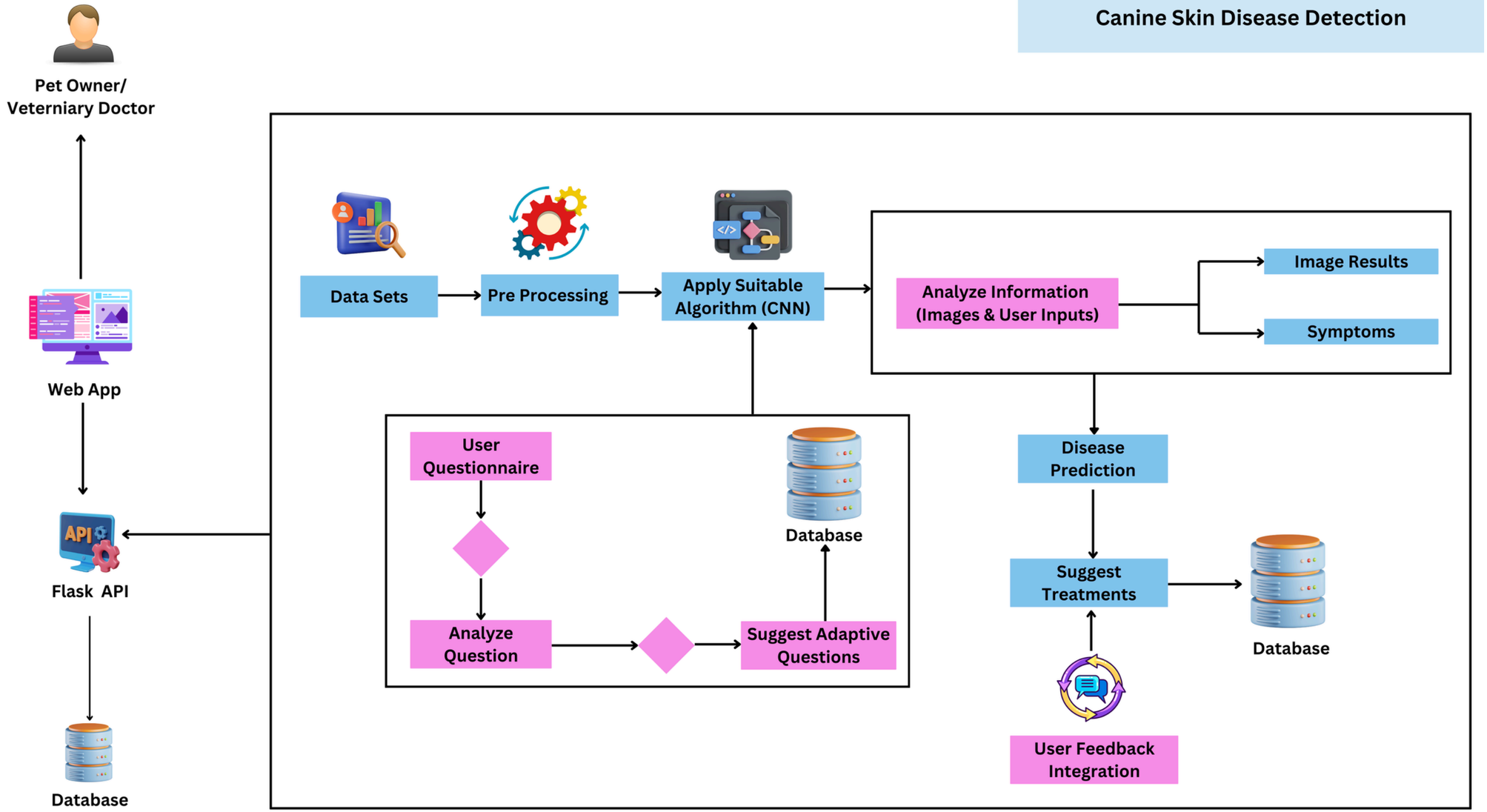
SUB OBJECTIVES

- **Implement Image Recognition:** Develop and integrate a system for accurate analysis of canine skin conditions.
- **Analyze Skin Images:** Evaluate images to identify anomalies and disease signs.
- **Early Disease Detection:** Use advanced algorithms to detect early signs of diseases for prompt intervention.
- **Diagnosis and Treatment Suggestions:** Generate reports and personalized treatment recommendations by considering ongoing health data.

COMPONENT DIAGRAM



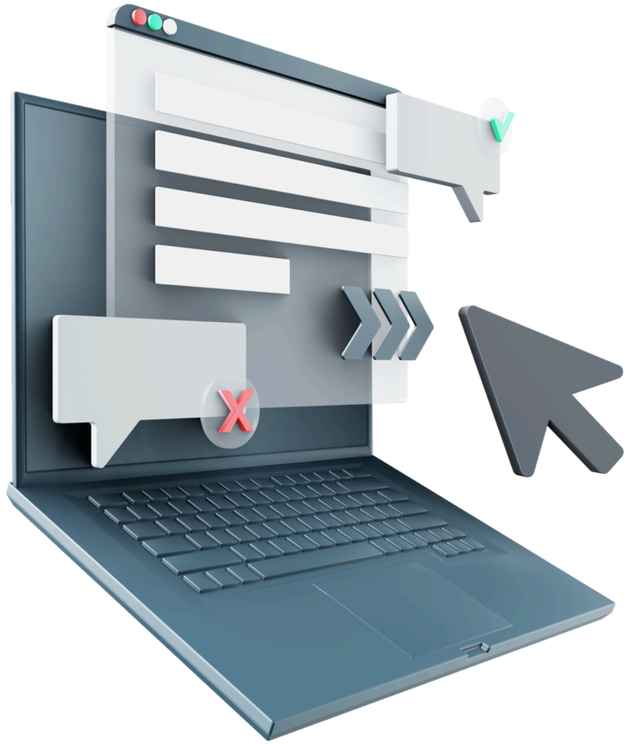
PLANNED TECHNOLOGIES

TECHNOLOGIES

- Frontend - React, Next Js
- Backend - Python, Python related server-side Fast API
- Firebase Realtime Database/Firestore: For cloud-based data storage and real-time synchronization.
- Figma (UI/UX design)

ALGORITHMS

- Convolutional Neural Networks (CNNs)
- Transfer Learning
- Data Augmentation
- Explainable AI (XAI) Methods
- Ensemble Methods



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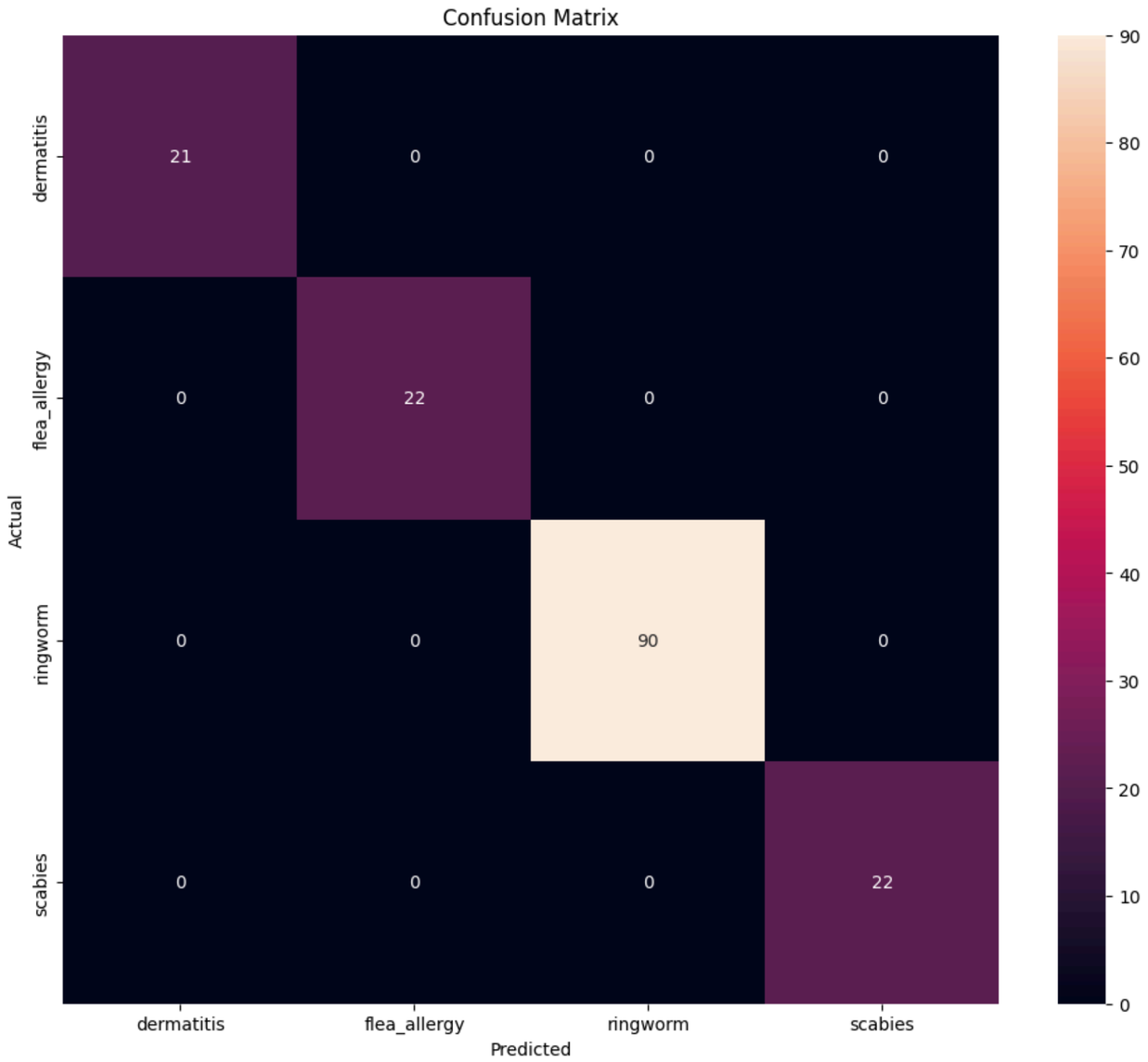
confusion matrix



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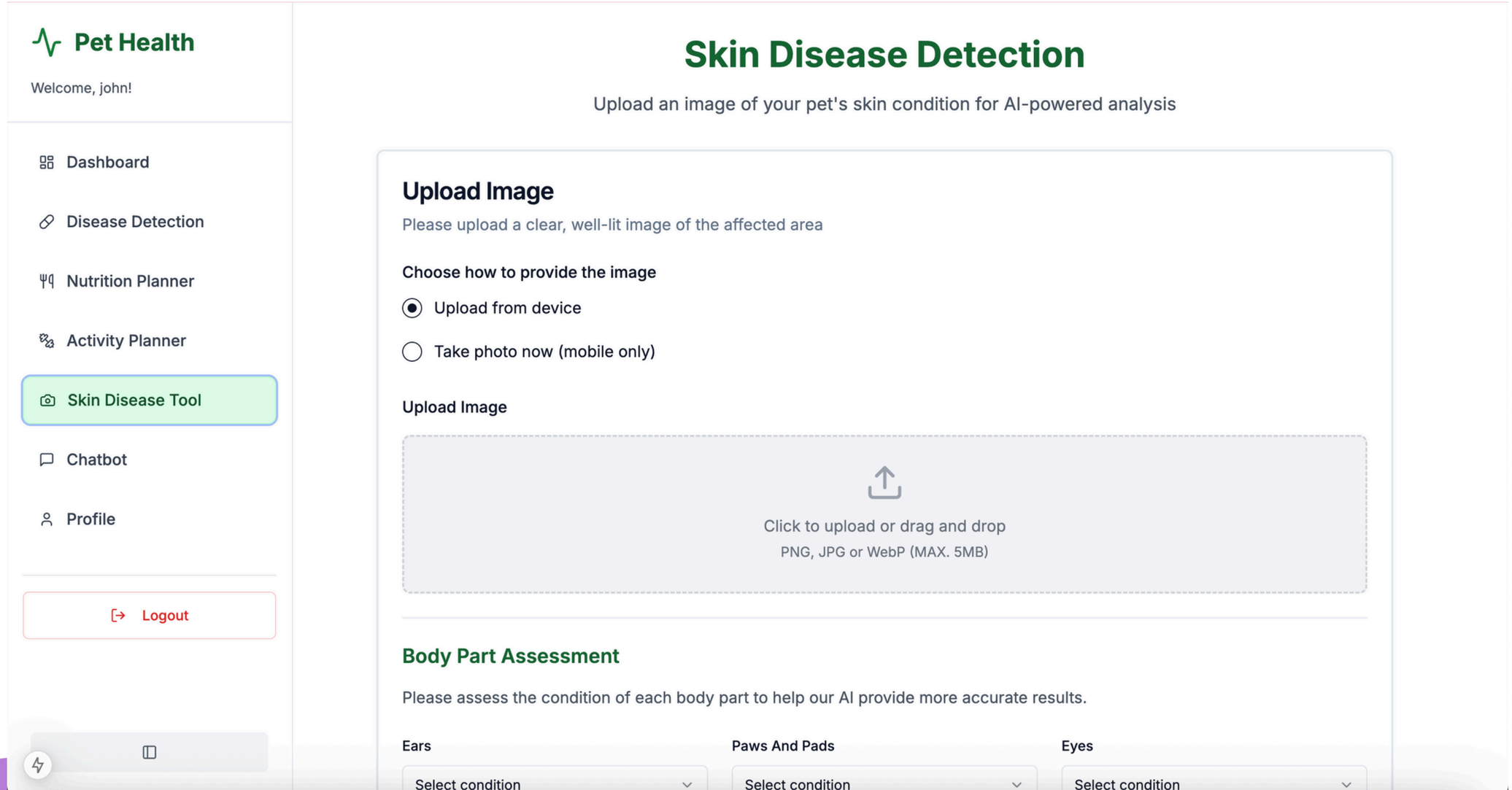
User Interfaces



REQUIREMENTS

FUNCTIONAL REQUIREMENTS

- Implement Image Recognition
- Analyze Skin Images
- Analyze Skin Images
- Early Disease Detection
- Provide Diagnosis and Treatment Suggestions
- Check Symptoms Considering Ongoing Health:

NON FUNCTIONAL REQUIREMENTS

- Scalability
- Security
- Usability
- Reliability
- Performance
- User-Friendly Interface

SYSTEM REQUIREMENTS

- Software
- User End
- Developer End
- Hardware
- Mobiles

REFERENCES

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FOR YOUR TIME

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