



Integrated Veterinary Application for Enhanced Cow Health Management

PROJECT ID: 24-25J-085

PRESENTED BY:
POORNAKA PERERA
EEHANEE HETTIARACHCHI
THESARANA DISSANAYAKE
DASUNIKA EKANAYAKA

Introduction

A

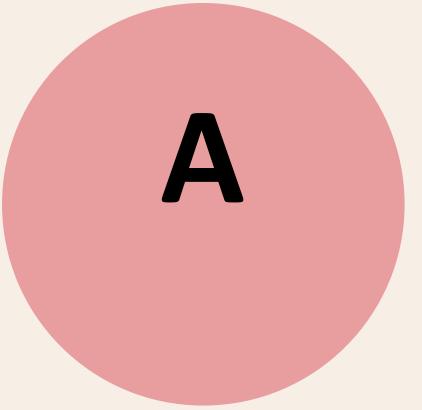
Brief overview of the project

B

Importance of cow health management in agriculture

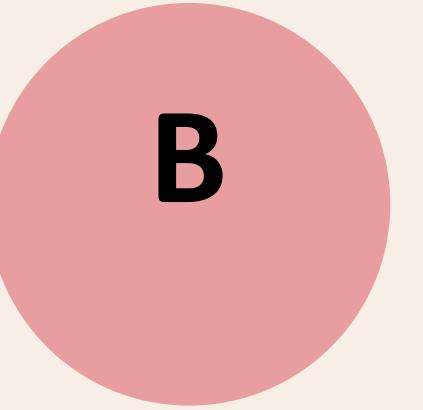
C

Goals of the project

**A**

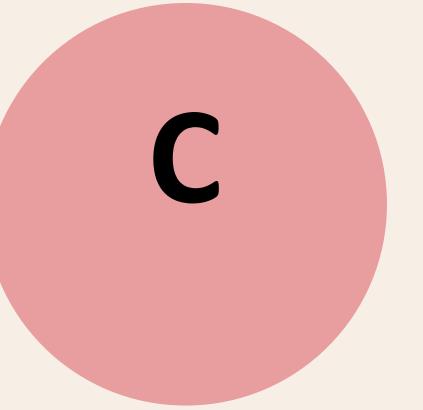
Brief Overview of the Project

Our project focuses on developing an integrated veterinary application to enhance cow health management. It aims to improve disease detection, optimize cow care practices, predict milk production, and streamline veterinary services.

**B**

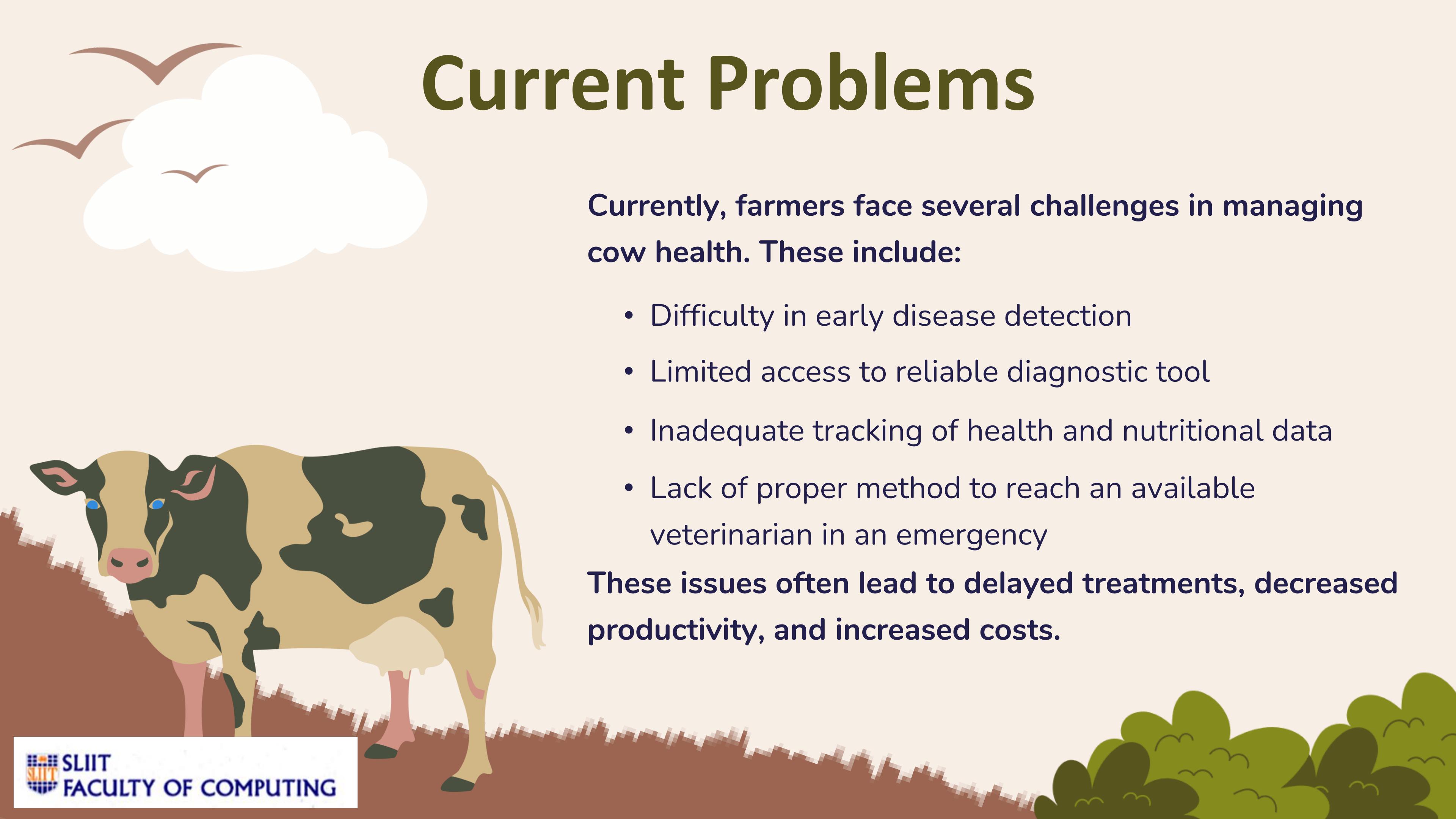
Importance

Effective cow health management is crucial for ensuring animal welfare, enhancing productivity, and sustaining profitability in the agricultural industry.

**C**

Goals of the Project

Our primary goals are to leverage advanced technologies for disease detection and milk production prediction, provide comprehensive tools for cow care, and facilitate efficient communication between farmers and veterinarians.



Current Problems

Currently, farmers face several challenges in managing cow health. These include:

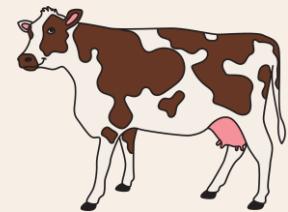
- Difficulty in early disease detection
- Limited access to reliable diagnostic tool
- Inadequate tracking of health and nutritional data
- Lack of proper method to reach an available veterinarian in an emergency

These issues often lead to delayed treatments, decreased productivity, and increased costs.

Project Objectives



Enhance disease detection and prevention



Improve cow care practices



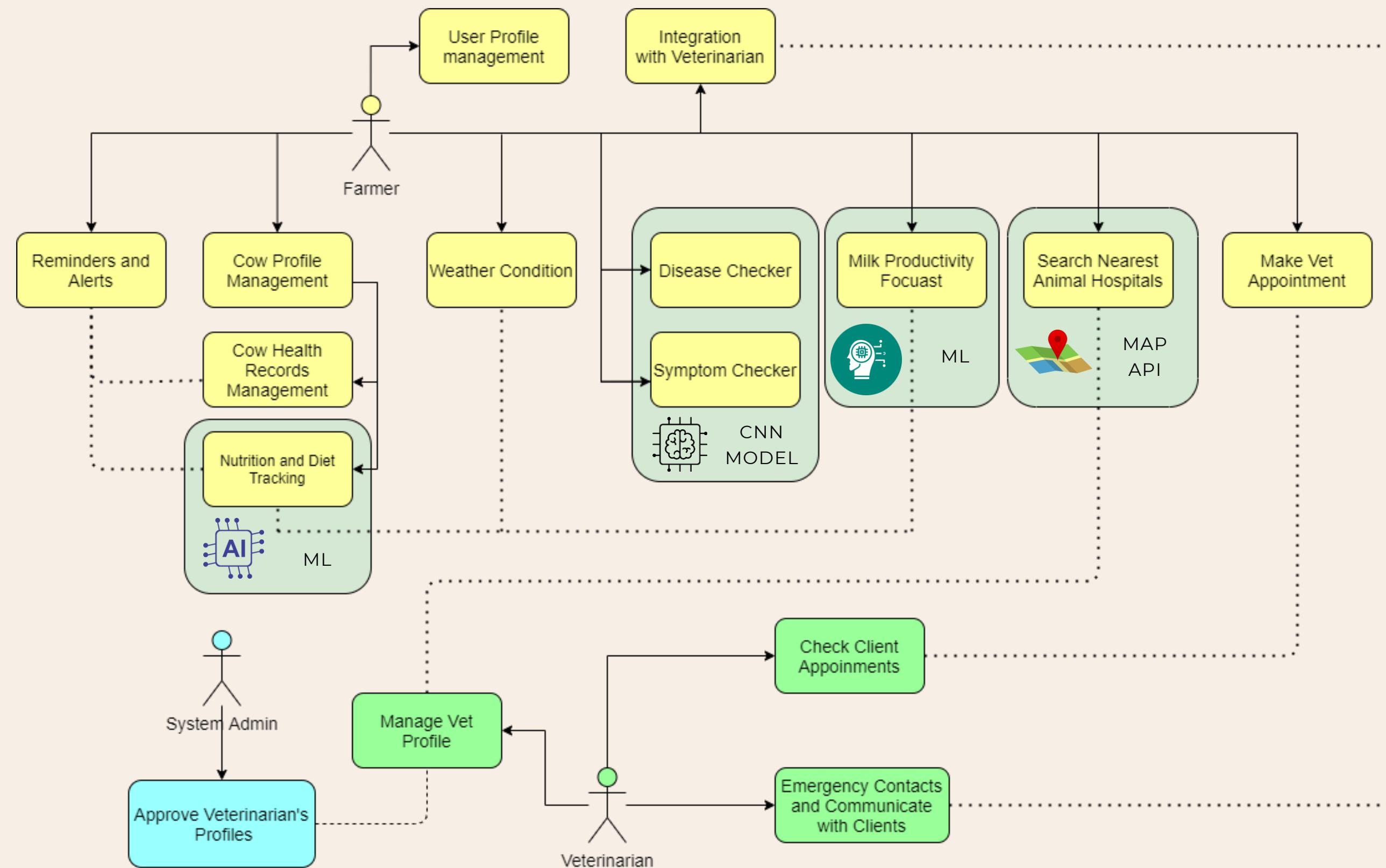
Predict milk production



Streamline veterinary communication and services



Overall System diagram





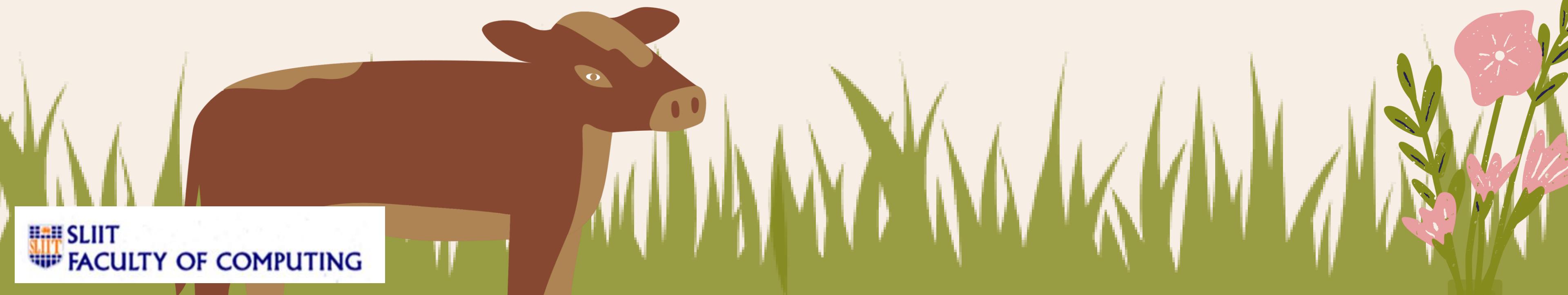
IT21381218 | Perera L.P.S.R

BSc. (Hons) Degree in Information Technology Specialization in Information Technology

Research Question

Component 1 : Disease Detection and Prevention

- How to identify the diseases that infected to the cattle skin?
- How to put together a database of different images depicting common cattle diseases?
- What are the preventions that can be taken until channeling a veterinarian?



Research Objectives

Specifics

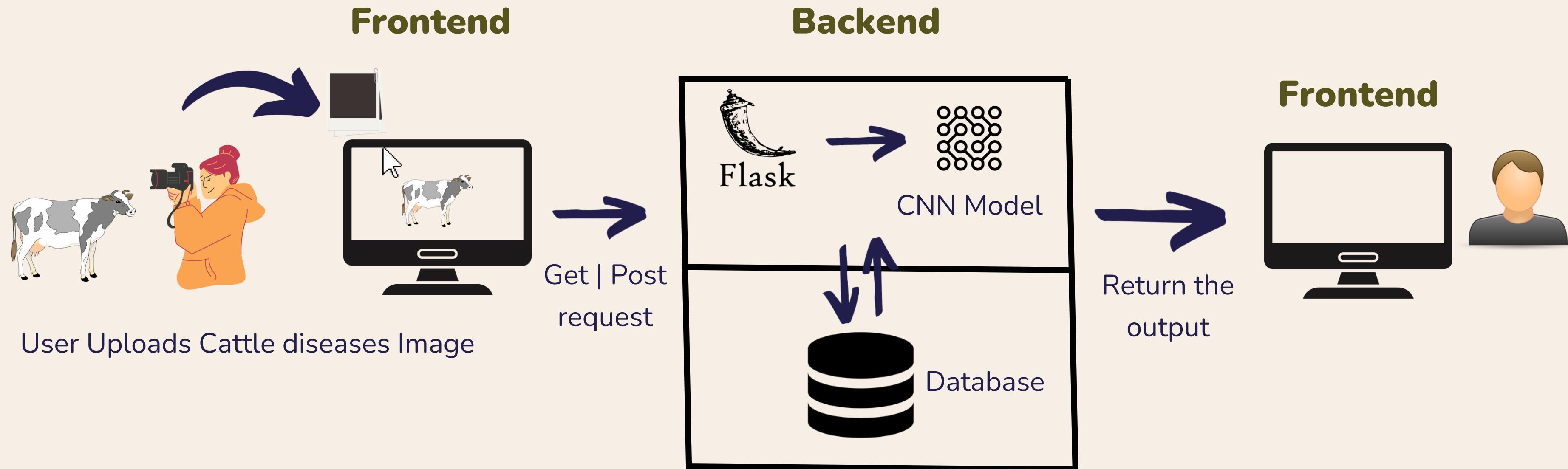
- To Identified the skin diseases earlier.
- Provide recommended actions and next steps based on febrile inputs.

Sub Objective

- Use of CNN for image classification to detect diseases.
- Develop a tool for farmers to input observed symptoms and receive effectiveness disease diagnoses.
- Compile and maintain a detailed list of common cattle diseases, including symptoms and recommended treatments

Research Gap	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	Our Research
Machine Learning	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓
Image-Based Detection	✓	✓	✓	✗	✗	✗	✗	✗	✗	✓
Symptom-Based Diagnosis	✗	✗	✗	✓	✓	✓	✗	✗	✗	✓
Recommendation System	✗	✗	✗	✓	✗	✗	✓	✓	✓	✓
Comprehensive Database	✗	✗	✗	✗	✗	✓	✗	✓	✗	✓
Real-Time Integration	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓
User-Friendly Platform	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓

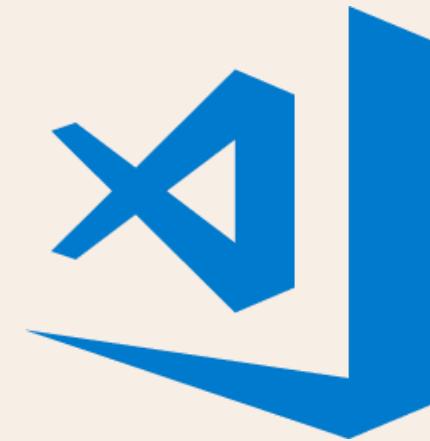
How CNN model Works



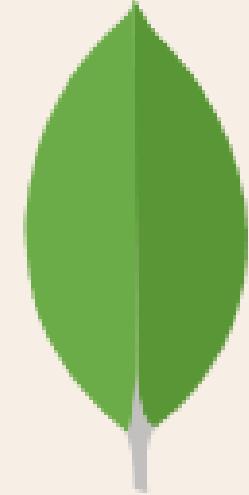
Technologies



Python



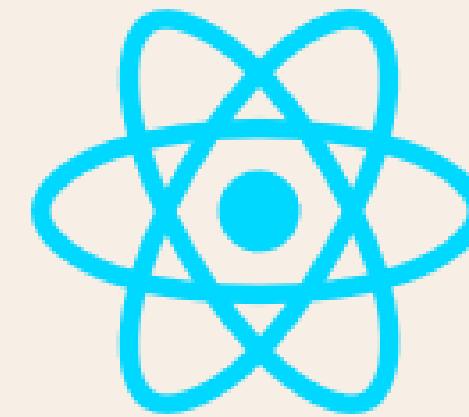
VS code



MongoDB



GitHub



React



Jupyter
Notebook



Postman

Functional Requirements

- Provide image-based disease classification.
- Enable users to input observed symptoms and receive disease diagnoses.
- Provide recommended actions and next steps based on input symptoms.

System Requirements

- High-resolution image capturing and processing capabilities.
- Efficient backend for CNN model integration.
- Secure data handling and transmission protocols.

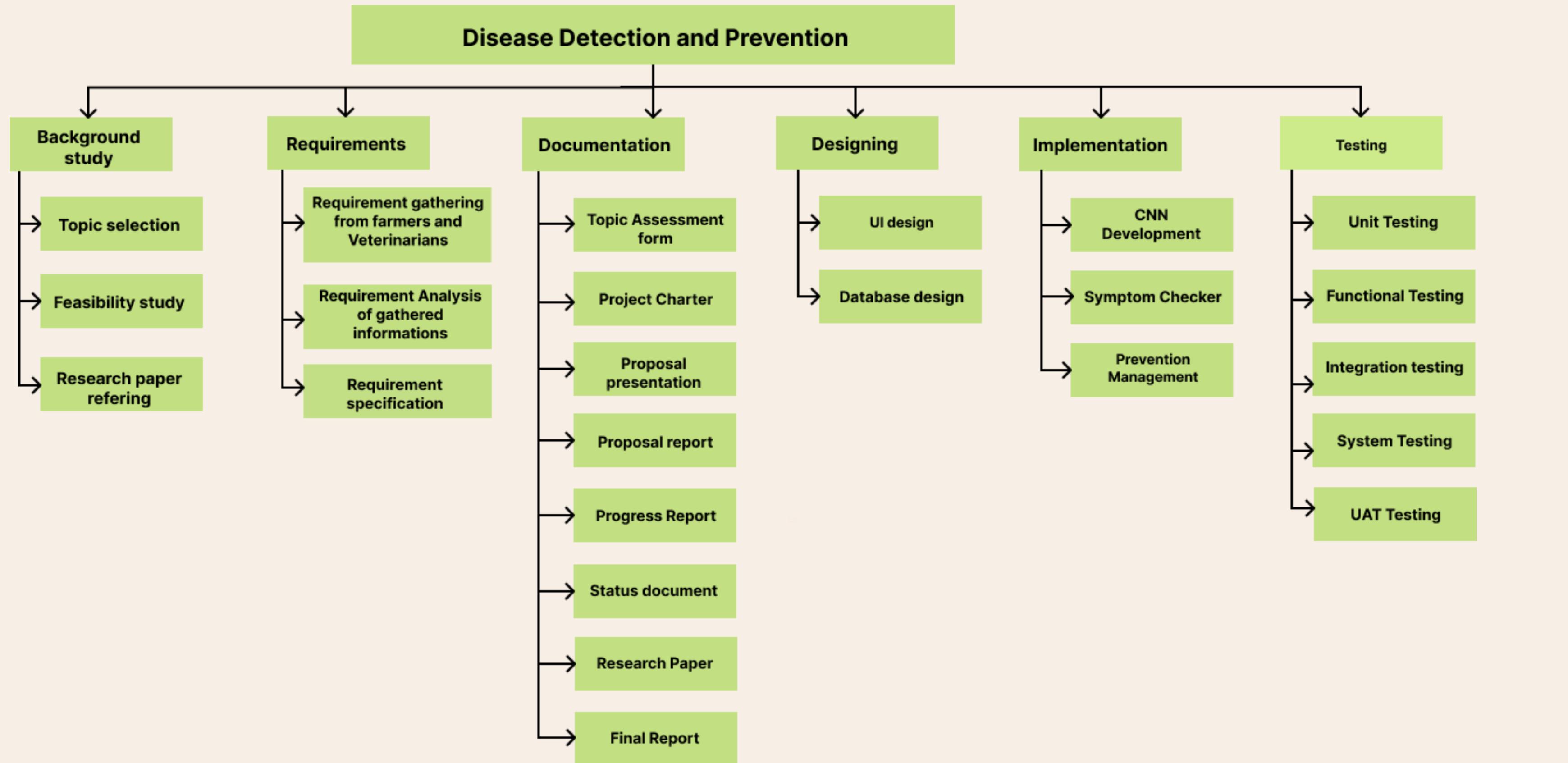
Non-Functional Requirements

- Ensure system reliability and accessibility 24/7.
- Ensure quick response time for disease detection (within seconds).
- Achieve high accuracy (90%+) in disease classification.

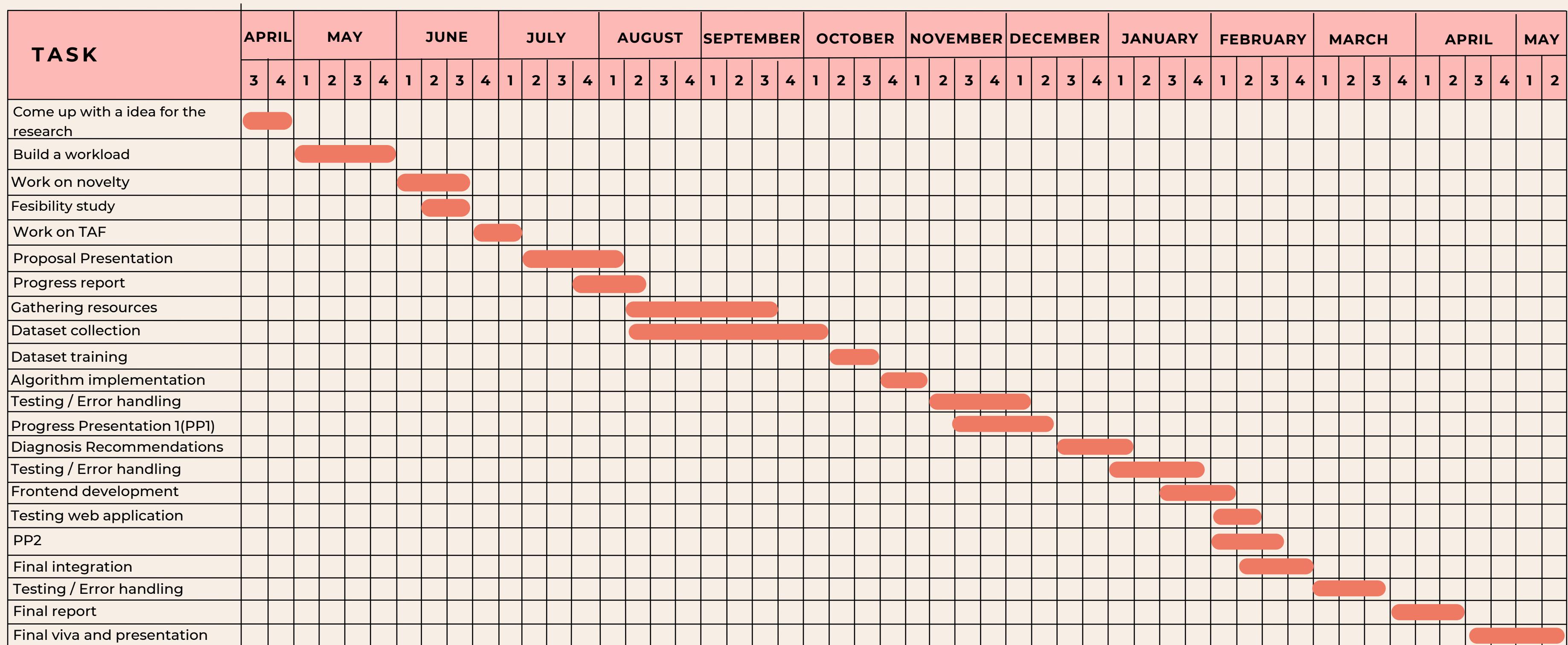
Personal Requirements

- Expertise in machine learning and image processing.
- Familiarity with veterinary diseases and treatments.
- Proficiency in backend development and database management.

Work Breakdown Structure



Gantt Chart



Estimated Budget per month

	Amount (LKR)
Travel fees for data collection(Dompe veterinary office)	2000.00
Internet charges (the development and technical information learning)	2500.00
Server Cost	5000.00
Electricity	3000.00
Documentation and Printing Cost	1000.00
Total	13500.00

References

- [1] A. A. AlZubi1, "Arcc Journals," 2024. [Online]. Available: <https://arccjournals.com/journal/indian-journal-of-animal-research/BF-1793>.
- [2] A. M. D. F. C. G. M. H. Ghaffari, "journalofdairyscience," 2022. [Online]. Available: [https://www.journalofdairyscience.org/article/S0022-0302\(22\)00609-9/fulltext#:~:text=A%20deep%20convolutional%20neural%20network,3%20d%20of%20life%20on..](https://www.journalofdairyscience.org/article/S0022-0302(22)00609-9/fulltext#:~:text=A%20deep%20convolutional%20neural%20network,3%20d%20of%20life%20on..)
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- [8] C. C. A. K. Naftali Slob, "researchgate," Application of Machine Learning to Improve Dairy Farm Management: A Systematic Literature Review, 2020. [Online]. Available: https://www.researchgate.net/publication/347729135_Application_of_Machine_Learning_to_Improve_Dairy_Farm_Management_A_Systematic_Literature_Review.
- [9] K. S. K. S. A. R. Sakshi Shinde, "researchgate," 2023. [Online]. Available: https://www.researchgate.net/publication/369417859_Survey_on_Crop_Recommendation_System.



IT21164194 | Dissanayake D.M.W.B.T

BSc. (Hons) Degree in Information Technology Specialization in Information Technology

Component 2: Enhancing Cow Care Practices

- Management of cow profiles and health records
- Nutrition and diet tracking
- Reminders and alerts for vaccinations and other medical situations



Current Challenges in Cow Care

- Fragmented health records management.
- Lack of personalized nutrition plans.
- Manual tracking of vaccinations and vet check-ups.

Proposed Solution Overview

Our Integrated ML-Based Solution

- Comprehensive cow profile management.
- Personalized nutrition and diet tracking.
- Automated reminders and alerts.



Comparison with Existing Research

How Our Research Differs

Health Records Management Systems

- Existing Research: Focuses on digitizing health records but lacks integration with nutrition and reminders.
- Our Approach: Integrates health records with nutrition and reminders for a holistic system.

Nutrition and Diet Tracking Systems

- Existing Research: Monitors and optimizes nutrition but lacks health data integration.
- Our Approach: Personalizes diet plans based on individual health data.

Research Objectives

Specific

To present a holistic approach to cow care by integrating the management of cow profiles, nutrition tracking, and automated reminders using Machine Learning, focusing primarily on enhancing cow productivity.

Sub Objective

- Develop Comprehensive Cow Profile Management
- Implement Personalized Nutrition and Diet Tracking
- Leverage Machine Learning for Predictive Analytics
- Improve Overall Cow Welfare and Management Efficiency
- Create Automated Reminder Systems



Research Gap

	Vet2Pet	Vetter Software	PetDesk	Our Research
Application type	mobile	web	mobile	web
Comprehensive Cow Profile Management	✗	✗	✗	✓
Integrated Health Records and Nutrition	✗	✗	✗	✓
Personalized Nutrition and Diet Tracking	✗	✗	✗	✓
Machine Learning Predictive Analytics	✗	✗	✗	✓
Automated Reminders for Medical Situations	✗	✗	✗	✓

Management of Cow Profiles and Health Records

Developing user-friendly interfaces for managing cow profiles, including health records, vaccination history, and medical treatments.

Features

- Centralized health records.
- Easy access and update of medical treatments.
- Detailed vaccination history.



Nutrition and Diet Tracking

Implementing features for nutrition and diet tracking, allowing personalized diet plans and monitoring feed intake.

Features

- Personalized diet plans based on health data.
- Real-time monitoring of feed intake.
- Adjustments based on health metrics.



Reminders and alerts for vaccinations and other medical situations

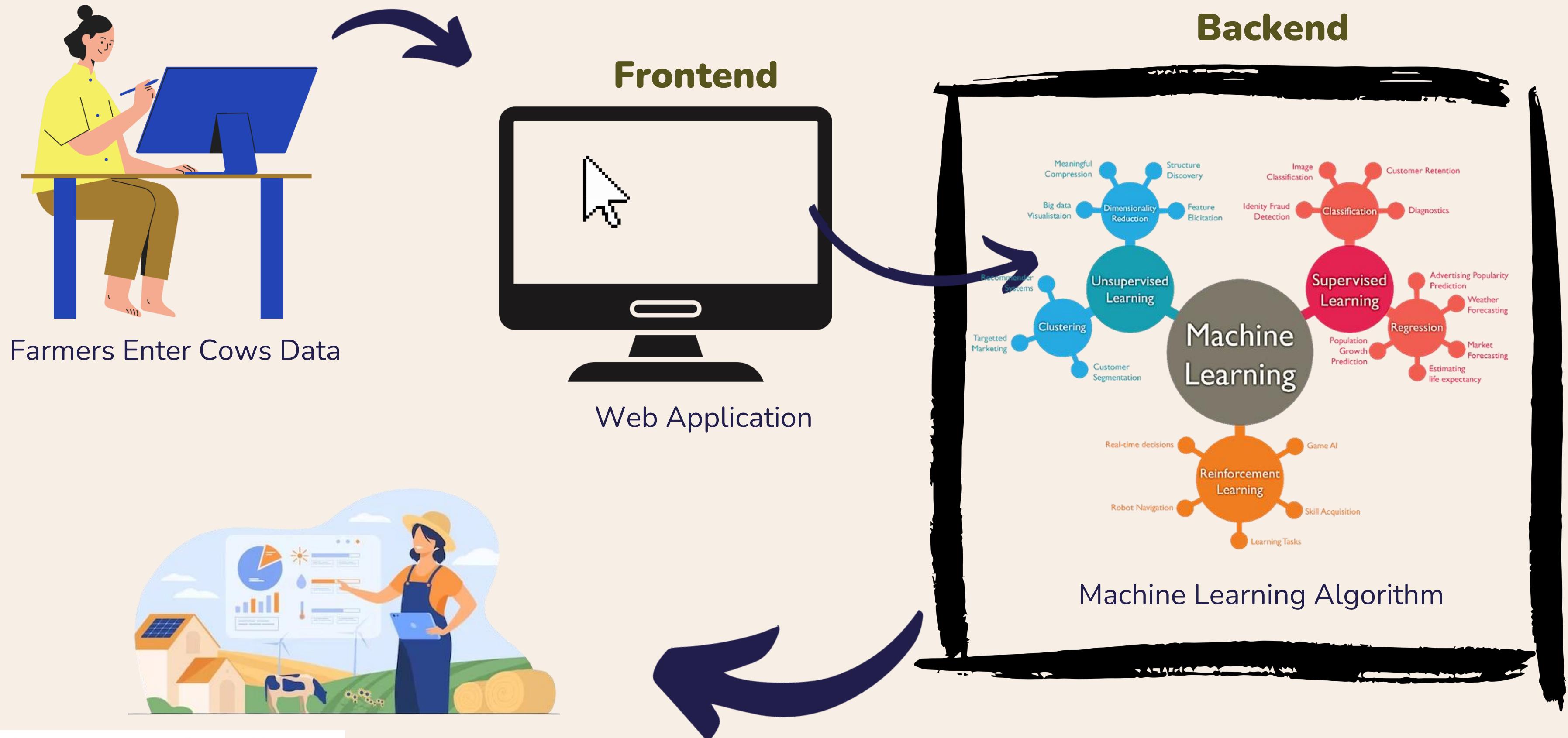
Creating tools for setting reminders and alerts for important tasks such as vaccinations and vet check-ups.



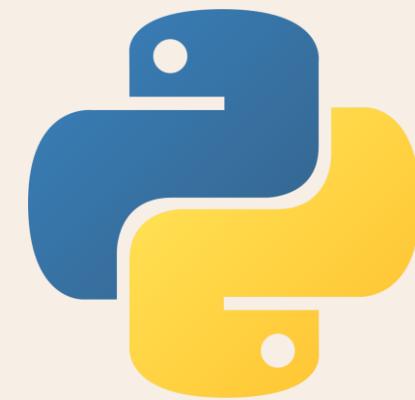
Features

- Automated scheduling of reminders.
- Multi-channel notifications (email, SMS, app).
- Tracking compliance and follow-up actions.

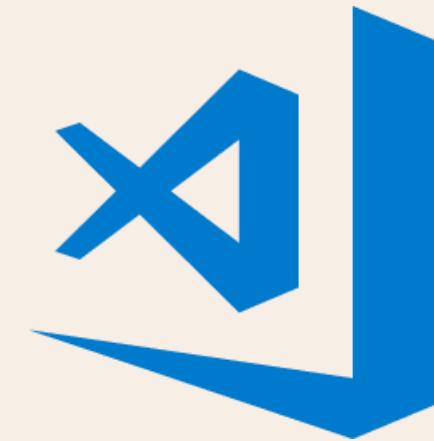
System Diagram



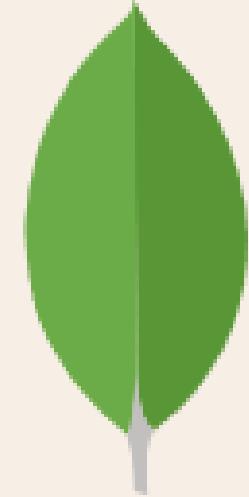
Technologies



Python



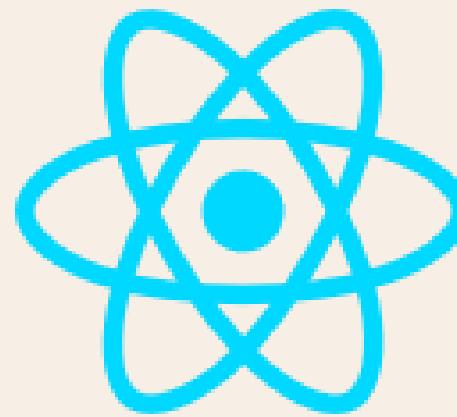
VS code



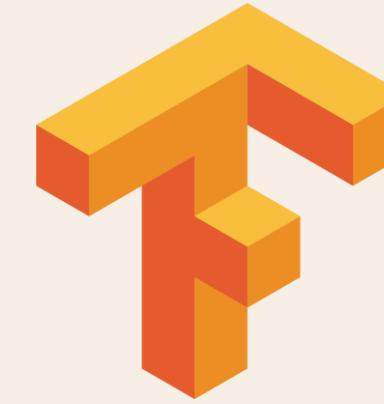
MongoDB



GitHub



React



TensorFlow

Functional Requirements

- Provide interfaces to create and manage comprehensive cow profiles.
- Allow modifications to cow profiles.
- Enable tracking of individual cow's feeding regimens and health records.
- Create systems for setting alerts and reminders for critical tasks.

System Requirements

- User-friendly interfaces for data input and management.
- Backend system for storing and managing health records.
- Algorithms for analyzing nutritional data.
- Notification system for reminders and alerts.

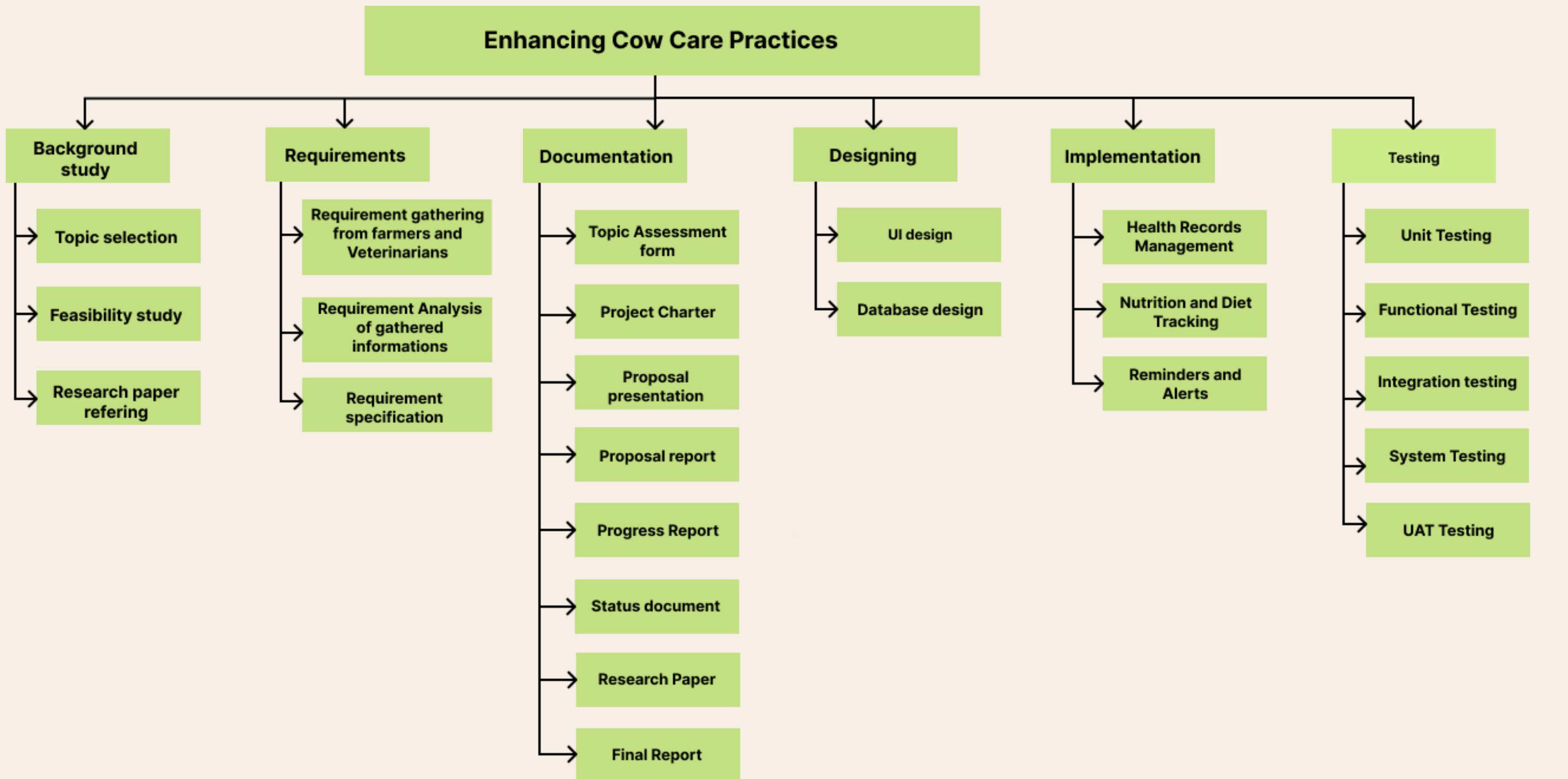
Non-Functional Requirements

- Scalability to manage increasing data without performance degradation.
- Ensure secure data handling and user authentication.

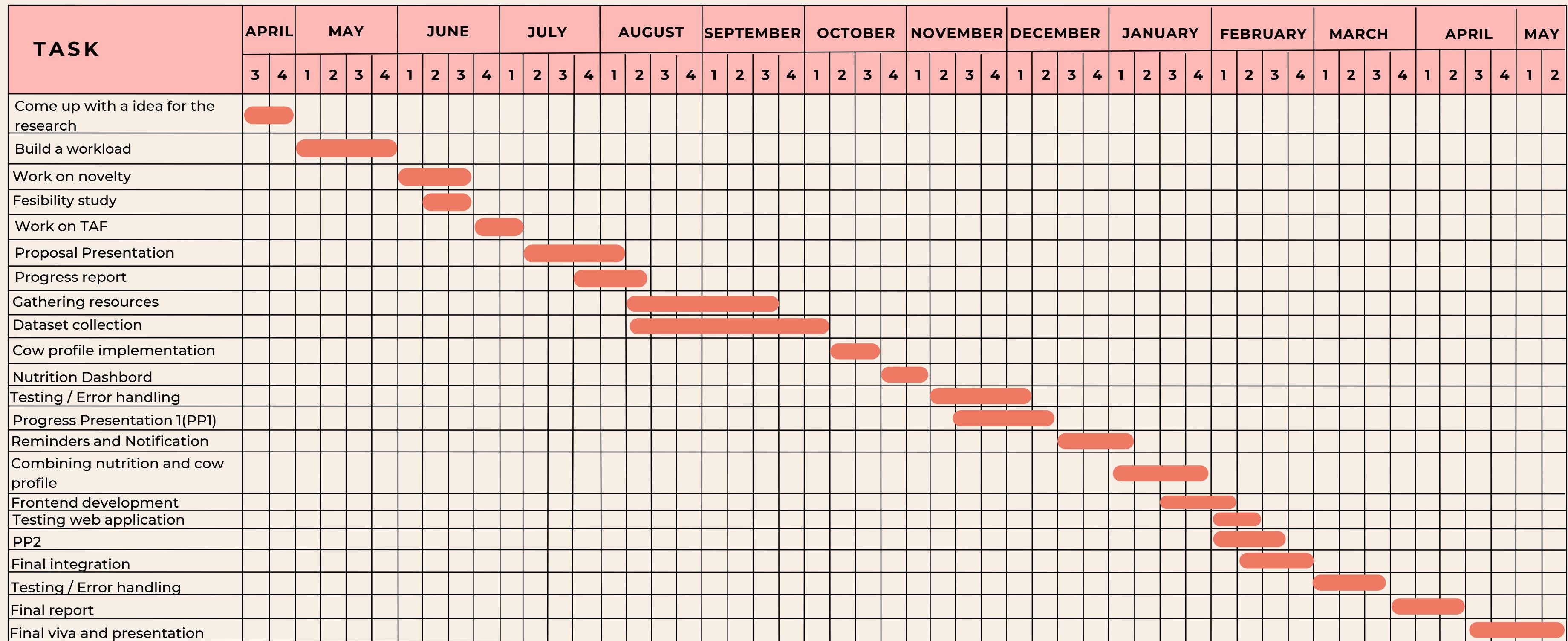
Personal Requirements

- Knowledge in UI/UX design.
- Experience in backend development and data management.
- Understanding of animal nutrition and health metrics.

Work Breakdown Structure



Gantt Chart



References

- [1] C. M. A. D. J. D. G.-W. G. Curtis, "The impact of early life nutrition and housing on growth and reproduction in dairy cattle," [Online]. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5812595/>.
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- [4] R. J. V. S. DVM, "Dry Cow Nutrition: The Key to Improving Fresh Cow Performance," sciencedirect, [Online]. Available: <https://www.sciencedirect.com/science/article/abs/pii/S0749072015307854>.



IT21174162 | Ekanayake E.M.D.T

BSc. (Hons) Degree in Information Technology Specialization in Information Technology

Component 2: Enhancing Dairy Farm Efficiency through Milk Production Prediction

- Identification of Key Environmental Factors
- Data Collection and Preparation for Milk Production Prediction
- Development and Optimization of Predictive Models
- Development of a Prediction Application

Research Question

Component 3 : Enhancing Dairy Farm Efficiency through Milk Production Prediction

- How do seasonal changes affect milk production?
- How to use past performance data to forecast future production?
- How to use technology to improve milk production predictions?
- What are the economic implications of milk production predictions?
- What are the best practices for herd management to optimize milk production?



Research Objectives

Specifics

- Gather historical and real-time data on environmental factors and milk production.
- Choose suitable machine learning models and train them.
- Develop an application or dashboard that integrates the predictive model for real-time predictions.

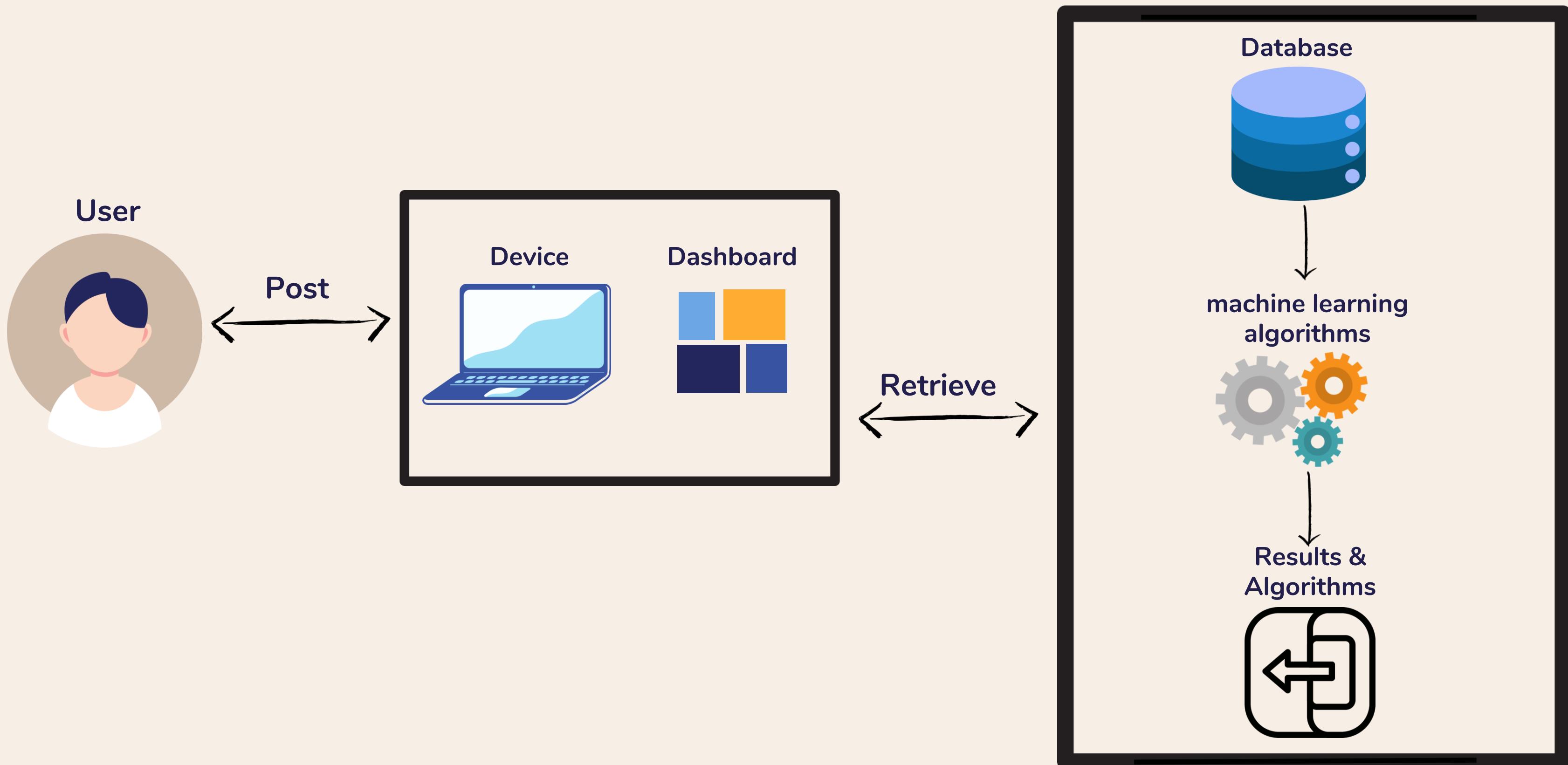
Sub Objective

- Select factors like temperature, humidity, and feed quality.
- Gather historical and real-time data from weather stations, IoT devices, and farm systems.
- Train models with historical data and optimize parameters.
- Create a user-friendly dashboard that integrates the predictive model.

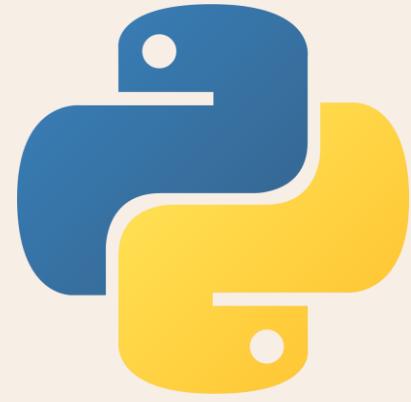
Research Gap

	Research A	Research B	Research C	Our Research
Machine Learning Algorithm	ANN	k-NN	LSTM	Random Forest
Localized Data	✗	✓	✗	✓
Feature Selection and Engineering	✓	✗	✗	✓
Seasonal and Environmental Factors	✓	✓	✗	✓
Feedback Loop	✗	✗	✗	✓

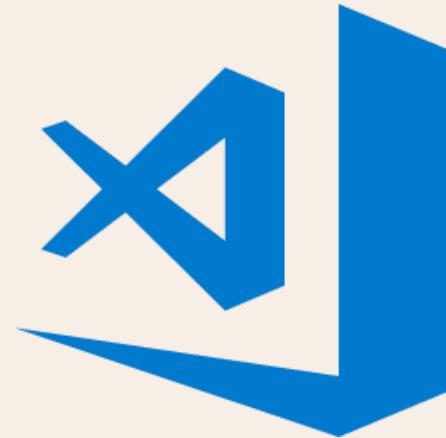
How the System Works



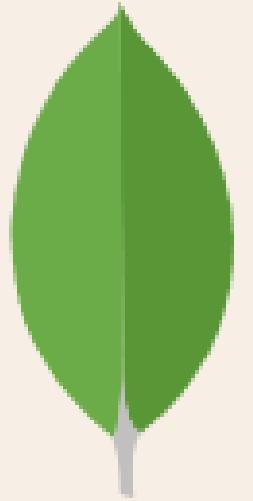
Technologies



Python



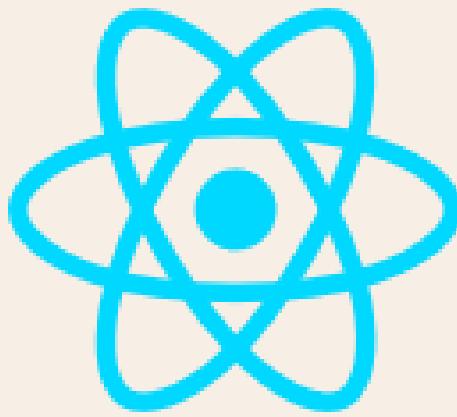
VS code



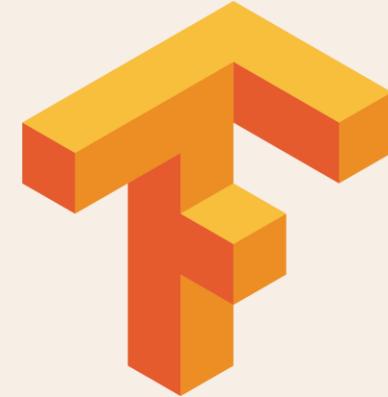
MongoDB



GitHub



React



TensorFlow

Functional Requirements

- Collect historical data on environment and milk production.
- Create a machine learning model to predict milk production.
- Provide an interface for farmers to input data and get predictions.

System Requirements

- Collect and store historical data.
- Train and deploy machine learning models.
- User interface for data input and output.

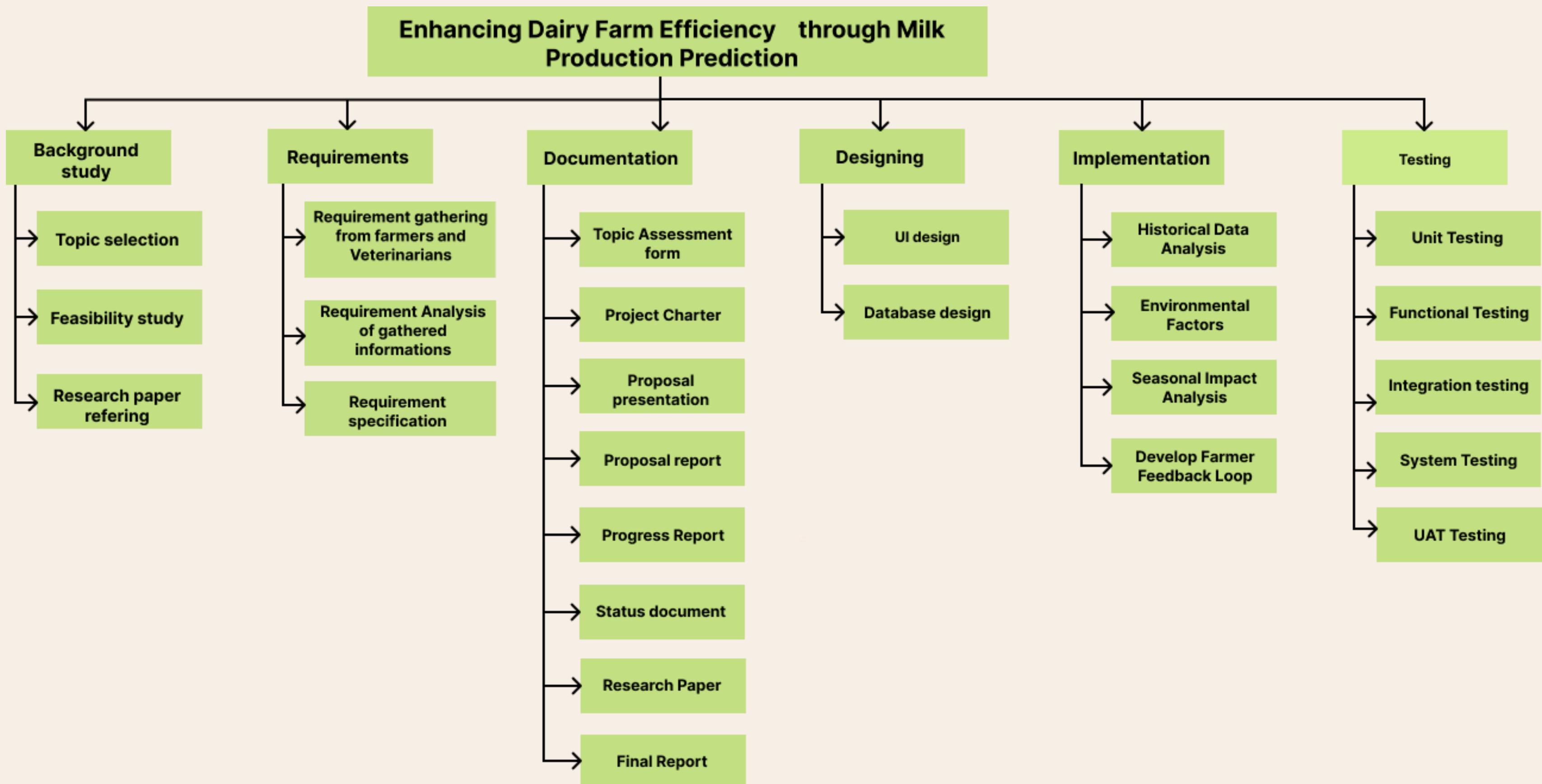
Non-Functional Requirements

- Keep making the model more accurate.
- Make predictions quickly.
- Give real-time answers.

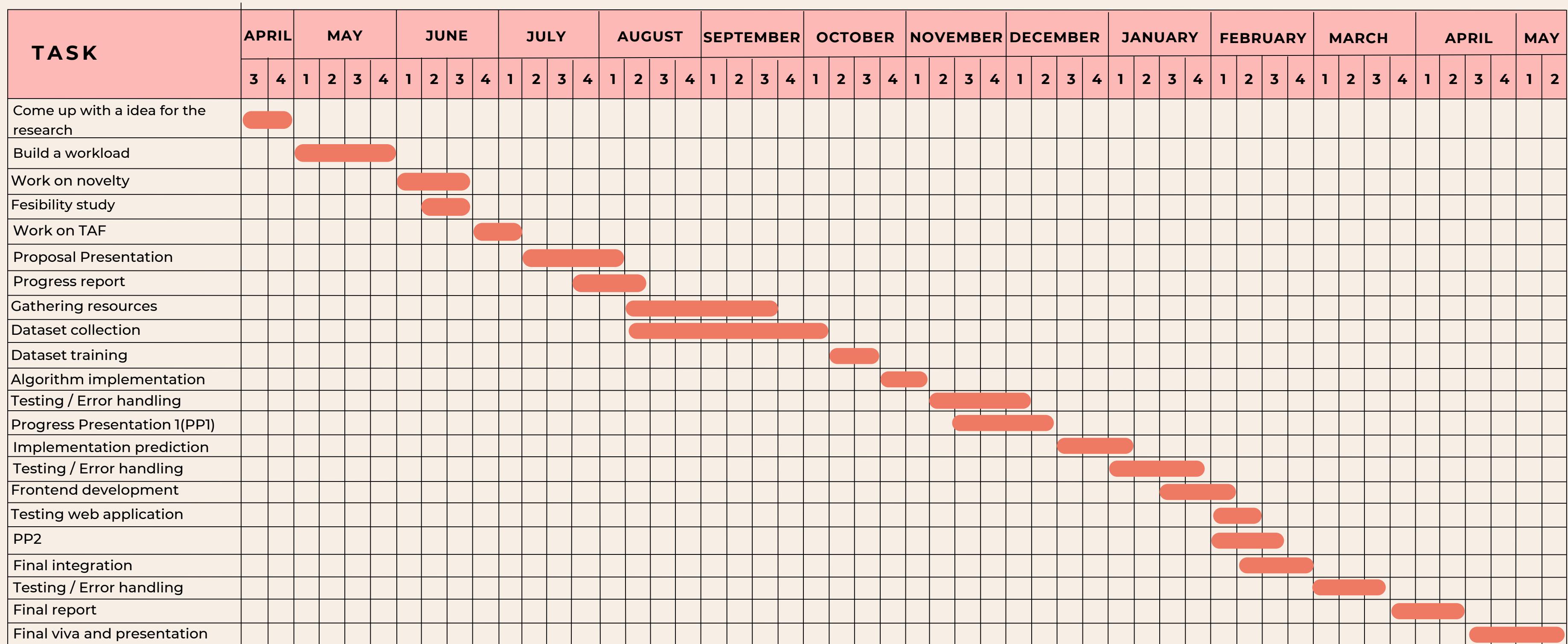
Personal Requirements

- Skills in data analysis and machine learning.
- Experience in building predictive models.
- Ability to integrate data and develop user interfaces.

Work Breakdown Structure



Gantt Chart



<h1>Estimated Budget per month</h1>	Amount (LKR)
Travel fees for data collection	2444.00
Internet charges	1556.00
Extra charges	1500.00
Total	5500.00

Referances

- [1] (Saleh et al., Prediction of some milk production traits using udder and TEAT measurements with a spotlight on their genetic background in Friesian Cows 2023)
- [2] (Suseendran & Duraisamy, Predication of dairy milk production using machine learning techniques 1970)
- [3](Damunupola et al., Sri Lanka's dairy sector: Where to move and what to do – prediction and a trend analysis 2022)



IT21379956 | Hettiarachchi V.E

BSc. (Hons) Degree in Information Technology Specialization in Information Technology

Research Question

Component 4 : Streamline veterinary communication and services

- How to find nearest available veterinarian center?
- How to find a qualitied veterinarian with good animal care service?
- What are the possible ways to schedule an appointment with the veterinarian?
- What are the better ways to communicate with a veterinarian that will be available immediately?



Research Objectives

Specific

Creating an application which facilitate the ability to identify nearest available veterinarians in an emergencies and provide the support to communicate easily.

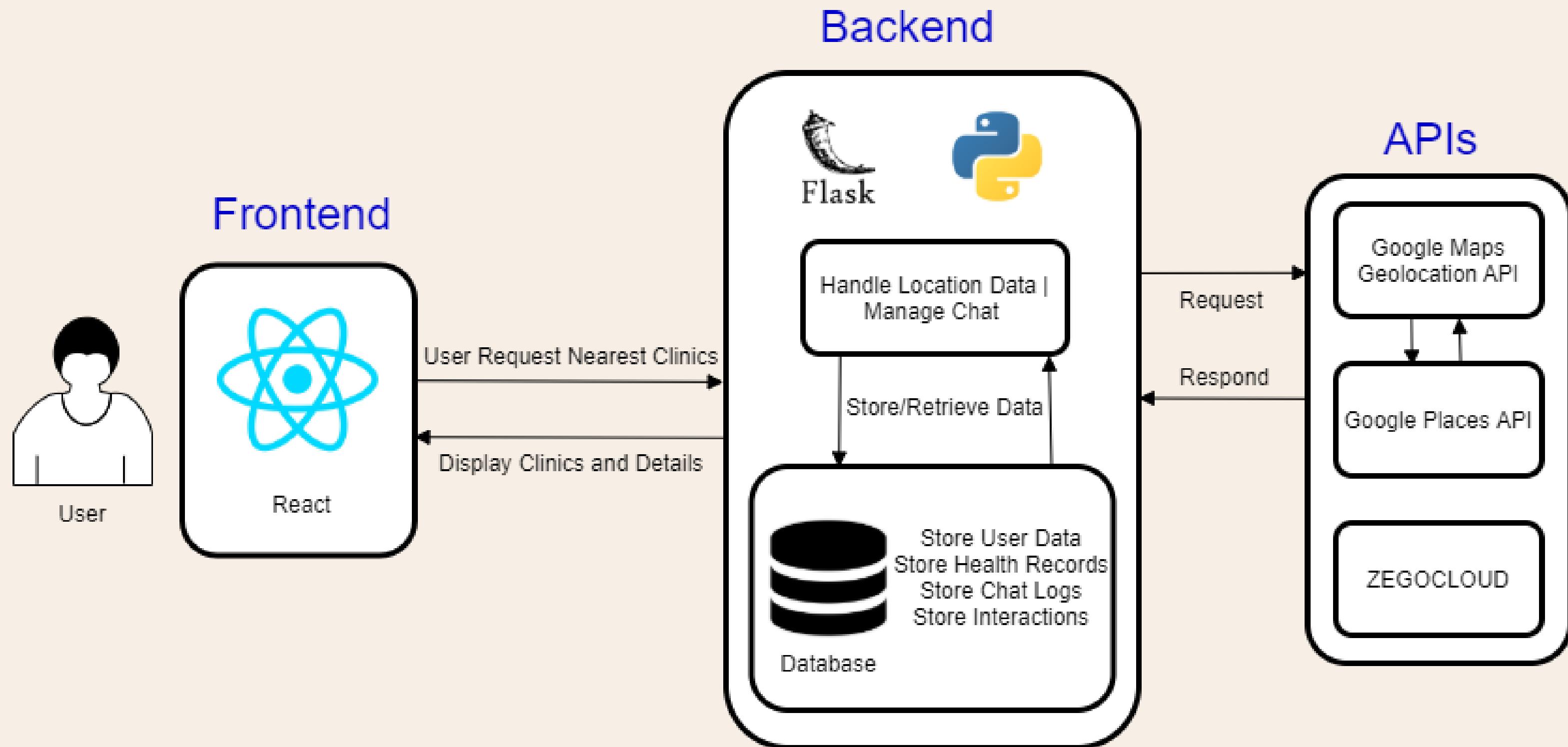
Sub Objective

- Integration of an API to locate the nearest animal hospitals.
- Communication tools for consultations and emergency support.
- Veterinarian Profile Management.
- Scheduling and managing veterinary appointments.
- Provide alerts about appointment scheduled.

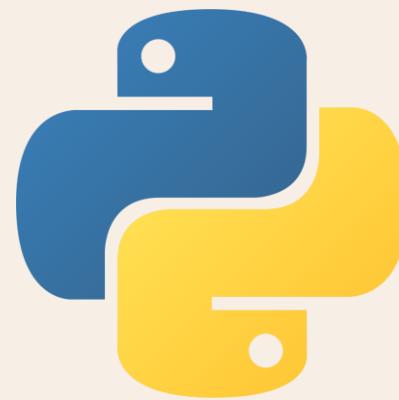


Research Gap	Detect nearest location	Appointment scheduling	Chat with veterinarians	Alerts	Veterinary Profile Management
Petvet	✗	✓	✗	✗	✗
Vet2Pet	✗	✓	✓	✓	✗
DaySmart vet	✗	✓	✗	✗	✗
PetDesk	✗	✓	✓	✓	✗
Vetstoria	✗	✓	✗	✓	✗
afimilk	✗	✗	✗	✗	✗
ezyVet	✗	✗	✓	✓	✗
CowManager	✗	✗	✗	✓	✗
Our Research	✓	✓	✓	✓	✓

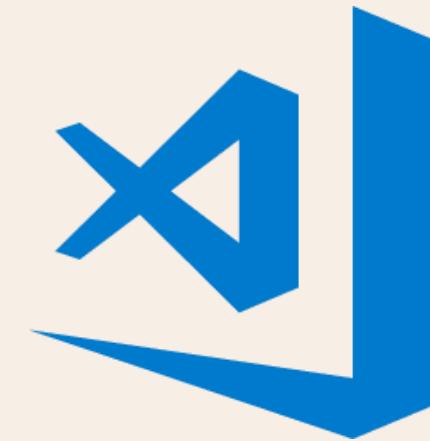
Diagram



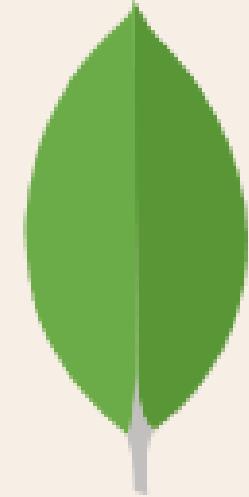
Technologies



Python



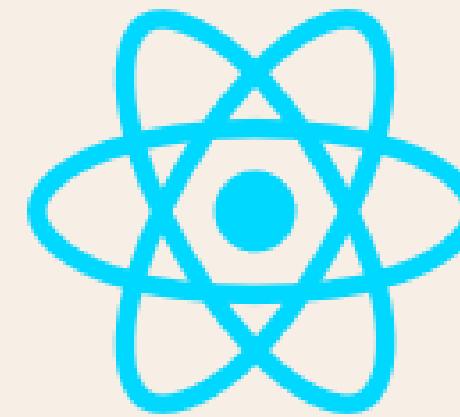
VS code



MongoDB



GitHub



React



Google map API



Postman

Requirements

Functional Requirements

- Provide online scheduling for veterinary appointments.
- Enable emergency assistance requests and quick response.
- Integrate an API to locate and display nearby veterinary clinics.
- Offer real-time information on availability and services.
- Ensure secure transmission and data protection.

Non-Functional Requirements

- Ensure 24/7 accessibility of scheduling and communication features.
- Maintain high system availability and minimal downtime.
- Provide latency-free communication channels for real-time interaction.

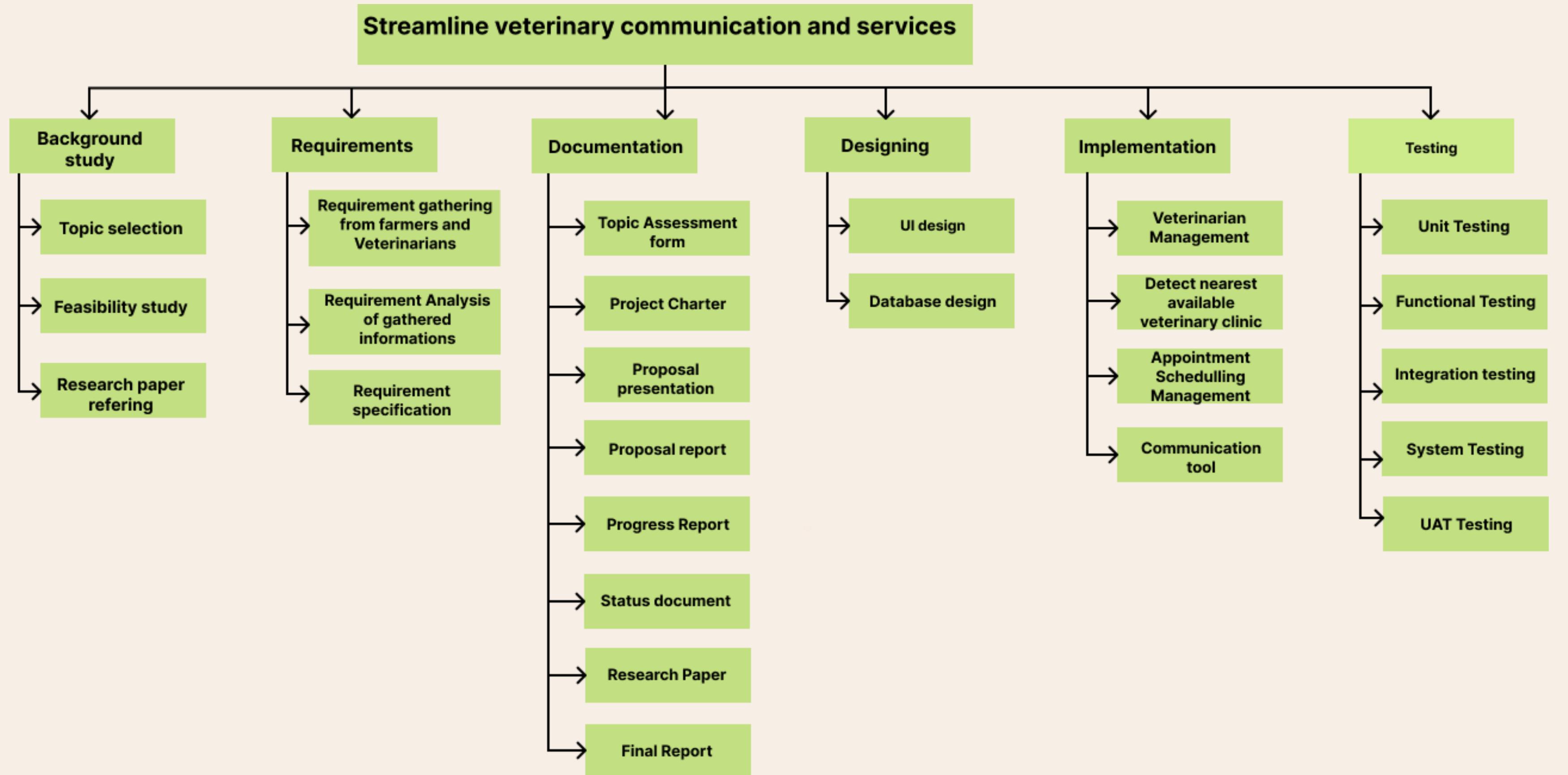
System Requirements

- Appointment scheduling system.
- Communication tools for messaging and consultations.
- API integration for locating veterinary clinics.
- Profile management system for veterinarians.

Personal Requirements

- Experience in developing scheduling systems and communication tools.
- Skills in API integration and data security.
- Familiarity with veterinary practices and services.

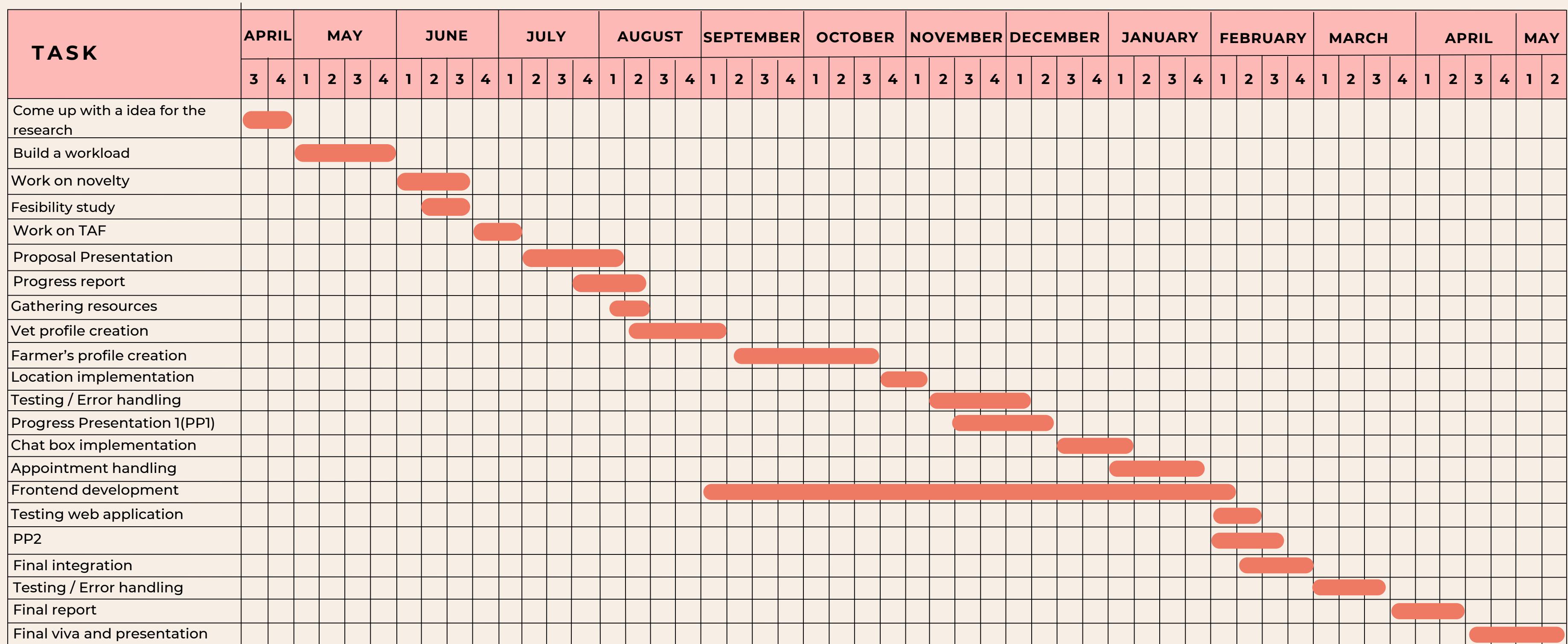
Work Breakdown Structure



Estimated Budget per month

	Amount (LKR)
Travel fees for data collection(Dompe veterinary office)	2000.00
Internet charges (the development and technical information learning)	3000.00
Server Cost	5000.00
Electricity	3500.00
Documentation and Printing Cost	1000.00
Total	14500.00

Gantt Chart



Referance

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Market Need

- The agricultural industry, particularly dairy farming, is constantly seeking ways to improve productivity, animal welfare, and operational efficiency.
- Current challenges such as delayed disease detection, inefficient cow care practices, and lack of predictive tools for milk production create a substantial demand for advanced technological solutions.
- Our application meets these needs by providing a comprehensive and user-friendly platform that integrates multiple functionalities.



Target Market

Dairy Farmers



Primary users who will benefit from improved disease detection, personalized cow care, and accurate milk production predictions.

Veterinarians

Professionals who require efficient tools for managing appointments, accessing health records, and providing timely advice and support.



Agricultural Enterprises

Companies involved in livestock management and dairy production, looking to optimize their operations and improve productivity



Animal Health Organizations

Institutions focused on animal welfare and health, seeking advanced tools to monitor and improve livestock health.

Commercialization

- **Online Platform:** Primary distribution through a dedicated website
- **Initial Launch:** Focus on regions with high dairy farming activity
- **Subscription-Based:** Offer monthly and annual subscription plans for farmers and veterinarians. (LKR 200.00 for month)
- **Digital Marketing:** Utilize social media and email campaigns to reach target audiences.





Thank you for listening!

Don't hesitate to ask any questions!