AGRI DOC

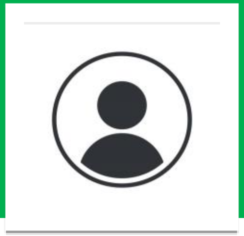
A Multifunctional Mobile Application for Enhancing Paddy Farming Efficiency

GROUP NO R25-057

Members

Supervisor
Ms. Sanjeevi Chandrasiri

Co-Supervisor
Ms. Karthiga Rajendran



External Supervisor
T. Tharshananthan
Agrarian Development Officer,
Agraron Service Center,
Uppuveli,Trincomale.

U. Sutharson

A.Shivaphiriyan

Lavanya .M

V. Abilaxshan

AgriDoc

Introduction to The Overall Project

How can an integrated digital platform address the challenges of irrigation management, weed identification, pest identification and control , and market analytics to improve the sustainability and productivity of paddy farming

Research Questions

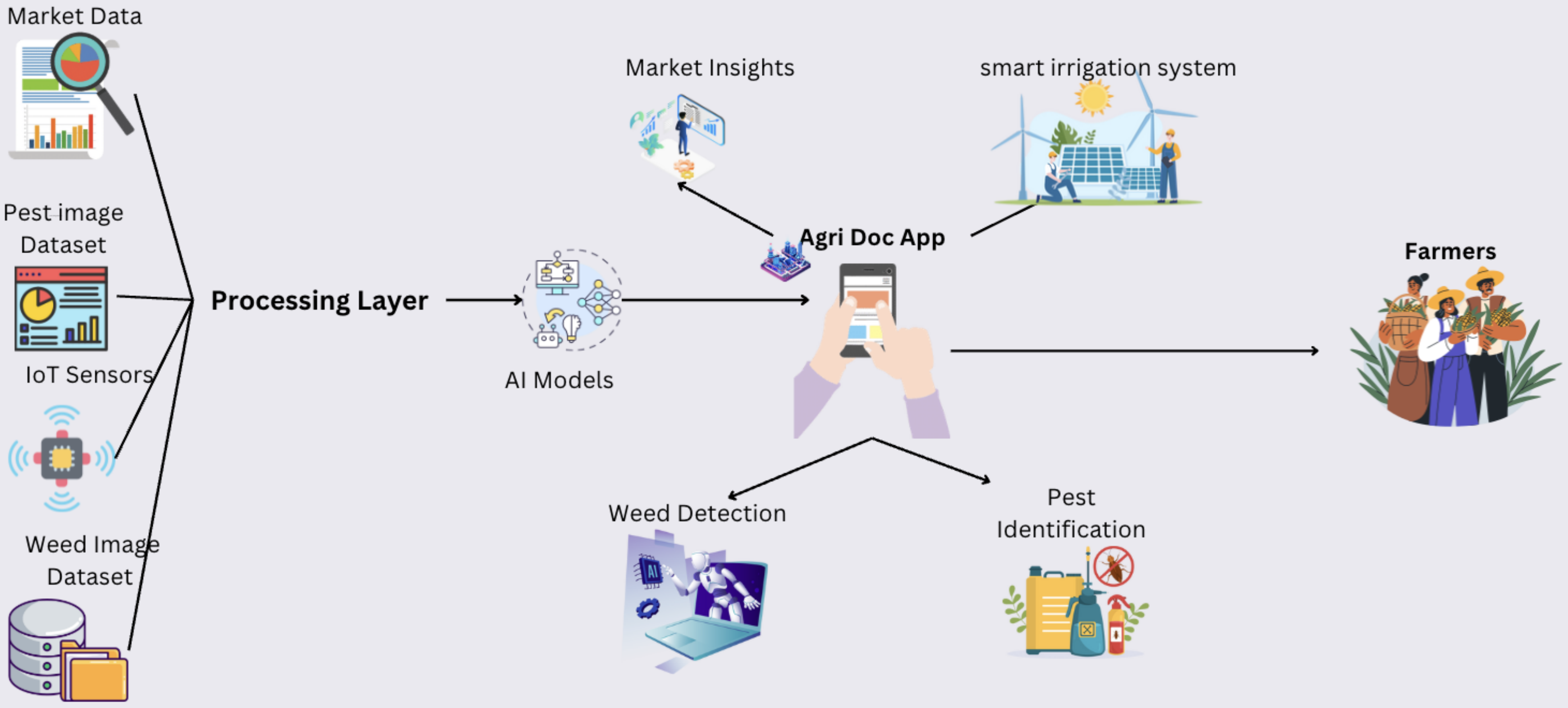
1. How can AI-driven weed identification enhance precision agriculture and reduce herbicide dependency in paddy farming?
2. What measurable impact can cause pest identification & Effete
3. How does an IoT-based automated irrigation system impact paddy crop yield and water resource efficiency?
4. How can a user-friendly mobile platform improve accessibility and adoption of digital farming solutions among small-scale farmers?

Research Objectives

Develop *Agri Doc* app to empower paddy farmers with technology-driven solutions.

- Real-time irrigation monitoring using IoT sensors.
- AI-based weed identification for targeted control.
- Location-specific weather forecasts and alerts.
- Market insights with pricing and demand trends.

Diagram for Agri Doc



IT21829406 | U SUTHARSON

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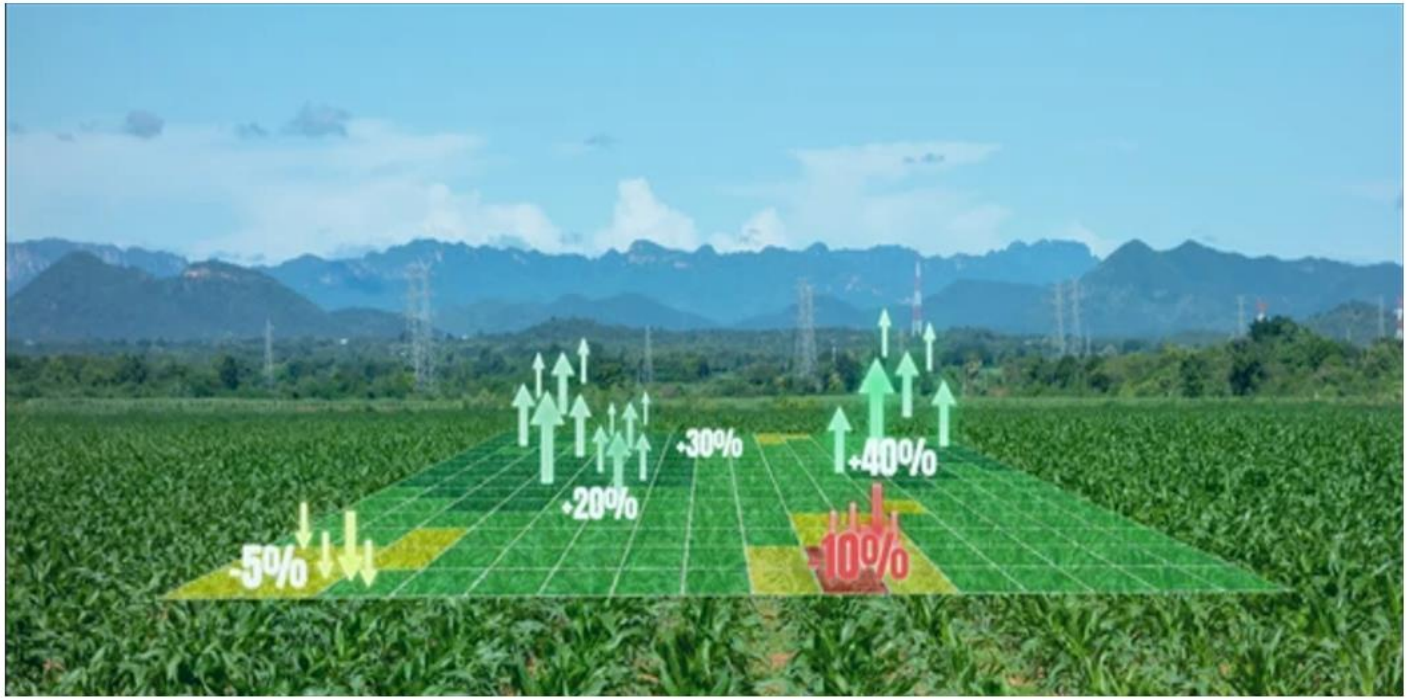
Market Data Analysis

Introduction

Farmers often face challenges due to the lack of real-time market data, which leads to poor pricing decisions and financial losses. The market data analysis function addresses this issue by providing valuable insights into pricing trends and market demand. By leveraging data analytics, machine learning, and seamless market integration, this function equips farmers with accurate and timely information. These insights enable better decision-making, improve profitability, and contribute to enhanced financial stability for farmers.

Research Problem

- Farmers lack real-time, accurate market insights for pricing and sales decisions.
- This leads to economic instability and undervaluation of produce.
- Developing a predictable trend for price and demand can address these challenges effectively.

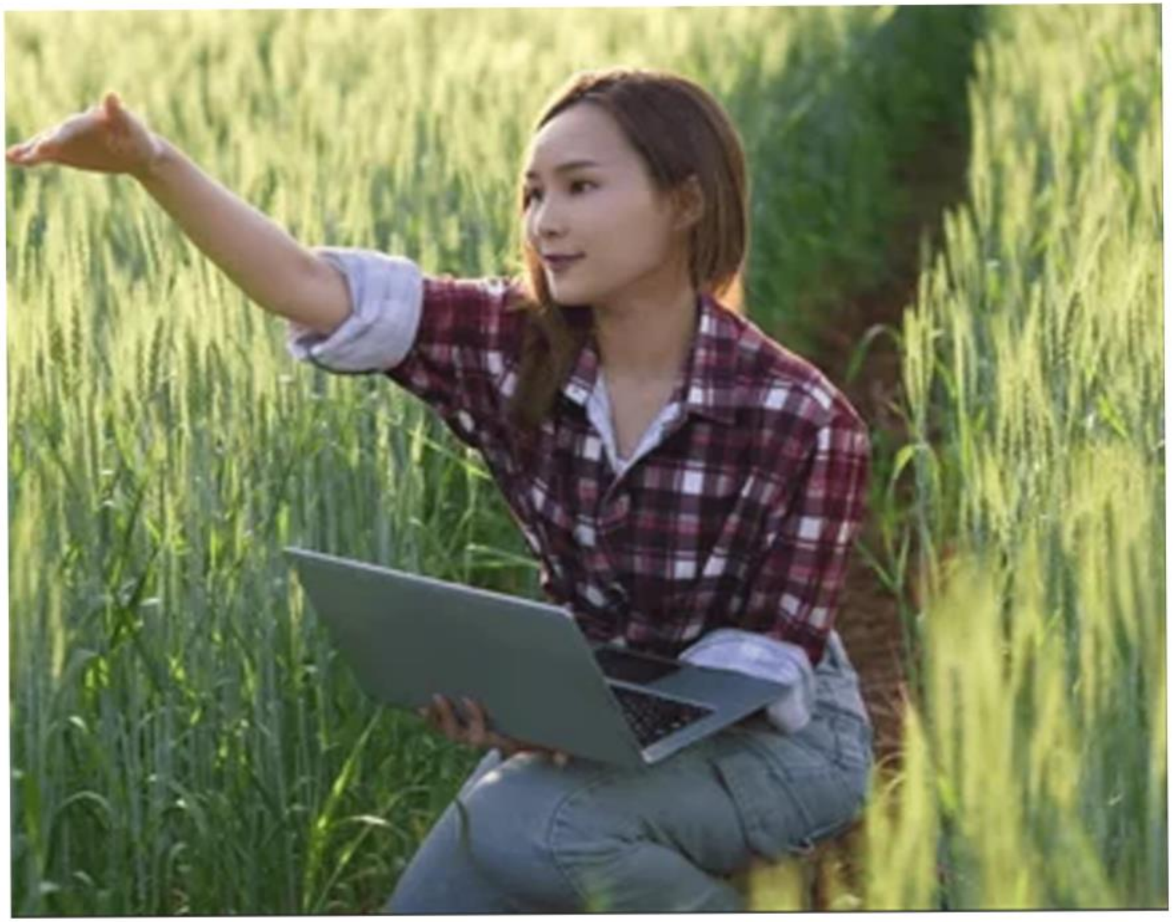


Research Gap

- Existing platforms focus primarily on crop cultivation, not market insights.
- No region-specific or predictive models tailored for paddy farmers.
- Previous apps and research have separate functions for prices or demands but lack a combined function integrating both price and demand.

Main Objective

To design a market data analysis module that equips farmers with actionable insights into pricing trends and optimal selling times.



Sub Objective

Collect and analyze

- Collect and analyze market data, including pricing and demand.

Develop

- Develop predictive models for future pricing trends and demand

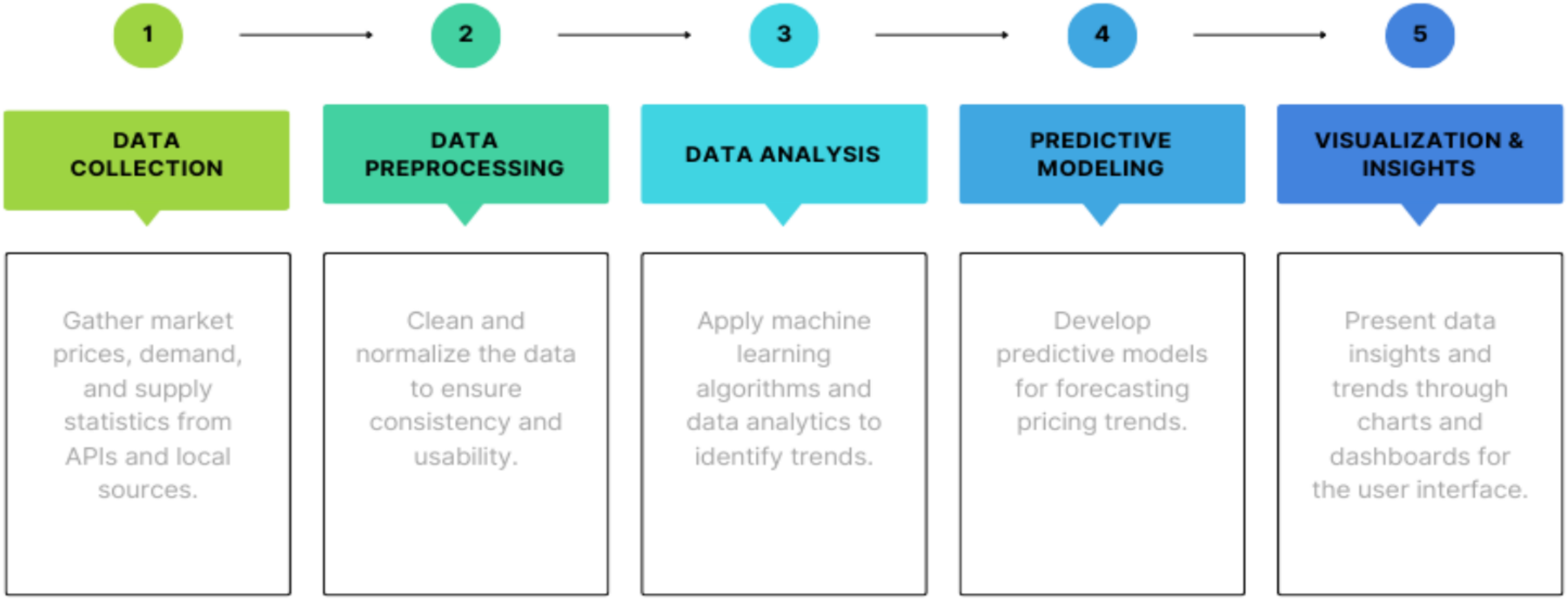
Provide

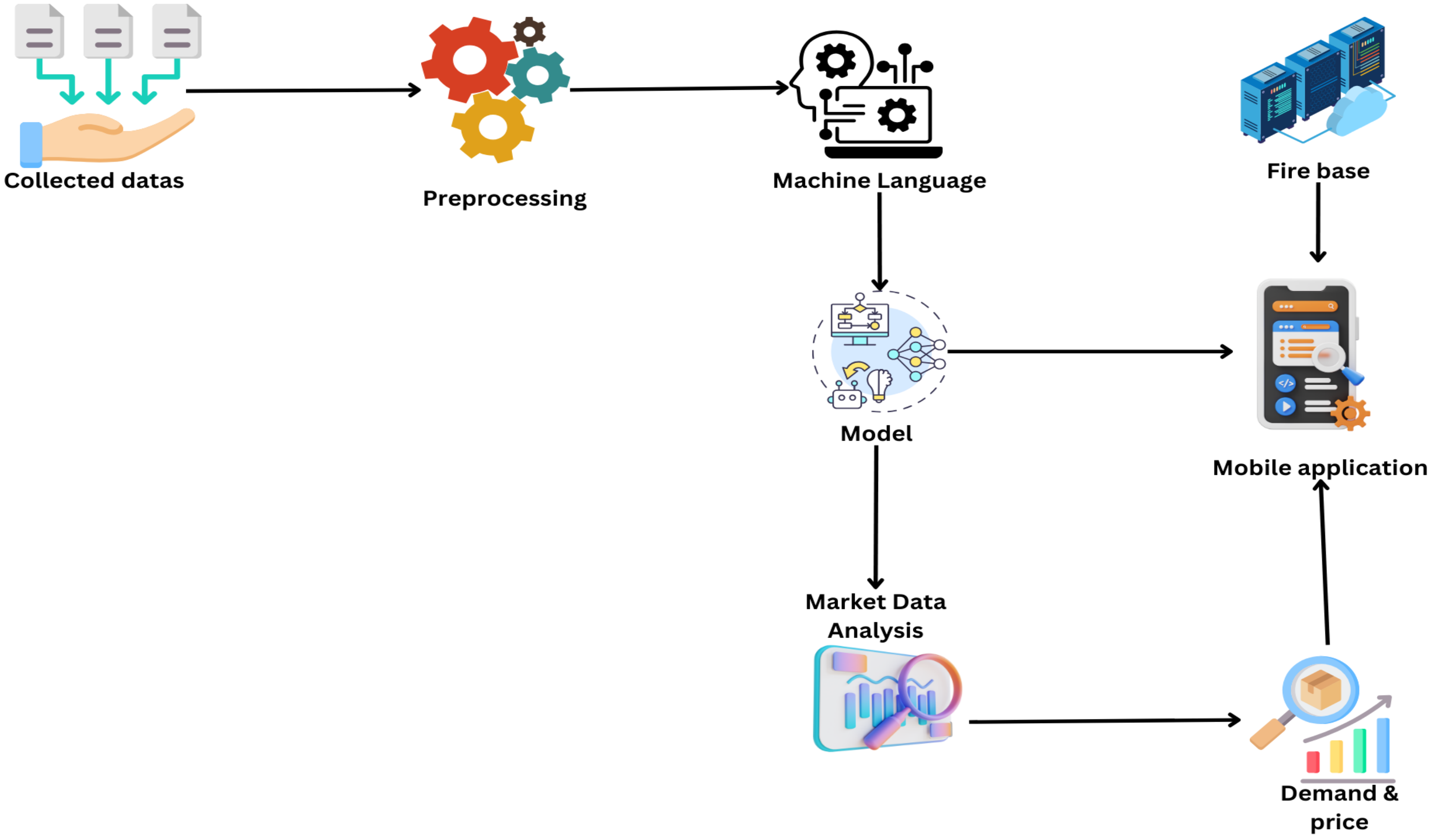
- Provide comparative insights into local and regional markets.

Enable

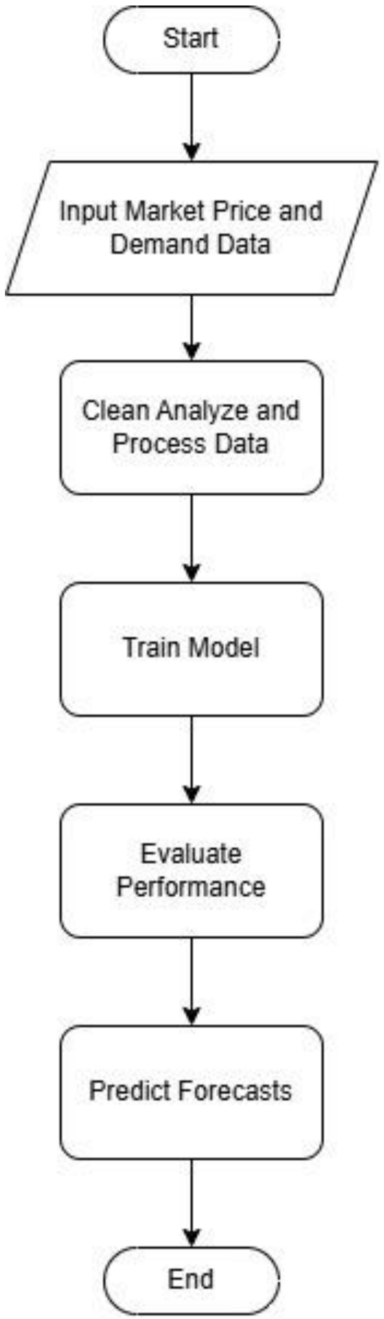
- Enable real-time tracking of market changes.

Methodology




Collected datas
Preprocessing
Machine Language
Fire base
Model
Mobile application
Market Data Analysis
Demand & price

Flow Chart Diagram



System Requirements

- **Hardware**:

  Server: Intel Core i5, 8GB RAM, 500GB SSD, high-speed internet.

  Mobile Devices: Android/iOS, 2GB RAM, 50MB storage.

- **Personal**:

  System Administrator, Data Analyst, Software Developer.

- **Software**:

  Development: Python, Dart, Firebase , Android Studio.

  Machine Learning: Supervised Learning

  Visualization: Flutter chart

  API Integration: RESTful APIs for real-time data.

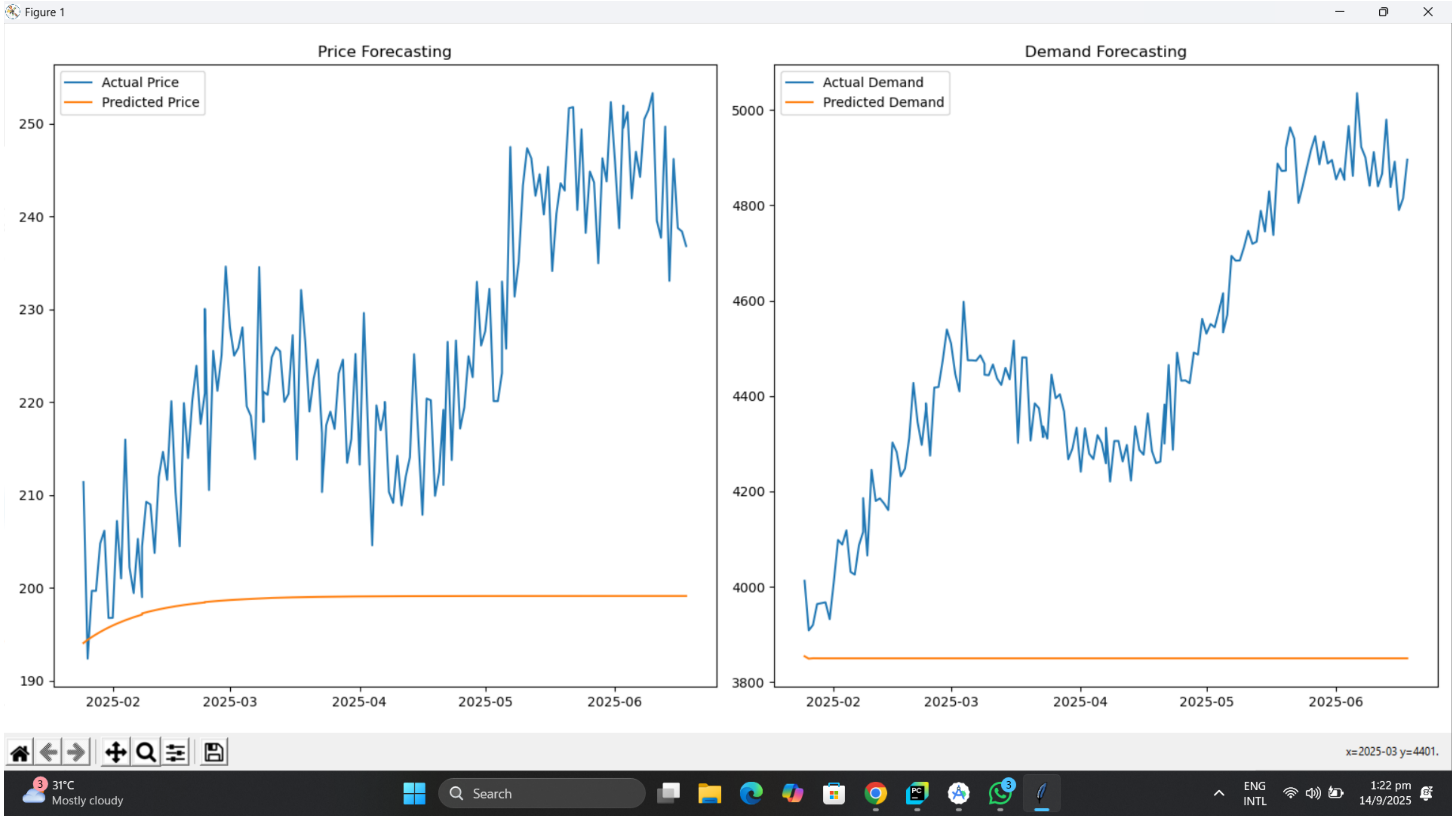
Technologies to Be Used

- Programming Languages: Python (analytics), Dart (Flutter UI)
- ML Frameworks: Supervised Learning
- Database: Firebase
- Dataset: Farmers
- Visualization Tools: Flutter chart

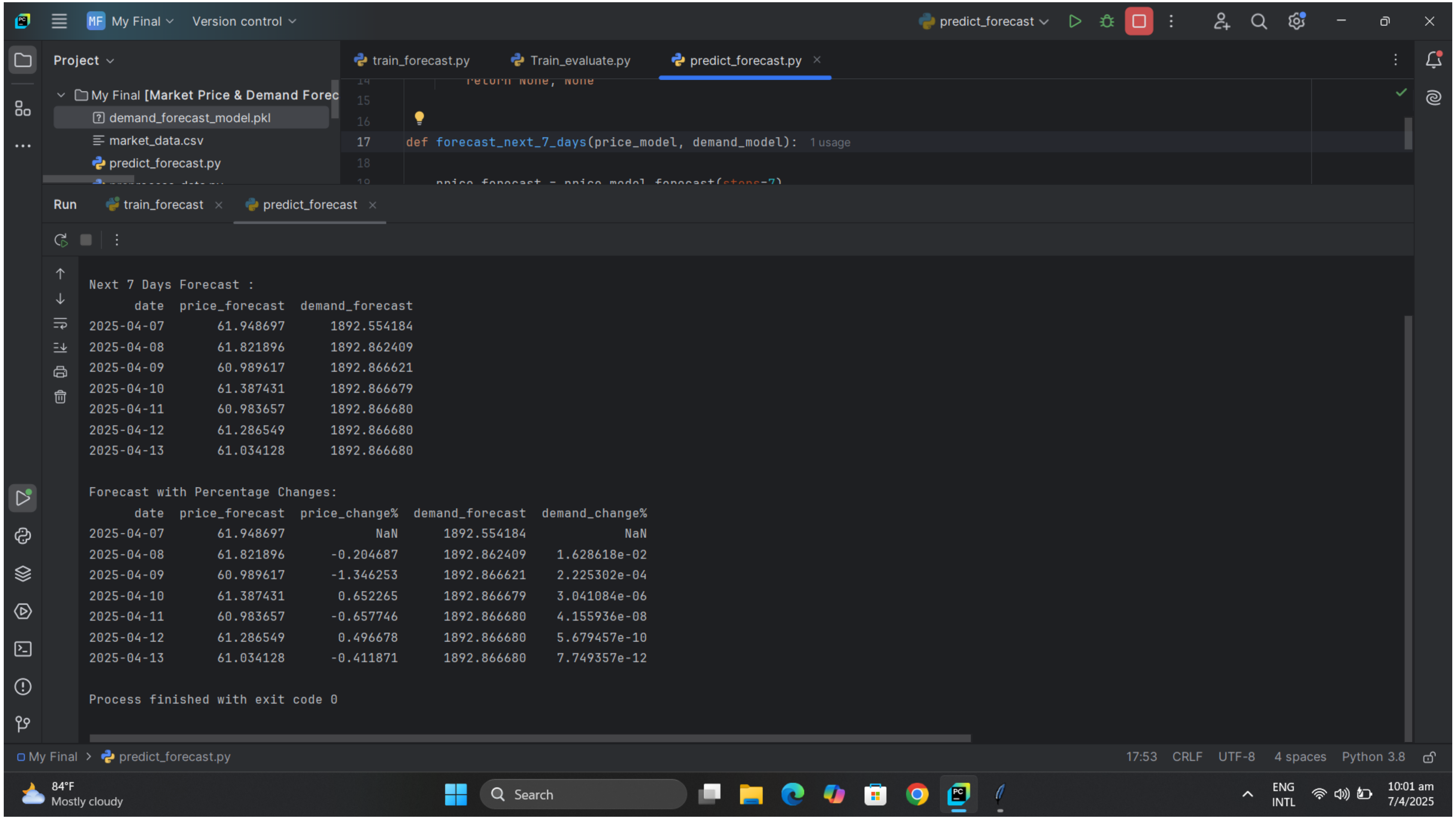
Commercialization Strategy

- **Target Audience**: Small to medium-scale paddy farmers, agricultural cooperatives.
- **Revenue Model**:
  - Freemium (basic insights free, advanced analytics premium).
  - Partnerships with governments/NGOs for subsidies.
  - Advertisement revenue from agricultural products.
- **Distribution**:
  - Mobile app stores (Google Play, Apple App).
  - Partnerships with farming associations.
  - Workshops and awareness campaigns.
- **Growth**:
  - Localized market data and languages.
  - Expand to other crops/agriculture industries.
  - Integrate with e-commerce platforms.

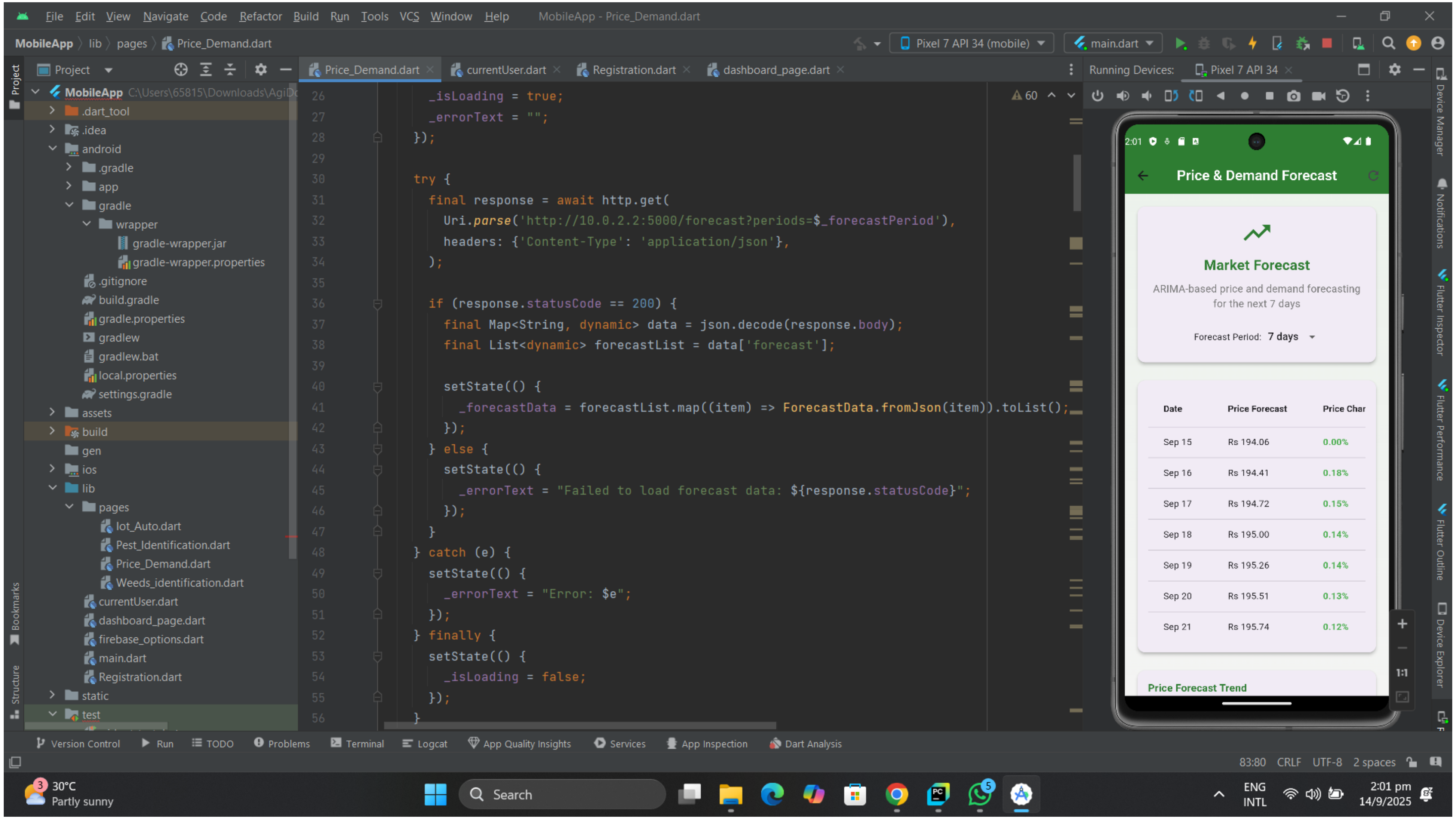
Training Forecast



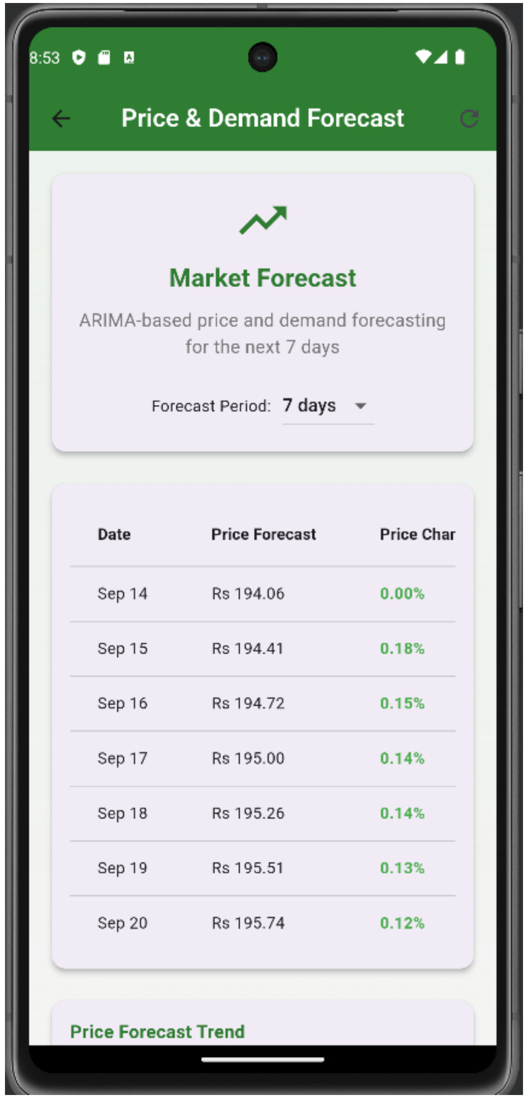
Prediction Forecast

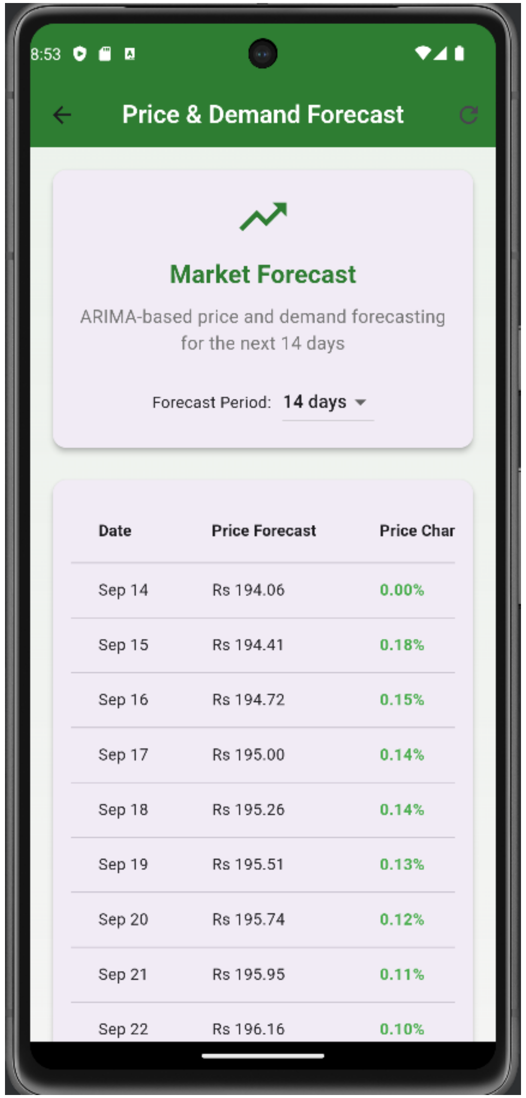


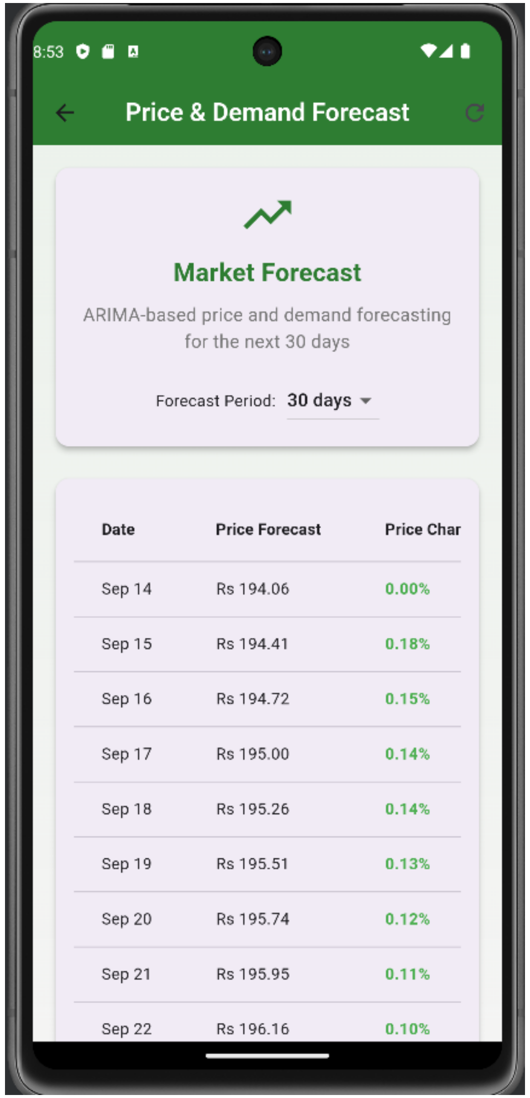
Debugging in Android Studio



Emulator Screenshots

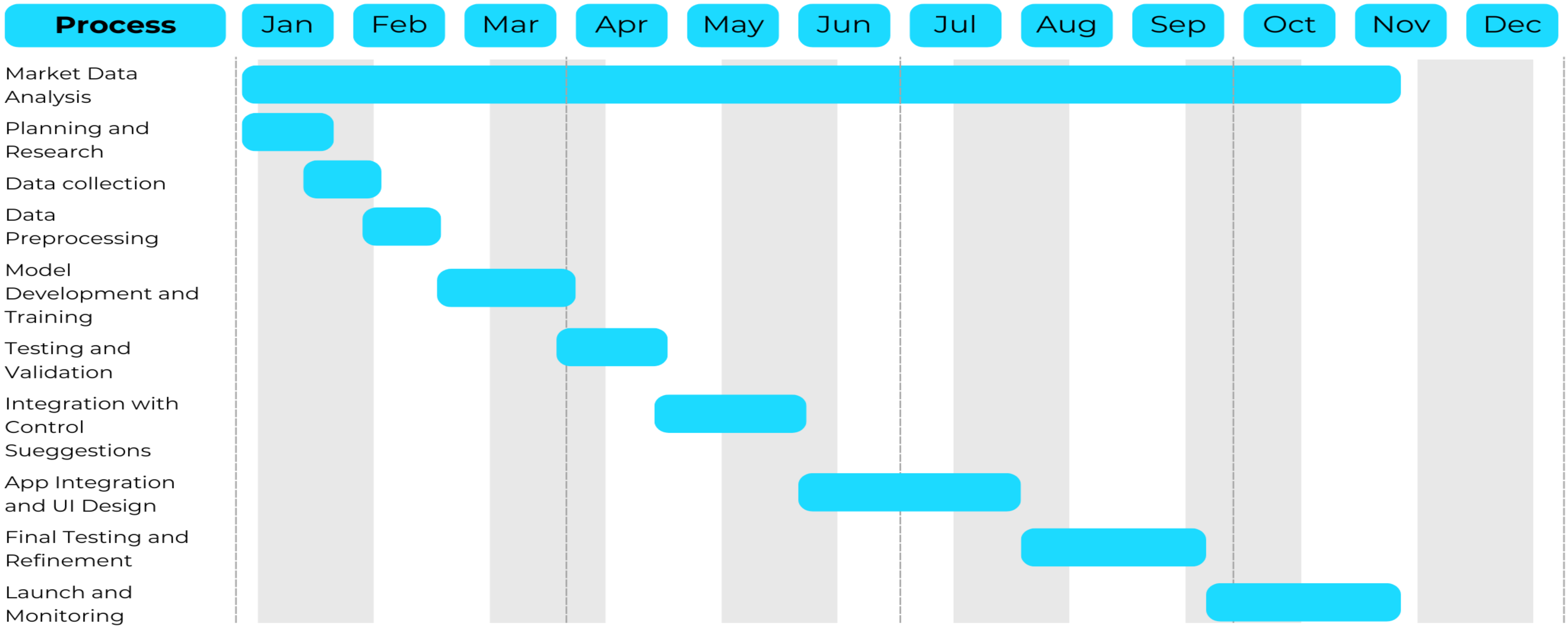






Gantt Chart

R25-057 | Agri Doc App



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IT21809460|LAVANYA.M

BSc (Hons) Information Technology Specializing in Information Technology

WEED IDENTIFICATION

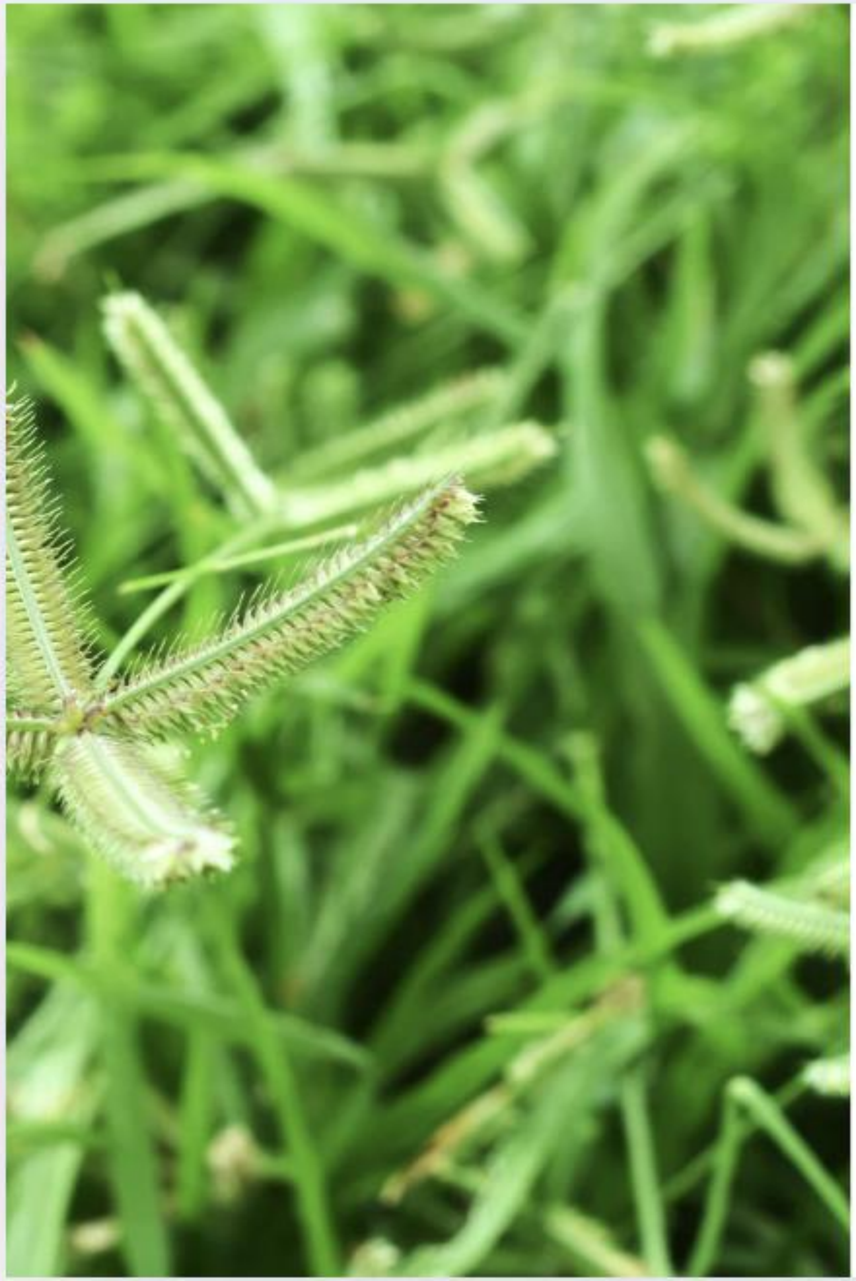
Introduction

Background

- Weed management boosts crop yield by reducing competition for resources. Traditional methods are labor-intensive and inefficient for large-scale farming.
- Manual detection is often inaccurate, and excessive herbicide use harms the environment. Advanced tools for precision weed control are lacking.
- AI and ML enhance weed detection through image recognition, classify weeds efficiently, and provide tailored recommendations for effective control.
- AI systems reduce herbicide use, save time, promote sustainability, and improve crop yield.

Research problem

How can AI-based image recognition techniques be employed to develop an adaptive system that effectively identifies and classifies weeds in paddy fields,providing real-time recommendations for environmentally sustainable weed management?



Specific and Sub Objectives

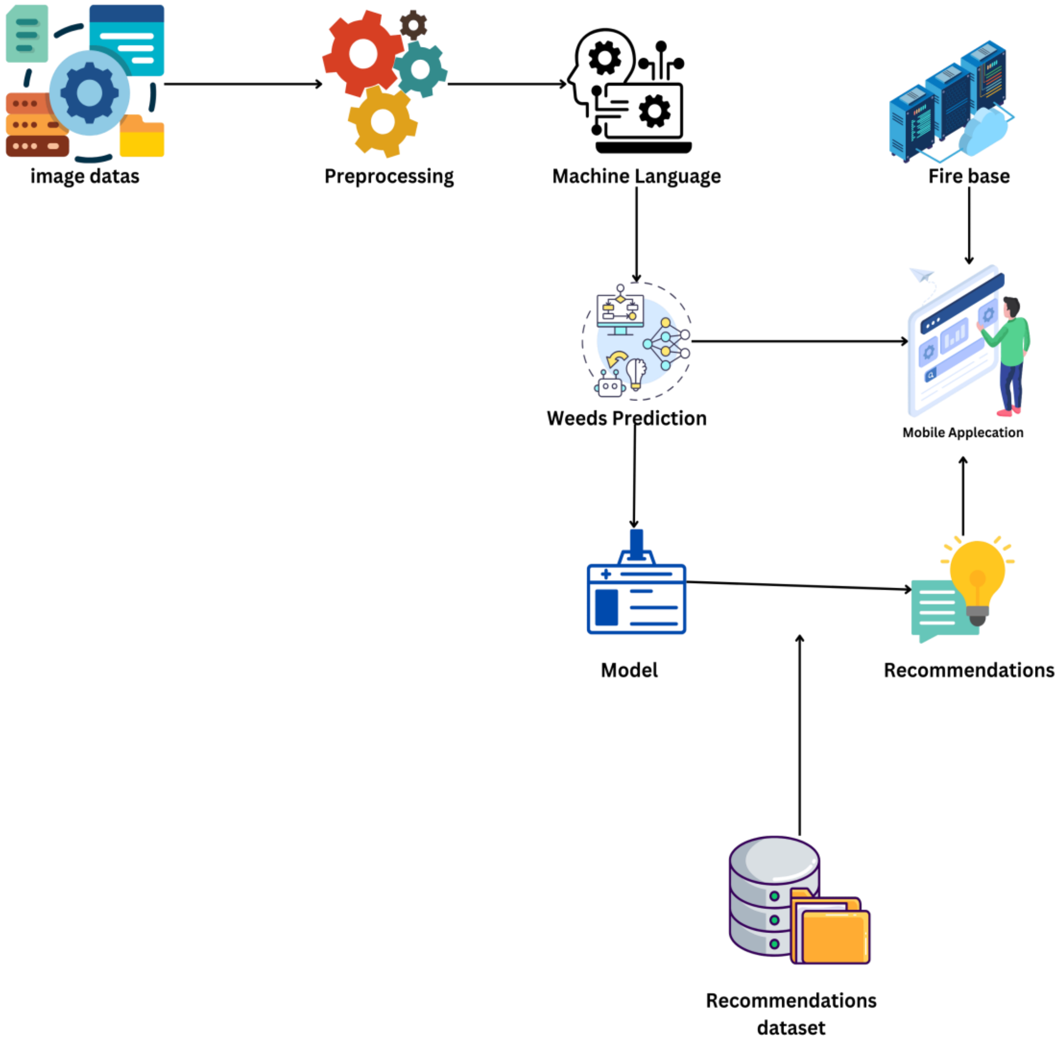
Specific Objectives

- Develop an Accurate Weed Identification Model
- Optimize for Real-Time Image Processing
- Provide Sustainable Weed Control Recommendations

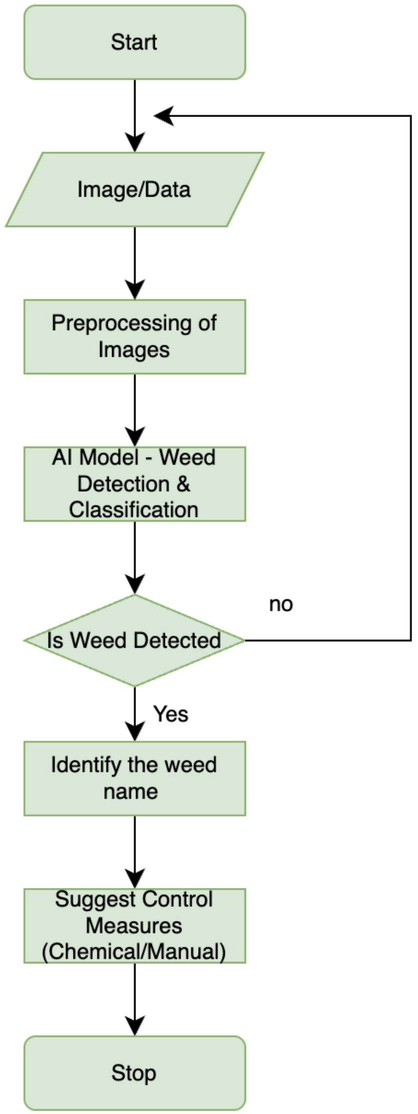
Sub-Objectives

- Data Collection & Labeling
- Model Training & Evaluation
- Cloud-Based Real-Time Alerts
- User Interface Design

System Diagram

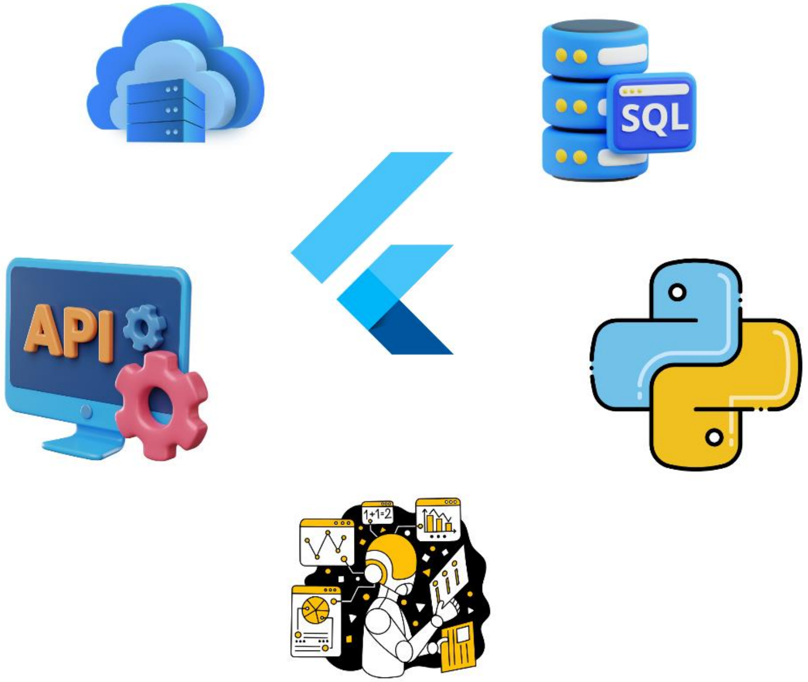


Flow chart



Start
Image/Data
Preprocessing of Images
AI Model - Weed Detection & Classification
Is Weed Detected
no
Yes
Identify the weed name
Suggest Control Measures (Chemical/Manual)
Stop

Tools & Technologies



Technologies

- OpenCV, Flutter, Firebase, FastAPI , TensorFlow,VGG16

Storage

- Firebase Cloud Storage

Programming Languages

- Python(training the machine learning model)
- Dart

Functional

Identify and classify weed species from field images.

Notify farmers through the mobile app about detected weeds.

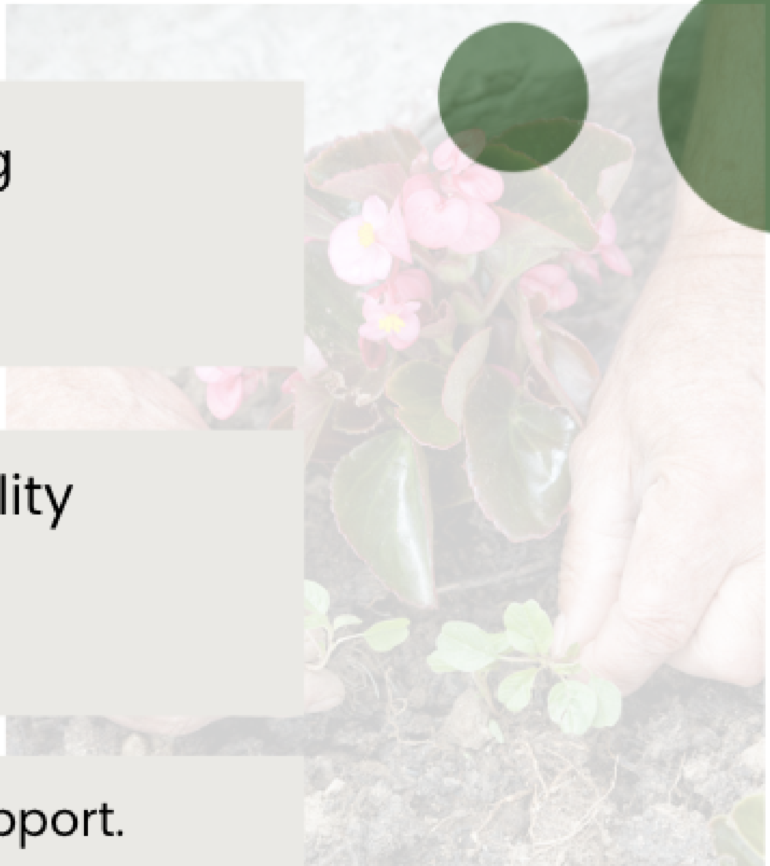
Provide real-time weed control recommendations.

Non-Functional

Fast processing

oHigh availability

oMultilingual support.



Weeds Identification System

Develop the Product: Create an easy-to-use mobile or web app with accurate AI-based weed detection, integrating it with agricultural tools like drones or automated sprayers.

Market Research: Identify target customers (farmers, agribusinesses, governments), analyze competitors, and tailor the product to meet market needs

Revenue Models: Offer subscription plans, freemium services, or B2B licensing to generate revenue.

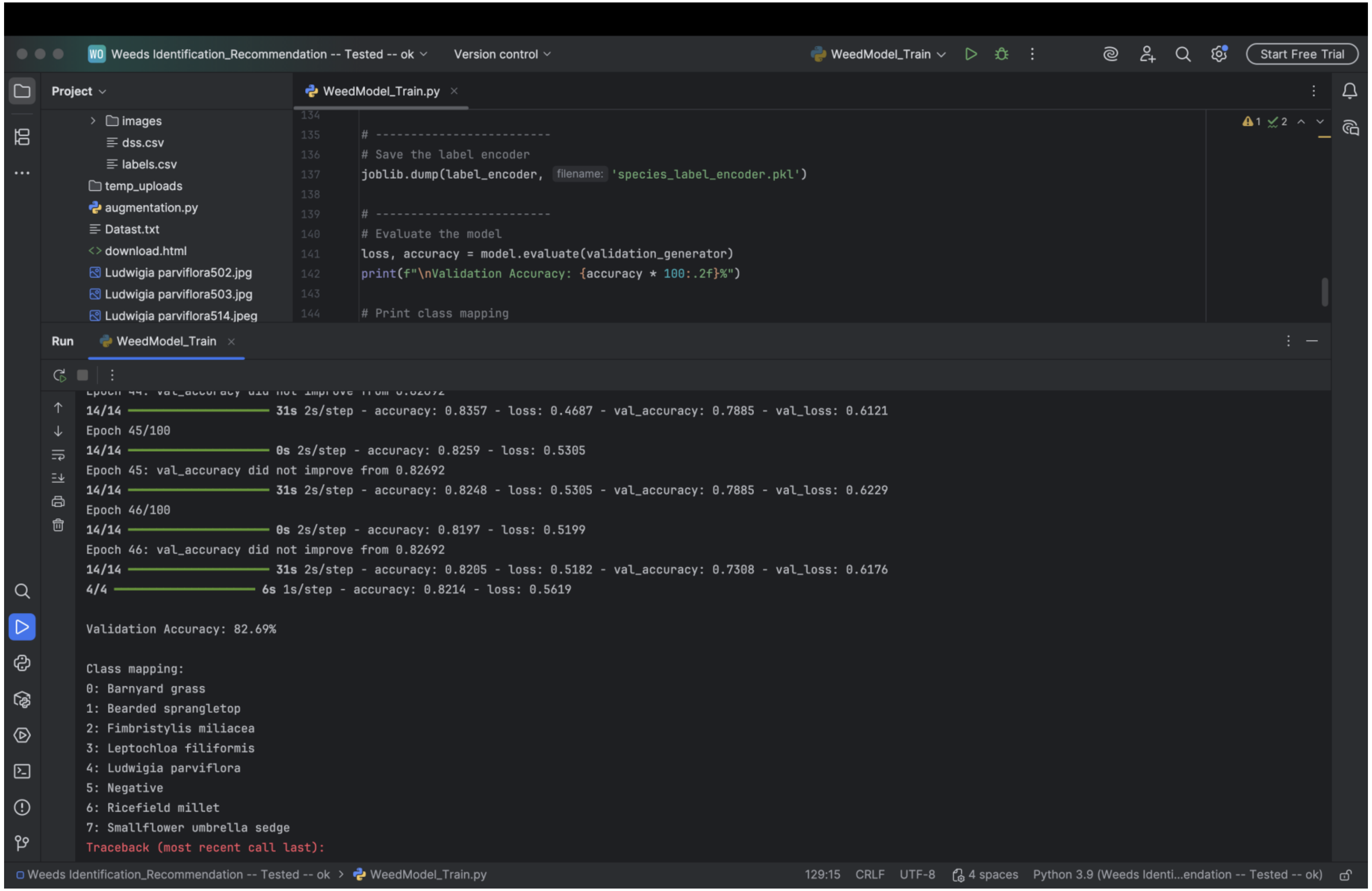
Partnerships: Collaborate with agricultural equipment manufacturers, research institutions, and government bodies.

Marketing: Promote through case studies, digital marketing, trade shows, and referral programs.

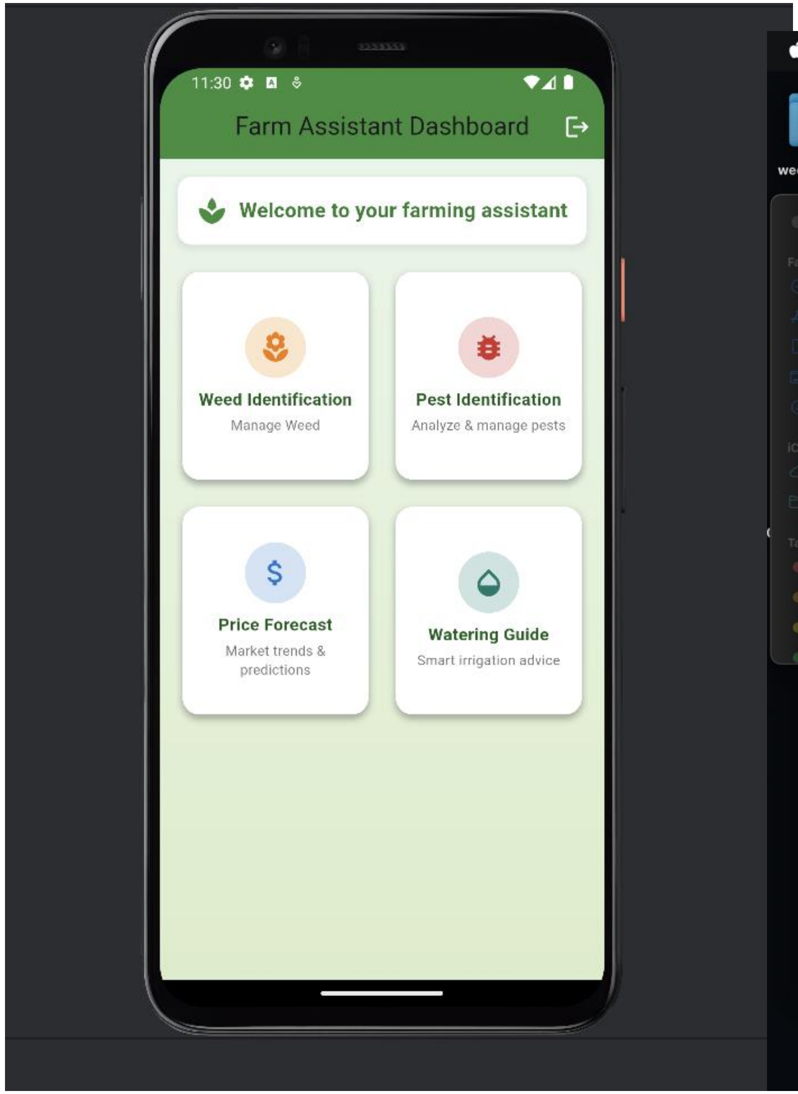
Global Expansion: Scale globally with cloud technology, localize for different regions, and integrate with global agricultural data.

Sustainabilit: Highlight environmental benefits by reducing herbicide use and promoting sustainable farming practices.

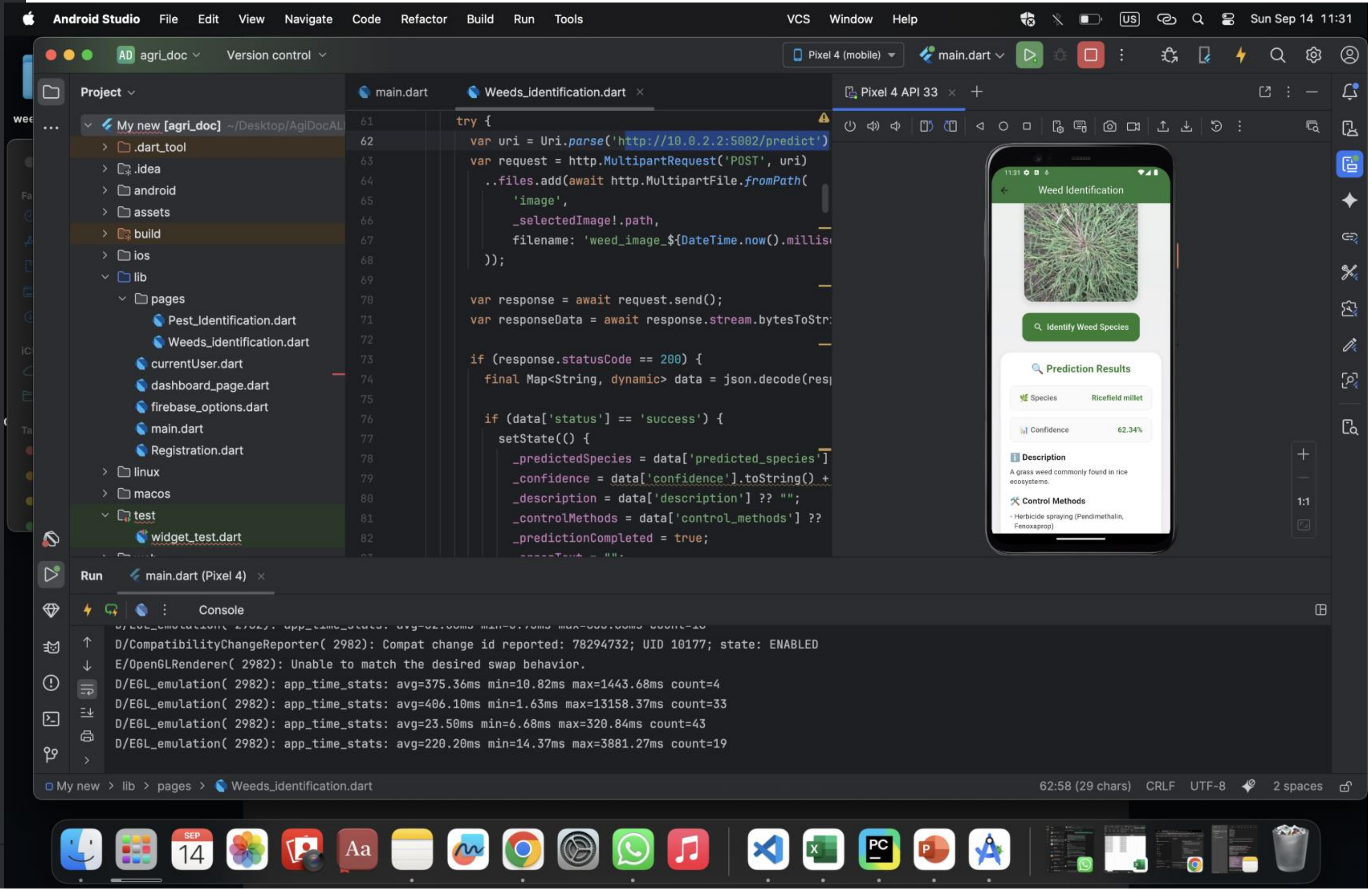
Accuracy 82.69%



UI

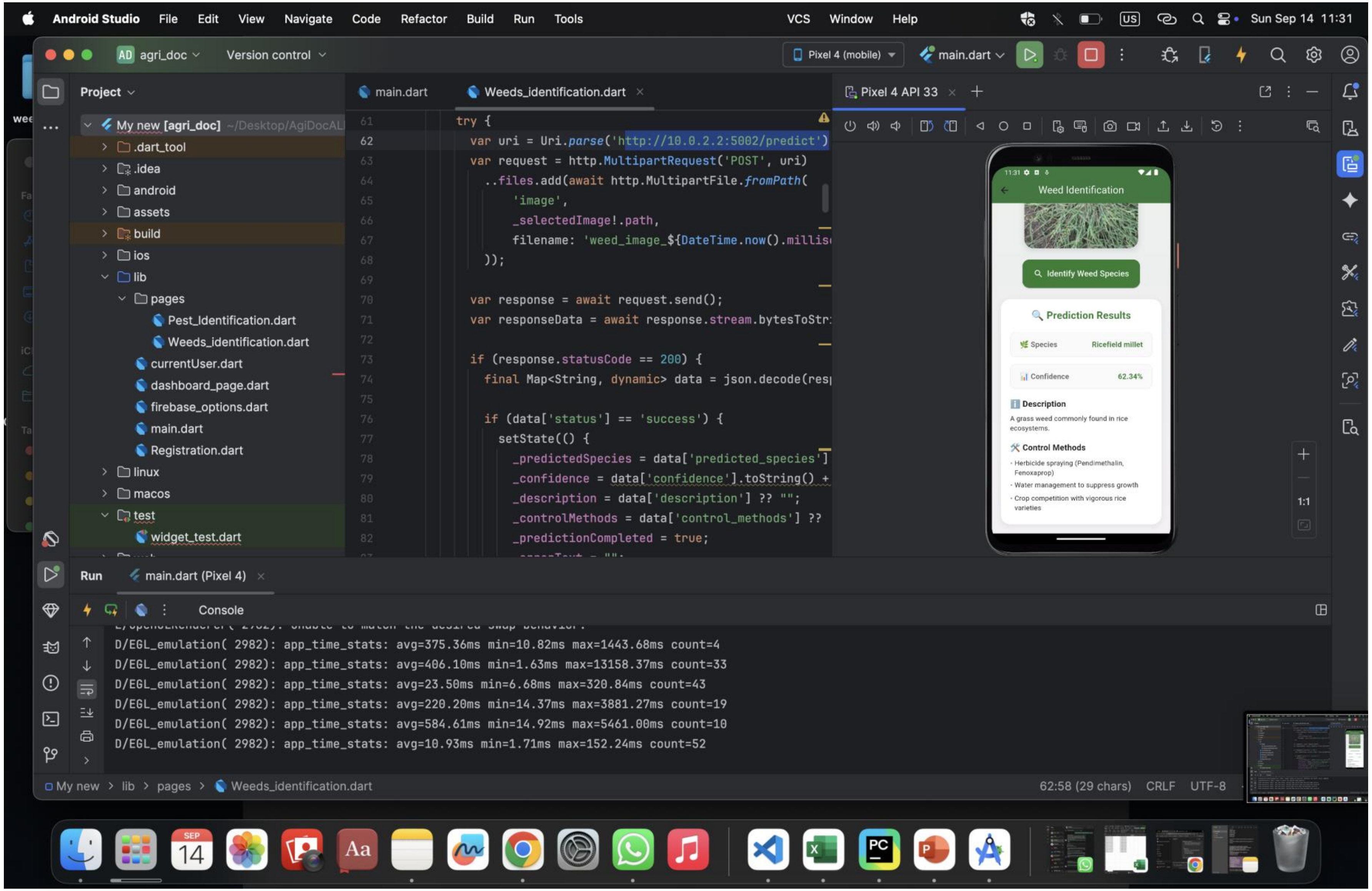


Farm Assistant Dashboard
Welcome to your farming assistant
Weed Identification
Manage Weed
Pest Identification
Analyze & manage pests
Price Forecast
Market trends & predictions
Watering Guide
Smart irrigation advice



Android Studio
Weeds_identification.dart
Weed Identification
Identify Weed Species
Prediction Results
Species
Ricefield millet
Confidence
62.34%
Description
Control Methods

Relative Topic Suggestion



Gantt Chart

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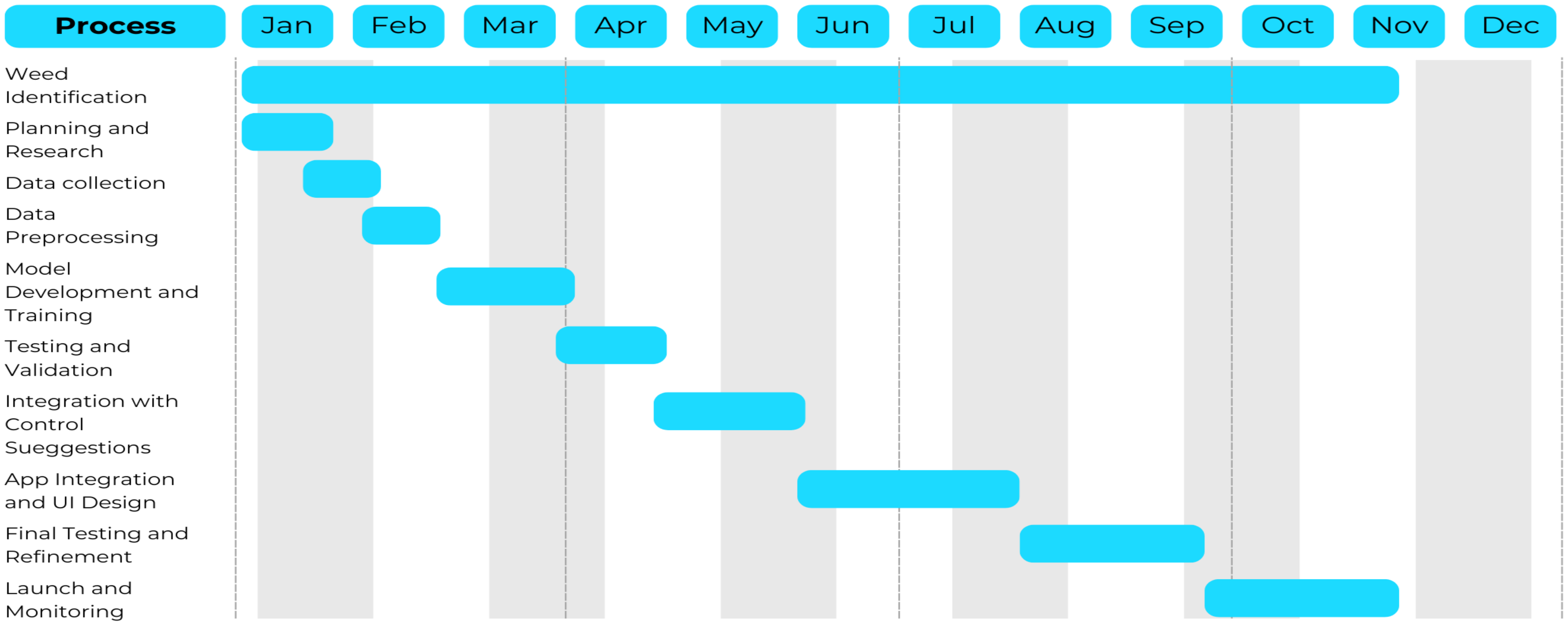

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IT21819506 | V ABILAXSHAN

BSc (Hons) Information Technology Specializing in Information Technology

Smart Irrigation System

INTRODUCTION

- Agriculture is a cornerstone of Sri Lanka's economy, with paddy farming being one of the primary crops cultivated.

- Irrigation is essential for paddy farming, but traditional methods are often inefficient, relying on fixed schedules rather than real-time water needs.

- Global efforts in smart agriculture have demonstrated the potential of IoT and machine learning in optimizing irrigation systems, yet these technologies are underutilized in Sri Lanka.

Research gaps

Technological Gaps

- Current systems lack real-time monitoring of environmental and soil conditions.
- Limited use of machine learning models to predict irrigation needs based on data trends and environmental factors.

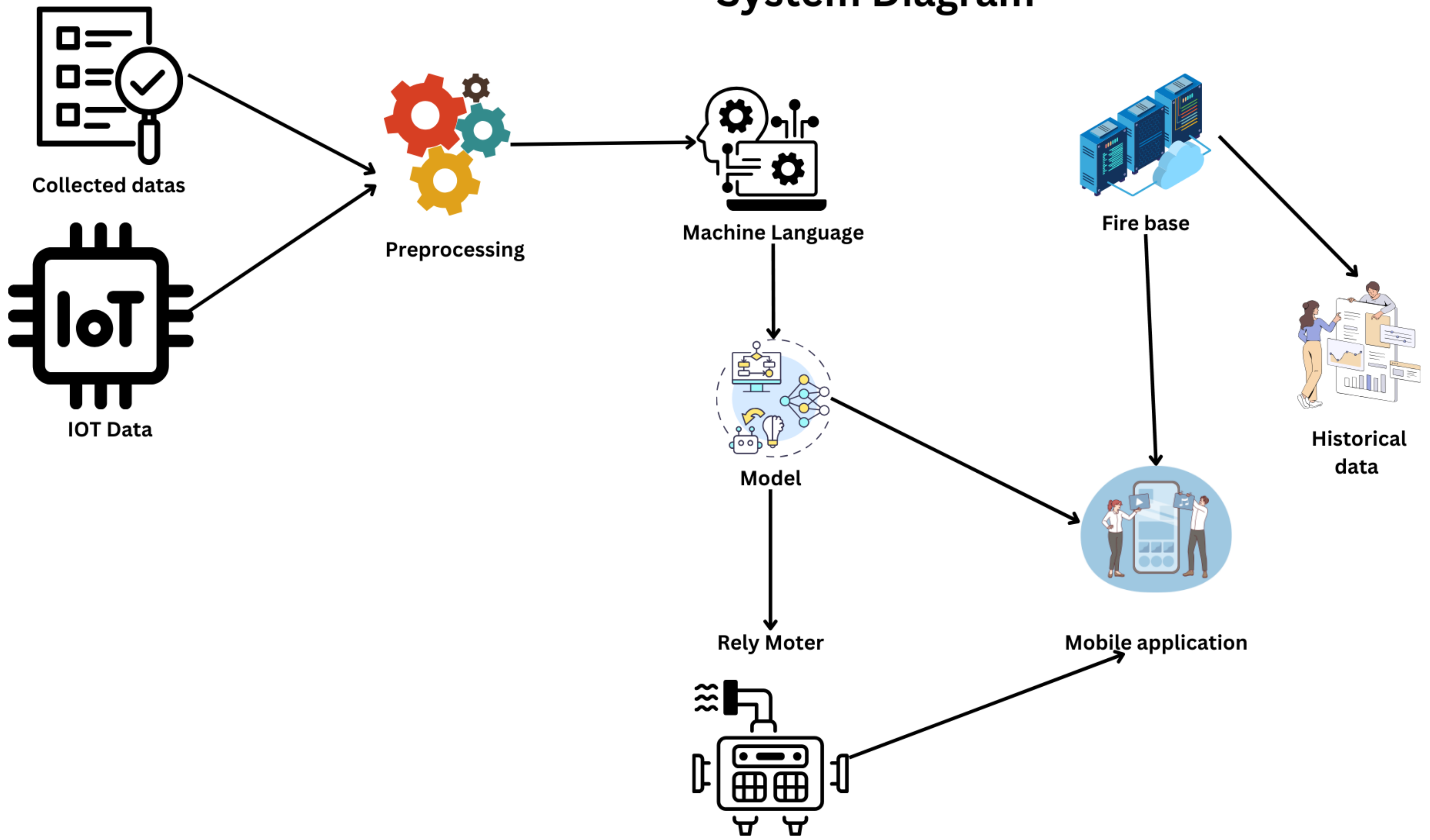
Farmer Adoption Challenges

- Most existing solutions are either too complex or expensive for local farmers to adopt.
- Lack of mobile-friendly platforms tailored to Sri Lankan farmers' needs and literacy levels.

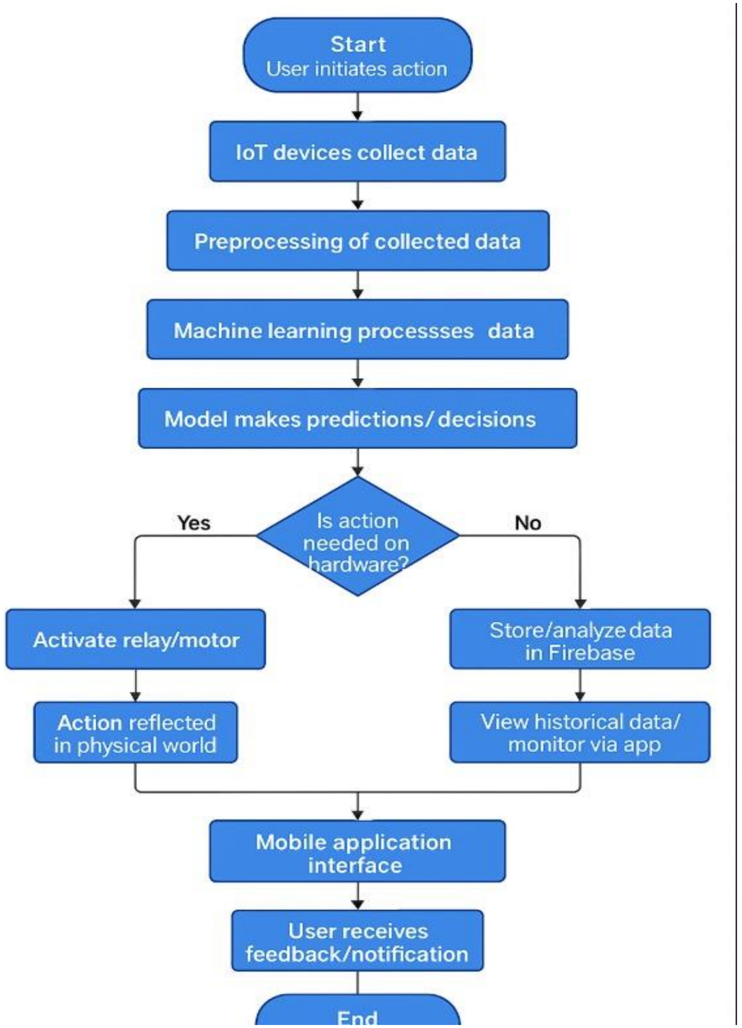
Localized Solutions

- Few solutions address the unique environmental and socio-economic conditions of Sri Lankan paddy fields, such as tank irrigation systems and irregular rainfall

System Diagram



Flow chart


Start
User initiates action
IoT devices collect data
Preprocessing of collected data
Machine learning processses data
Model makes predictions/ decisions
Is action needed on hardware?
Yes
No
Activate relay/motor
Store/analyze data in Firebase
Action reflected in physical world
View historical data/ monitor via app
Mobile application interface
User receives feedback/notification
End

System Requirements

Hardware

Server: Intel Core i5, 8GB RAM, 500GB SSD, high-speed internet.
Mobile Devices: Android/iOS, 2GB RAM, 50MB storage

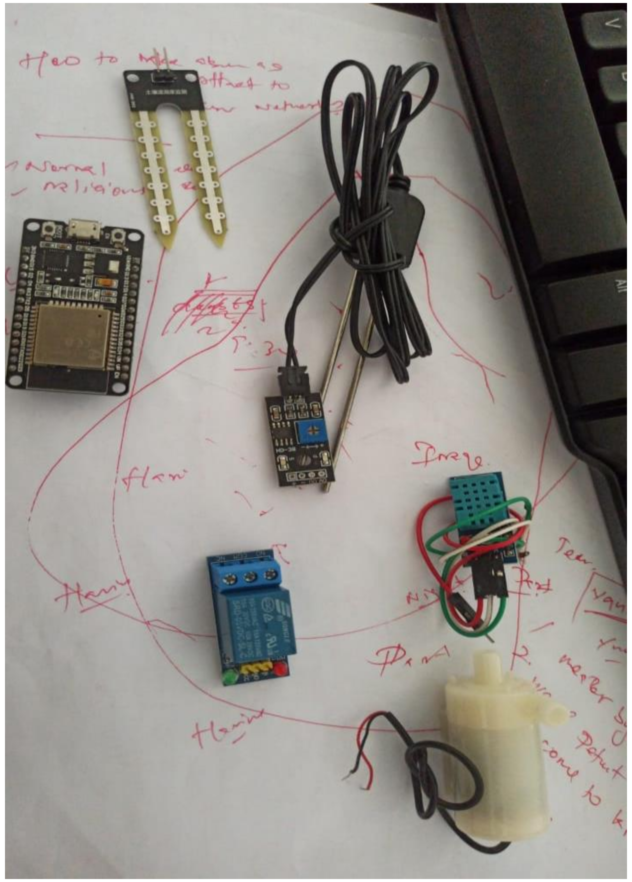
Software

Development: Python, Dart, MySQL, Android Studio.
Machine Learning: Supervised Learning
Visualization: Chart.js.
API Integration: RESTful APIs for real-time data.

Personnel

System Administrator, Data Analyst, Software Developer.

Key Technologies



Internet of Things (IoT)

Utilizes wireless sensor networks for continuous monitoring of soil moisture and other environmental parameters.

Machine Learning

Develops predictive models to analyze data and provide accurate irrigation recommendations. Using python

Cloud Computing

Enables secure data storage, analysis, and communication between system components.

Mobile App

Provides farmers with a user-friendly interface to access real-time data, irrigation schedules, and system alerts. Using **flutter**

Commercialization Strategy

1

Target Audience

Paddy farmers, agricultural cooperatives, and government agencies involved in promoting sustainable farming practices.

2

Value Proposition

Reduced water consumption, increased crop yields, and improved profitability for farmers, while promoting sustainable agriculture.

3

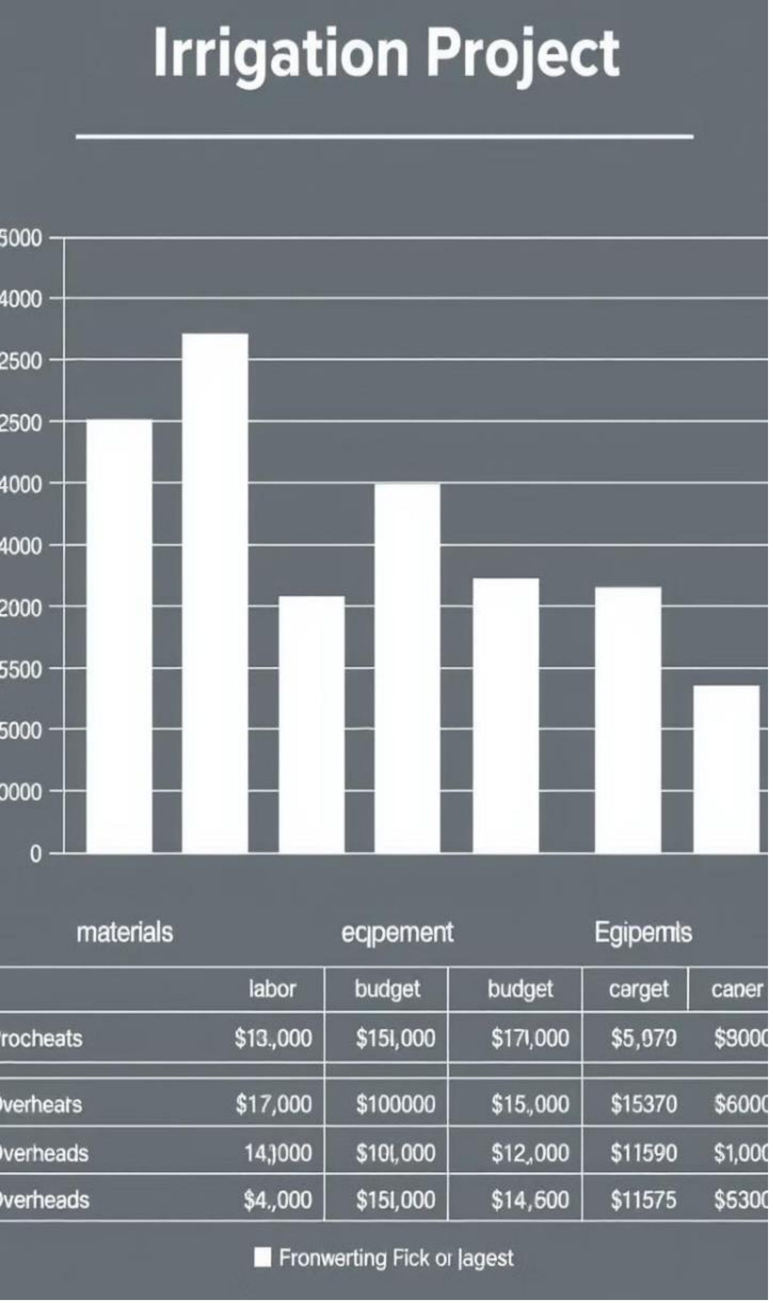
Marketing & Sales

Targeted marketing campaigns, partnerships with agricultural organizations, and demonstrations in pilot paddy fields.

4

Pricing Strategy

Subscription-based model with flexible pricing plans tailored to the specific needs of different farmer groups.



Budget & Funding

35k

Development Costs

Hardware, software, and development team expenses.

500K

Marketing & Sales

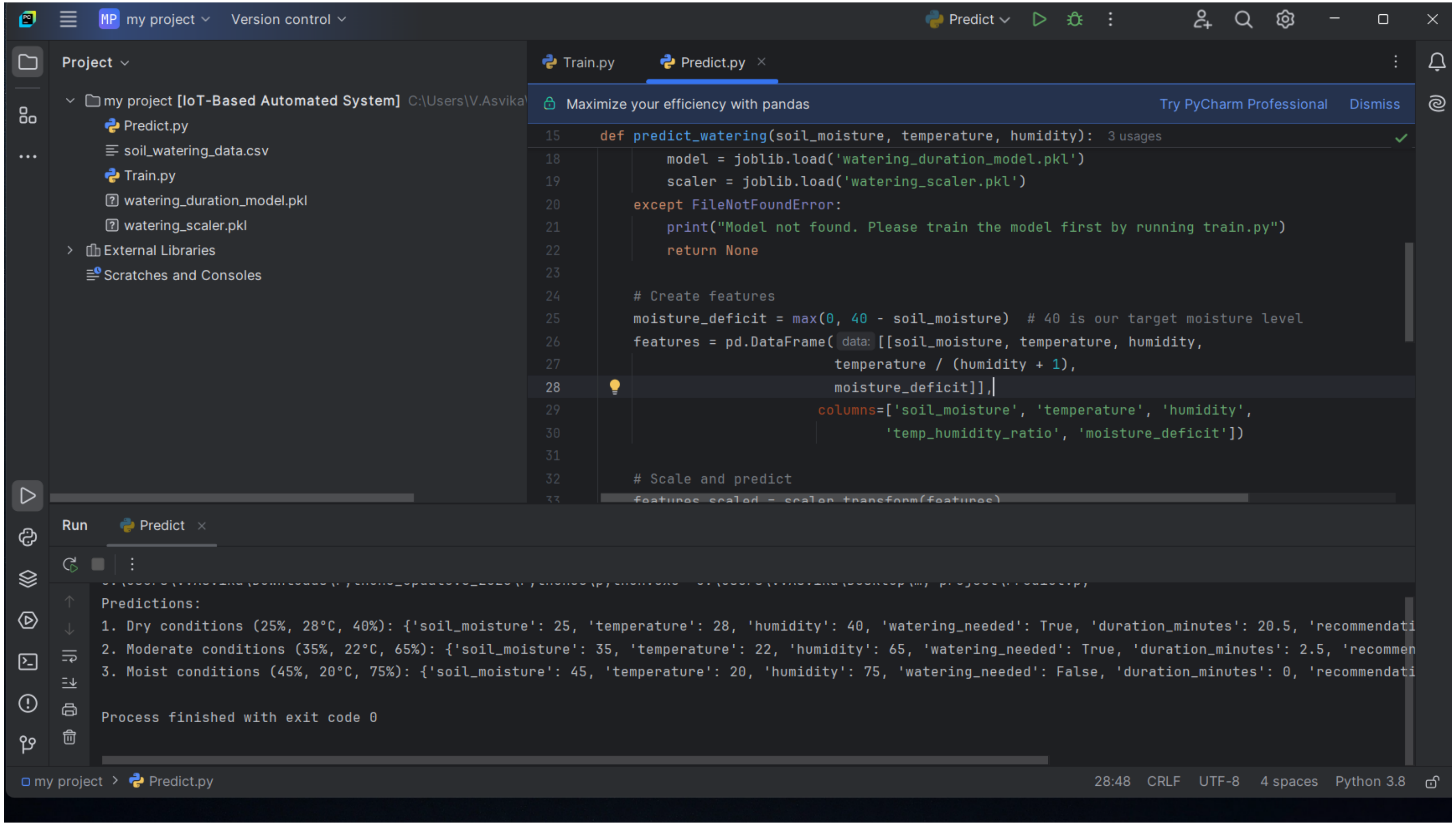
Marketing campaigns, partnerships, and training programs.

25k

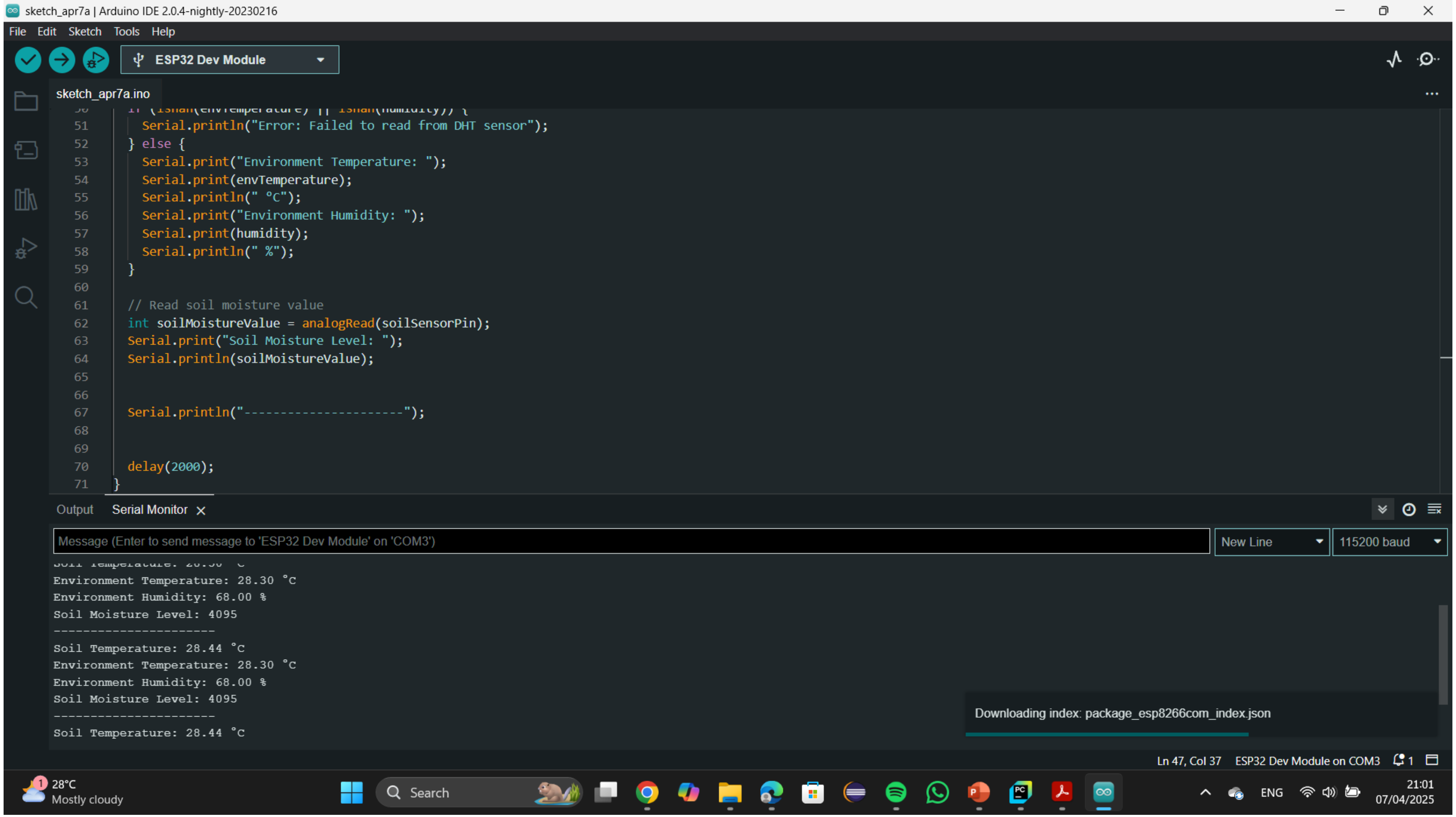
Pilot Deployment

System deployment costs and farmer training.

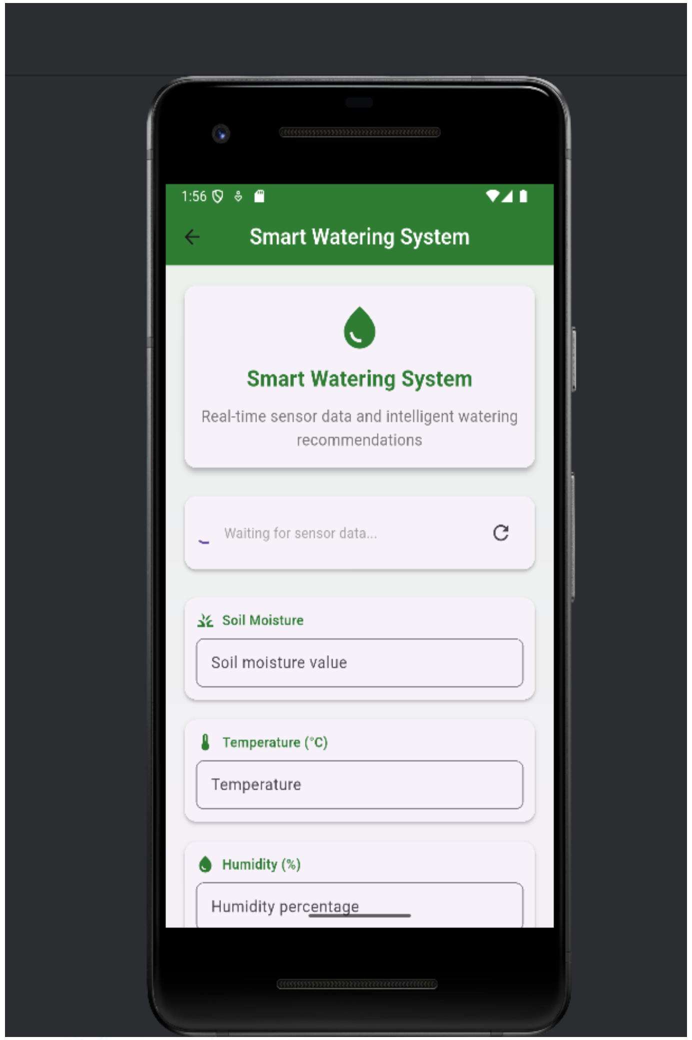
Prediction screen shot

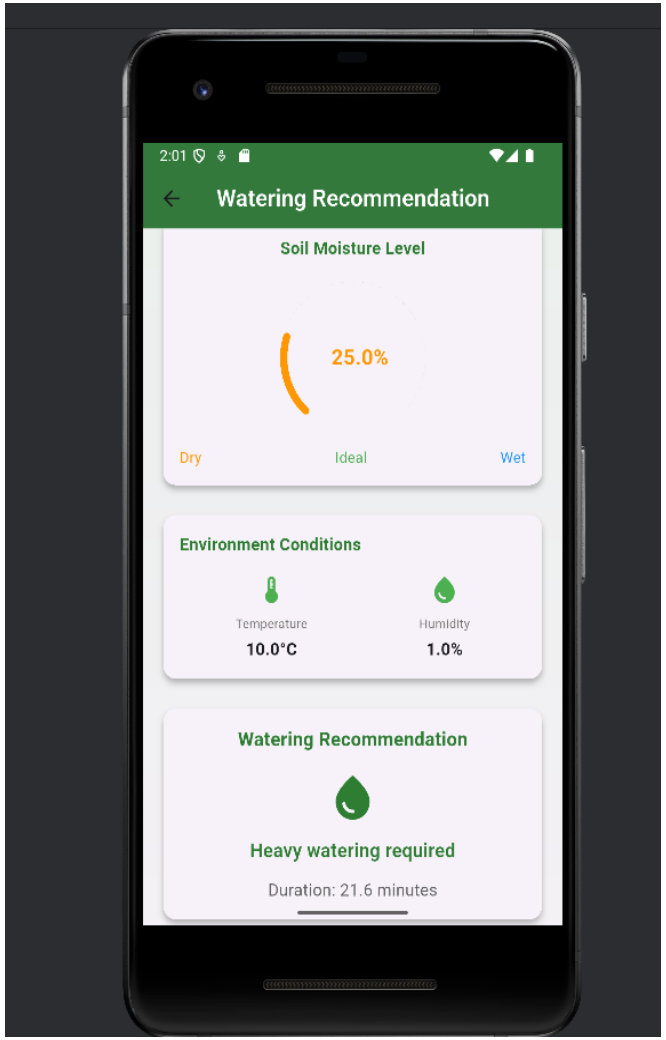


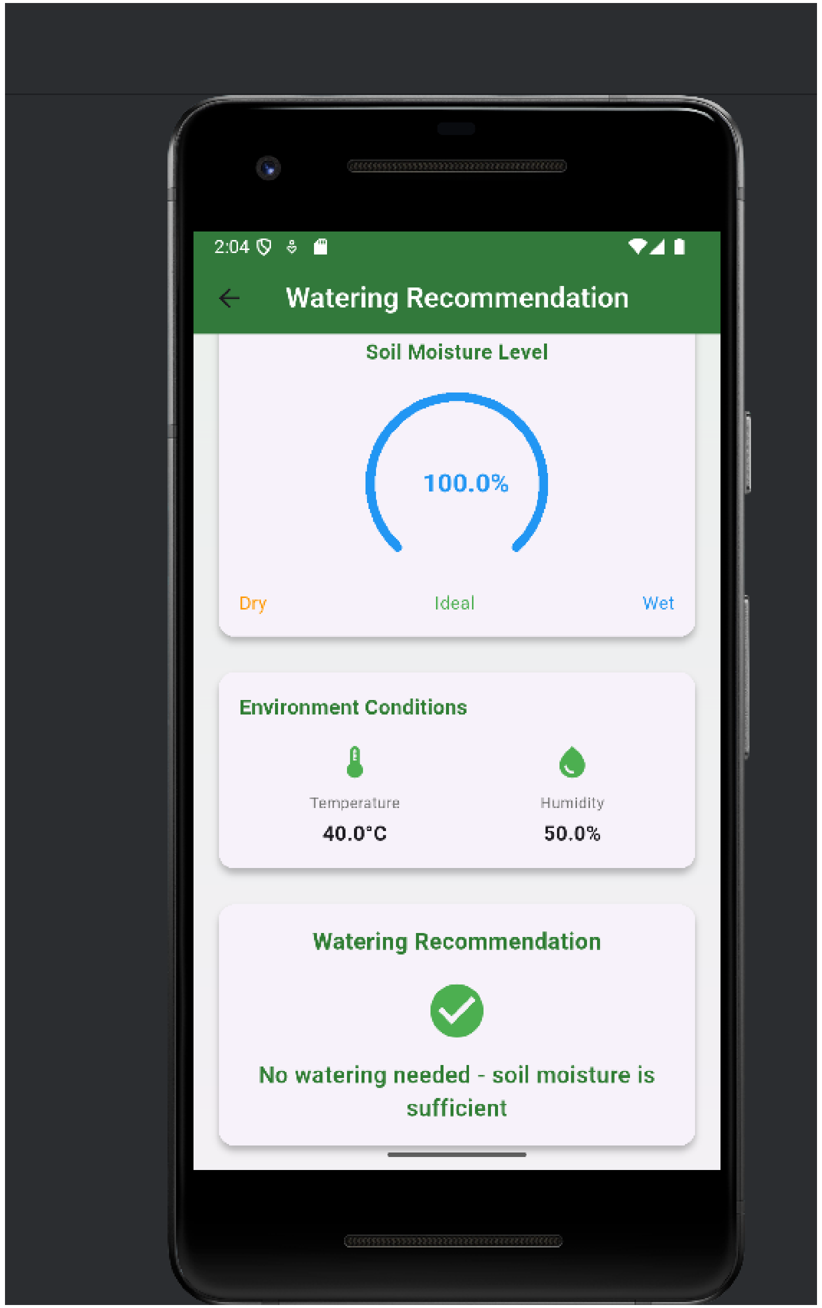
Arduino readings



Mobile application user Interface






2:04
Watering Recommendation
Soil Moisture Level
100.0%
Dry
Ideal
Wet
Environment Conditions
Temperature
40.0°C
Humidity
50.0%
Watering Recommendation
No watering needed - soil moisture is sufficient

Gantt Chart

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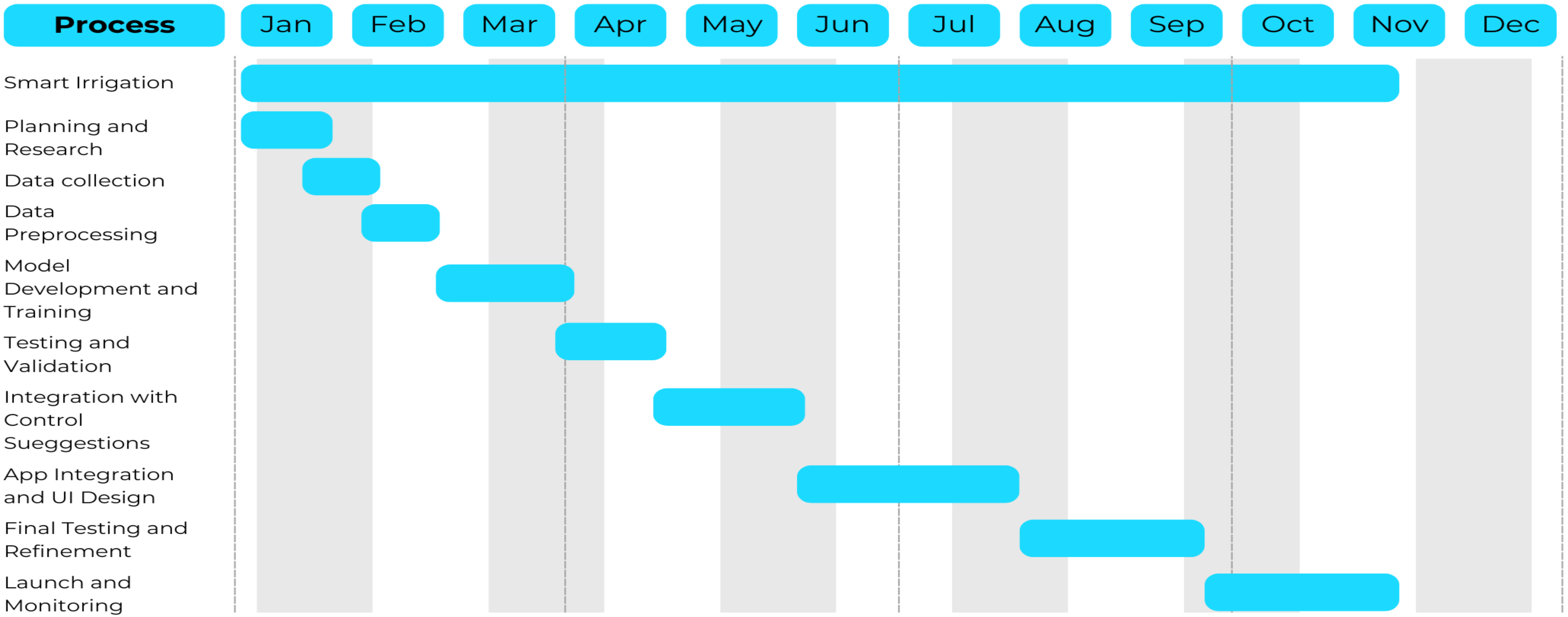

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IT21813320 | A.SHIVAPHIRIYAN

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PEST IDENTIFICATION &CONTROL

Introduction

This research project focuses on developing a pest identification and control system for paddy farmers. It leverages image processing and machine learning to identify pests, determine severity, and recommend suitable fertilizers. The system is designed to support sustainable farming through timely and accurate decision-making.

41% *of the Earth's landmass is used for agriculture*

Research Problem

Paddy cultivation in Sri Lanka is heavily impacted by pest infestations, yet most small-scale farmers lack access to timely and accurate pest identification methods. Traditional approaches are manual, depend on expert knowledge, and often result in delays in diagnosis and improper use of fertilizers. This leads to reduced crop yield, overuse of chemicals, and long-term soil degradation.

Research Gap

Current agricultural advisory systems lack automation in pest detection, struggle with accuracy in rural field conditions, and provide generalized recommendations. This project addresses these issues using AI and image analysis for tailored, real-time insights.

Objectives

Main Objective

To develop an AI-powered pest identification and control system using image processing to improve paddy farming productivity.

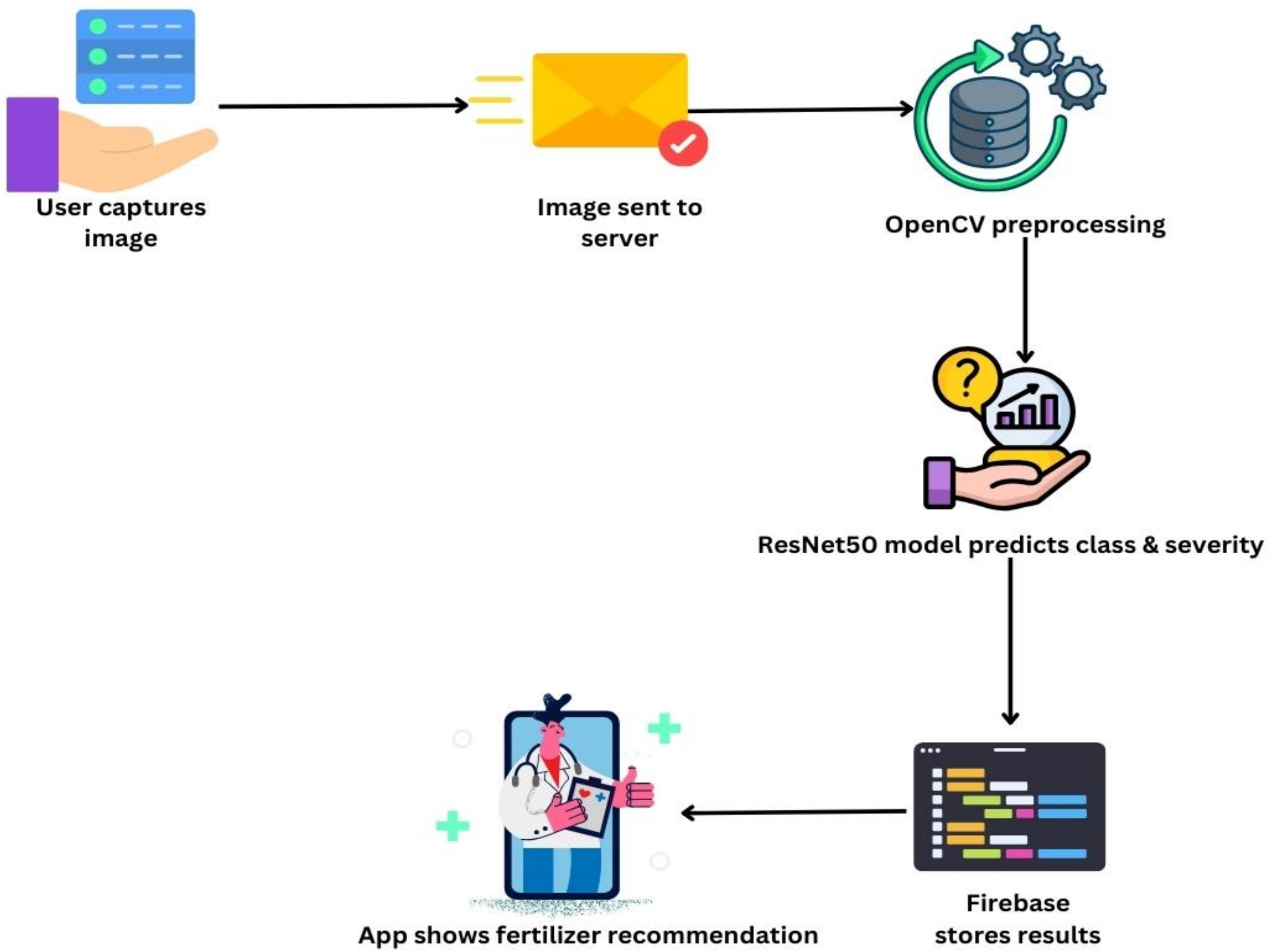
Sub-Objectives

1. Identify pests and classify them as harmful or harmless.
2. Determine severity of infestation (low, mild, severe).
3. Recommend suitable fertilizers (organic or artificial).
4. Analyze leaf affliction severity for further treatment.

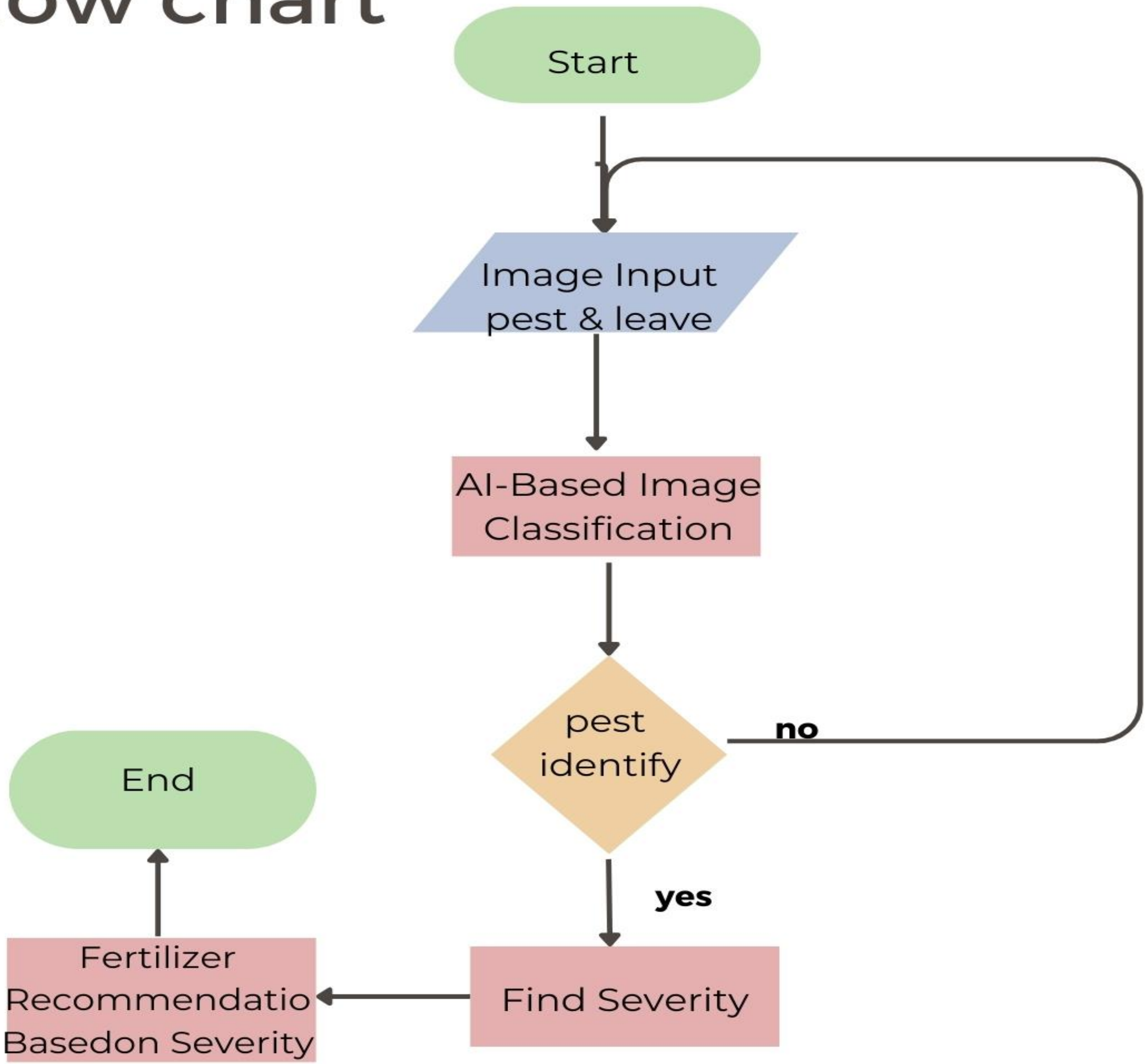
Project Methodology

- Phase 1: Data Collection - Gather pest and leaf images from field and datasets.
- Phase 2: Image Processing - Use OpenCV for image preprocessing (resizing, noise removal).
- Phase 3: Model Training - Train ResNet50 for pest classification and severity detection.
- Phase 4: Integration - Connect trained model with a mobile-friendly backend using Python and Firebase.
- Phase 5: Evaluation - Test system accuracy and usability.

System Diagram



Flow chart


Start
Image Input
pest & leave
AI-Based Image
Classification
pest
identify
no
yes
Find Severity
Fertilizer
Recommendatio
Basedon Severity
End

System Overview

UI Layer: Mobile app (Flutter) for uploading images and receiving recommendations.

Controller Layer: Python backend handles logic and model integration.

Backend Layer: Firebase stores images, user data, and model outputs.

System Requirements

Hardware:

- Android/iOS phone with camera
- Server: 8GB RAM, 100GB SSD, Python environment

Software:

- OpenCV for image processing
- TensorFlow with ResNet50
- Firebase for data storage and model output

Key Technologies

Frontend:	Flutter
Image Processing:	OpenCV
Model:	ResNet50 (Pretrained CNN for classification)
Backend:	Python
Database:	Firebase Realtime DB
ML Approach:	Supervised Learning (Image classification)

Commercialization Strategy

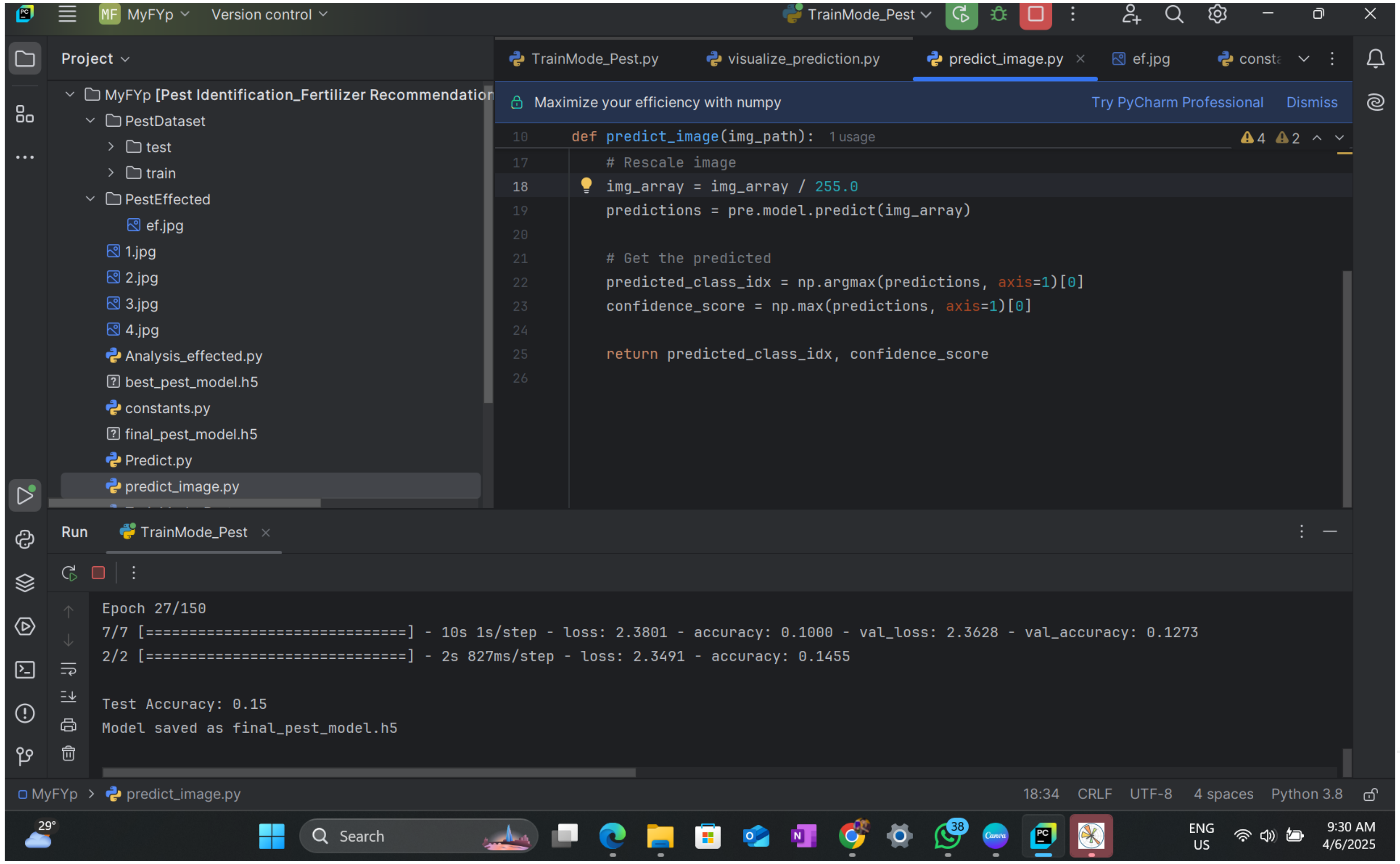
Target Audience:
Paddy farmers, agricultural extension officers

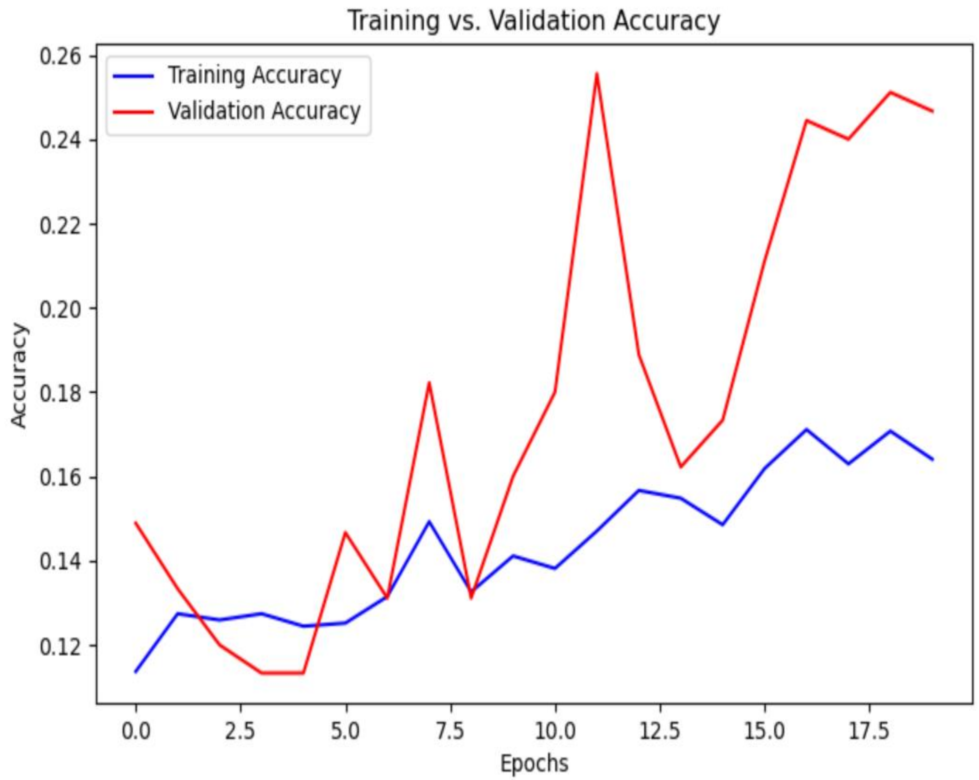
Value Proposition:
Fast, accurate pest detection and tailored fertilizer guidance

Marketing:
Farmer workshops, extension programs, digital outreach

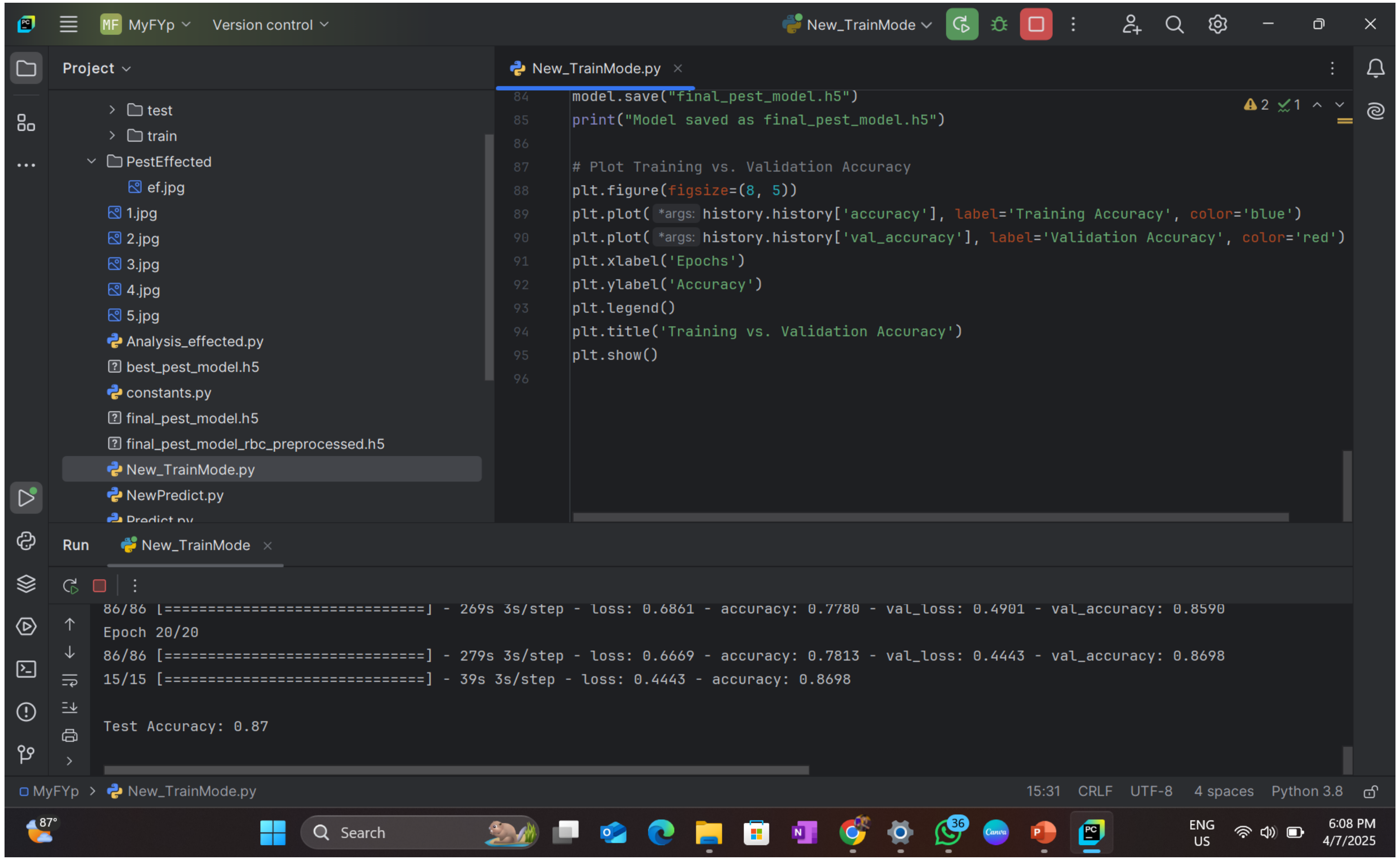
Pricing:
Freemium app with paid tier for detailed analytics and offline features

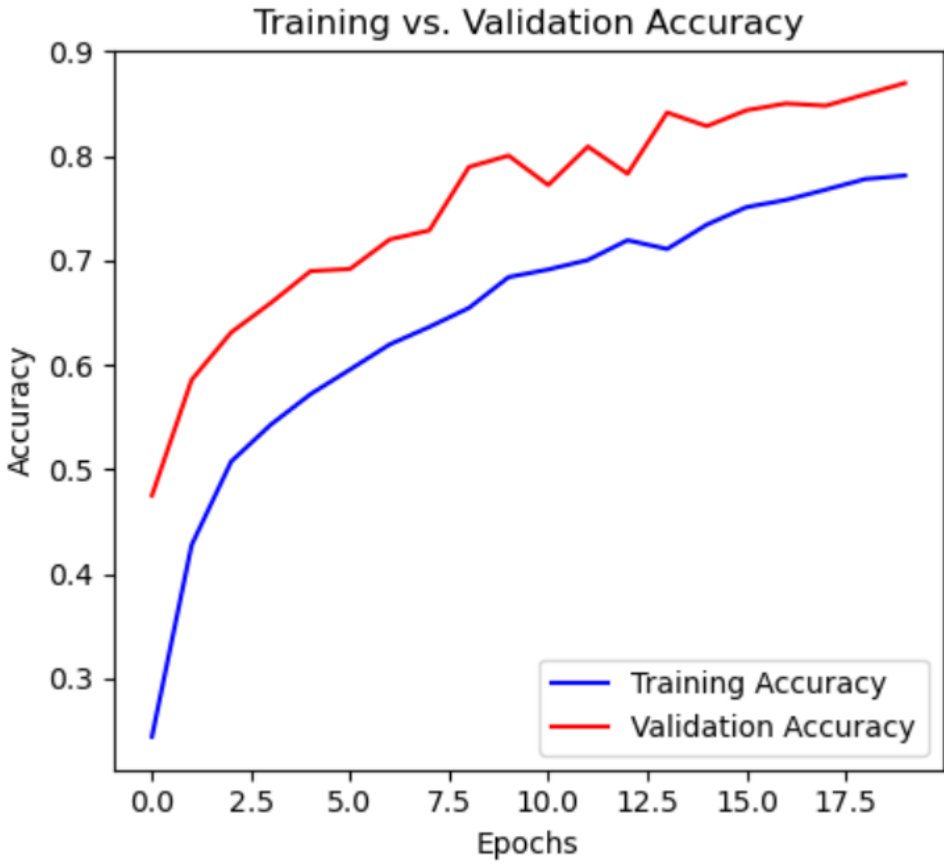
ResNet50 Model (accuracy-15%-30%)



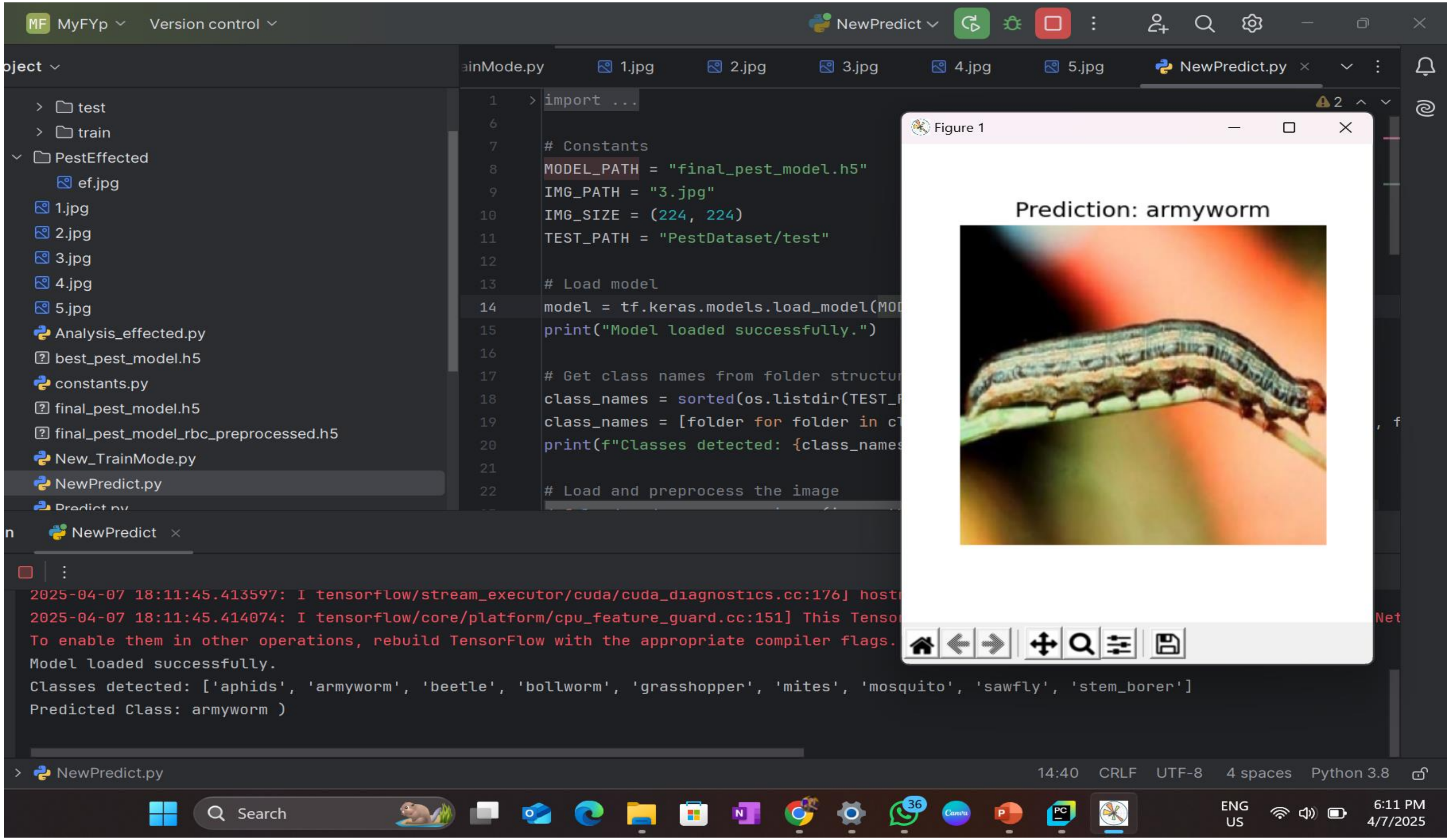


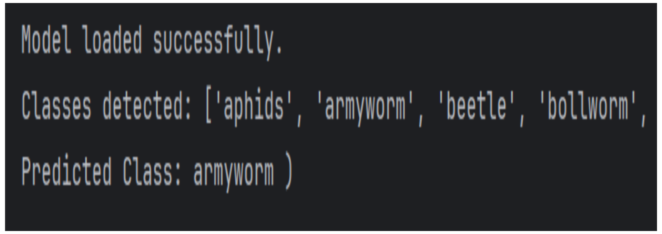
VGG16 Model(accuracy-87%)



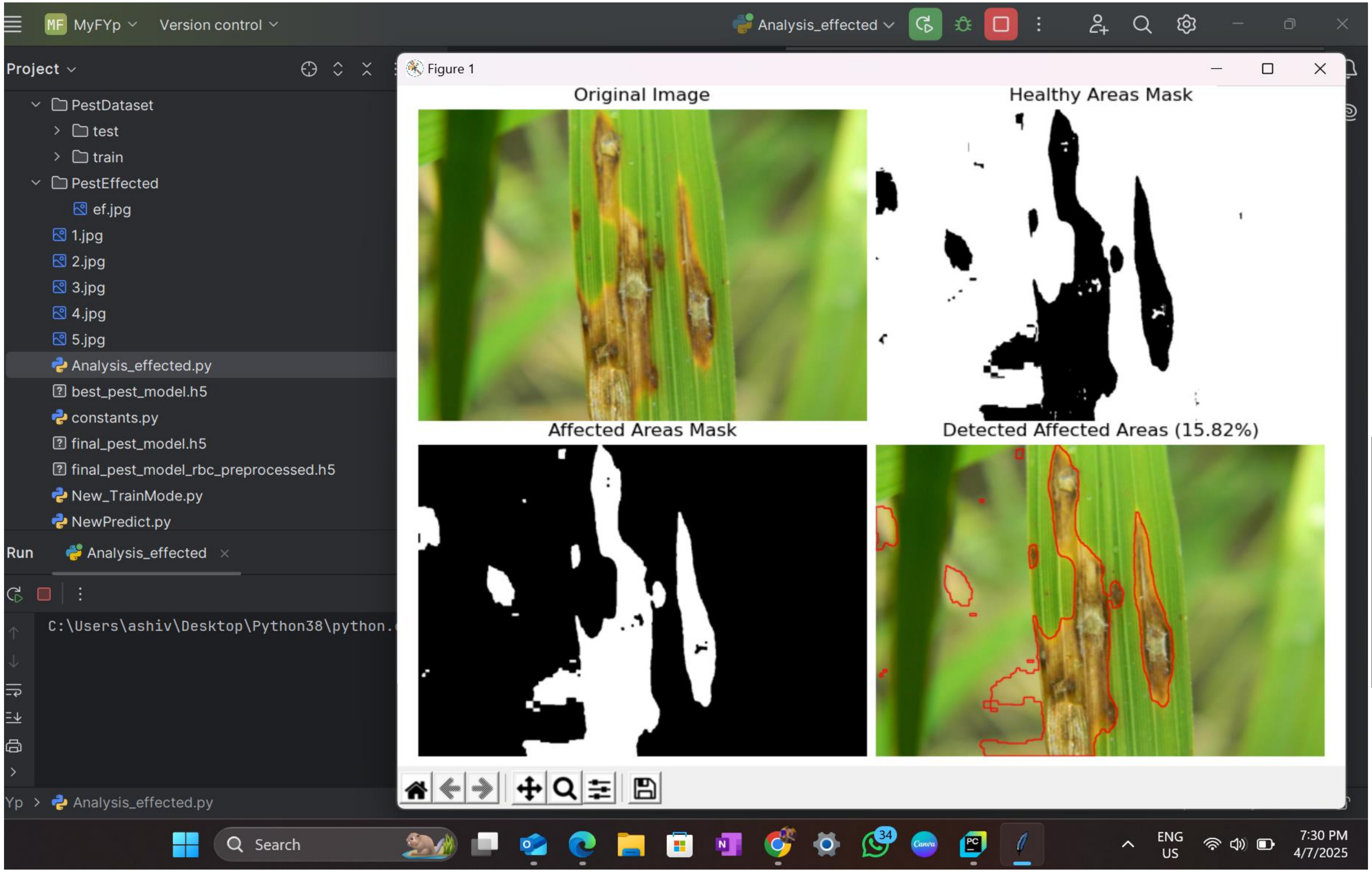


Pest Identification Result



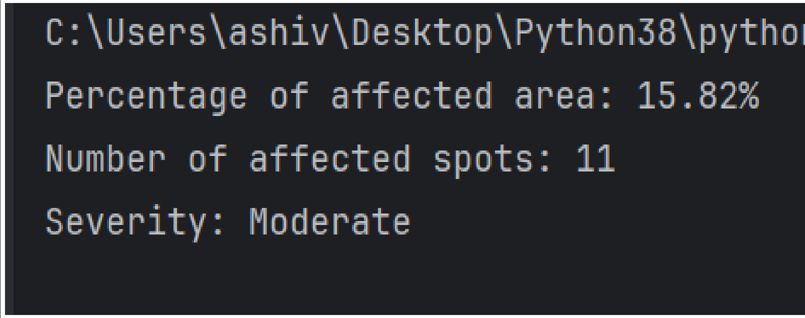


Effected Leaves Results (with Severity Level)

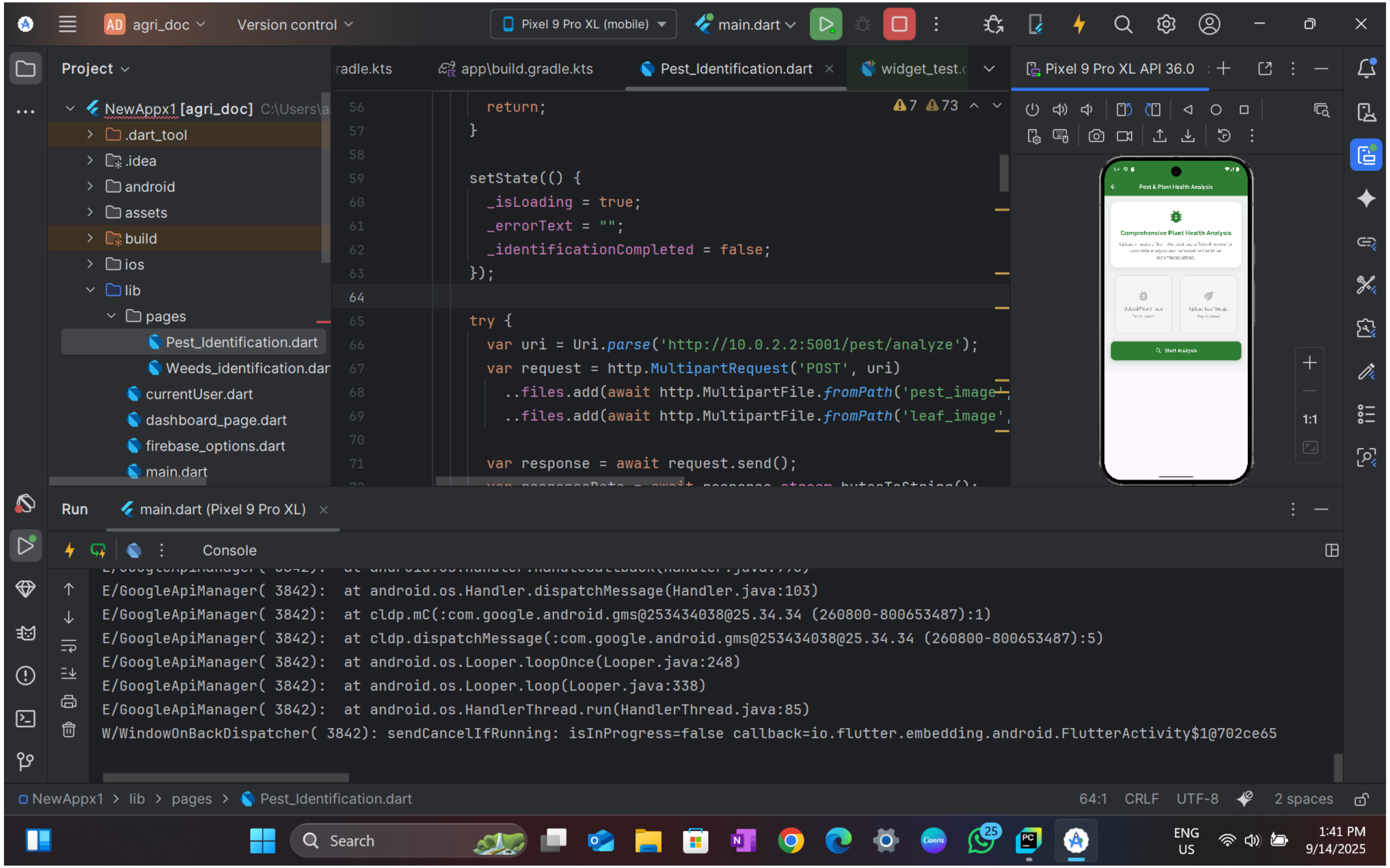


1.OpenCV preprocessing
Used to identify and segment affected areas on leaves

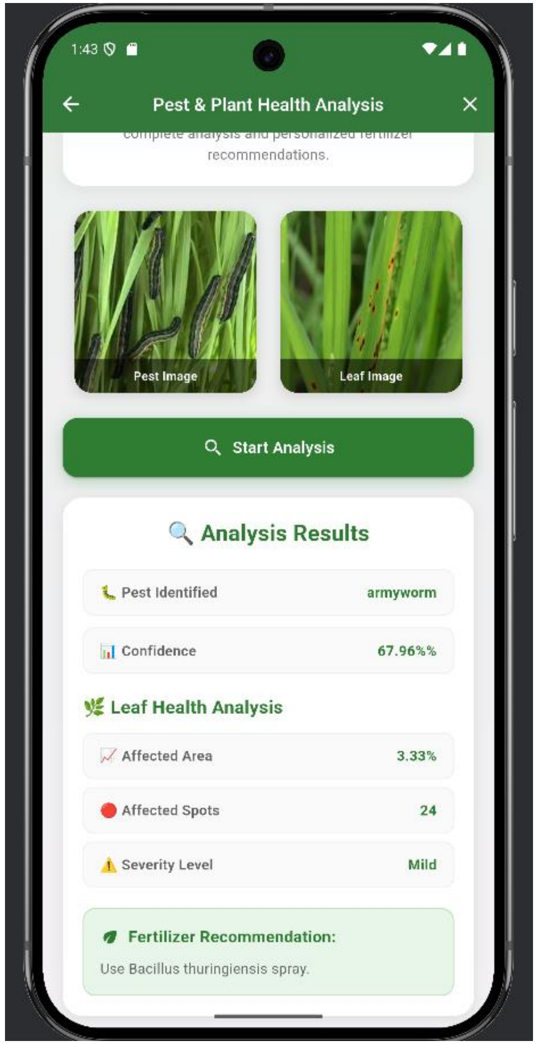
2.Calculates affected percentage (mild(<10%) , moderate(10-30%), severe(>30%)

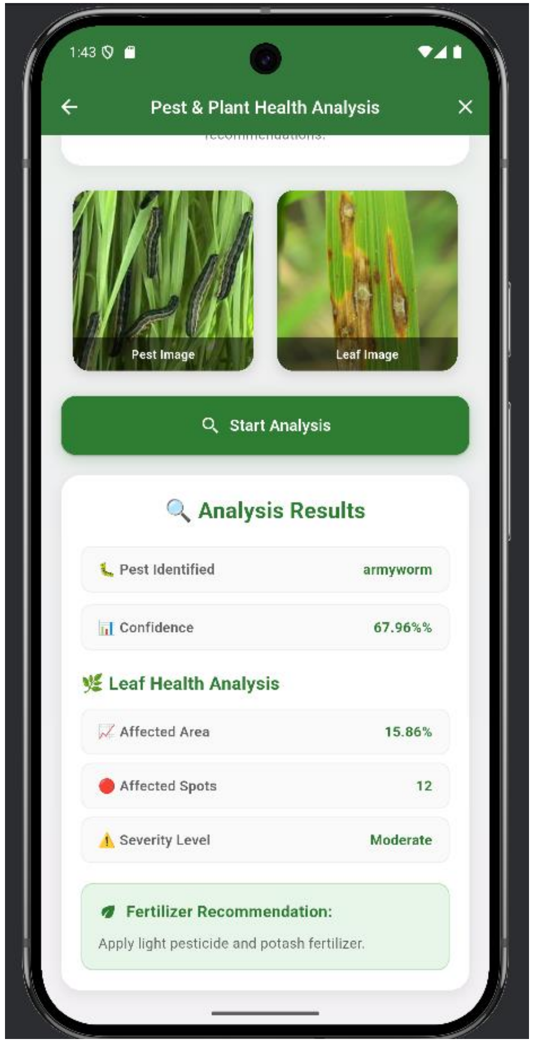


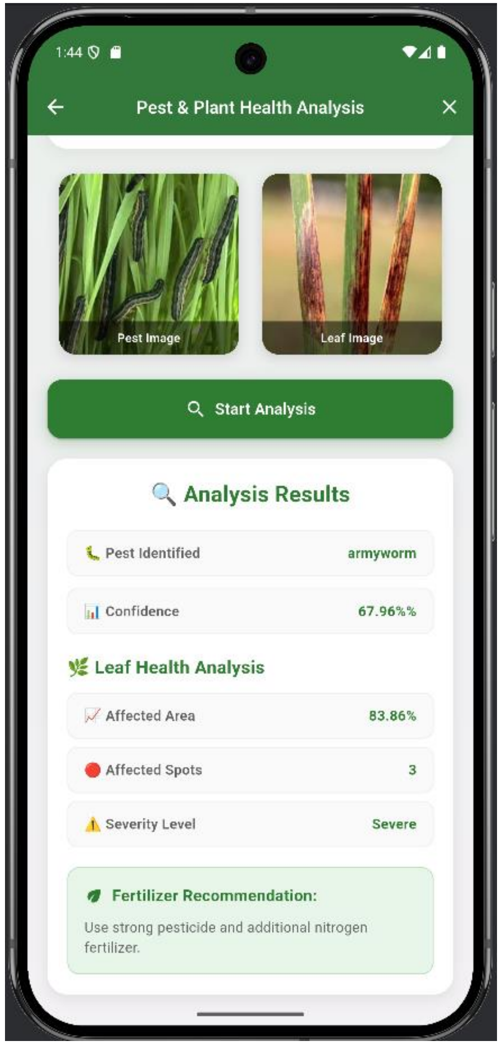
Mobile App Development: Debugging



Final Result







Gantt Chart

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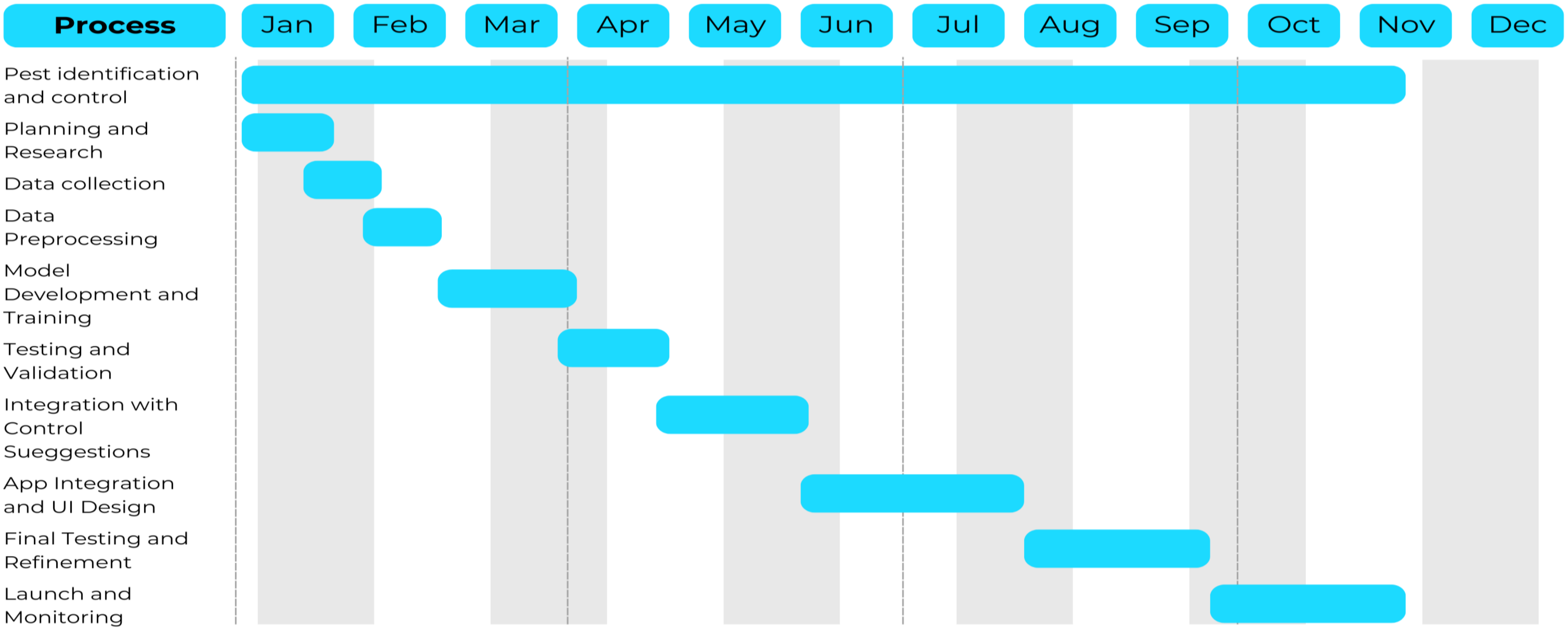

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Thank For Your Attention

End Presentation

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