

SMART ASSISTANCE FOR THE FLORICULTURE INDUSTRY

2023-133





Meet Our Team



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Introduction

- Smart Tech Revolution: Transforming Sri Lanka's floriculture with cost-effective, smart technology solutions.
- Beginner's Guide: PlantPal provides expert, smart assistance tailored for beginners and enthusiasts.
- Accessible & Seamless: Companion on iOS & Android; Web & Mobile optimized with remote access capabilities.

PlantPal



Guidance from Industry Experts

Collaborated with **Omega Green (Pvt) Ltd.**,
a leading floriculture company.

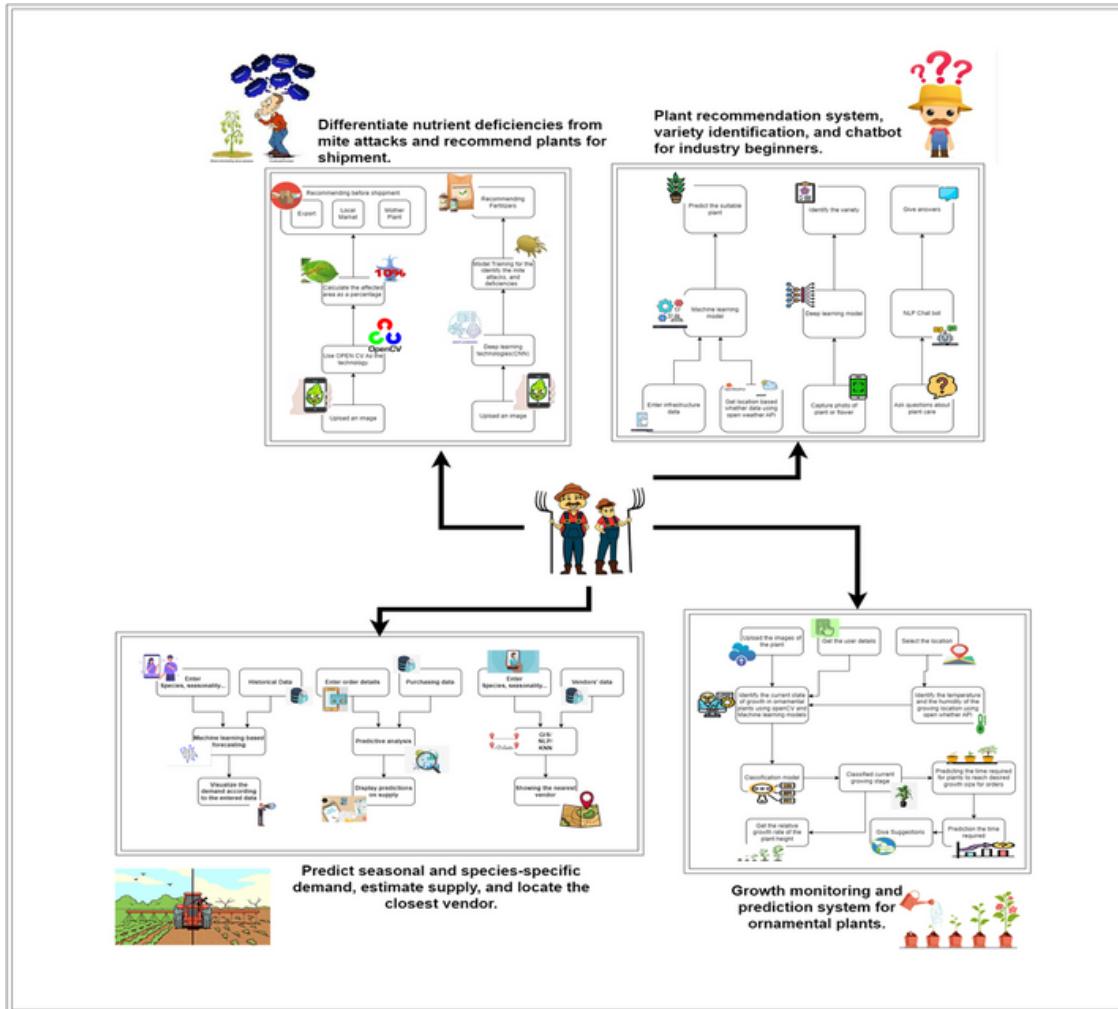


Leveraged industry **experts' knowledge** for valuable guidance.

Utilized **critical data** shared by Omega Green to power our app's AI features.



Overall System Diagram



IoT-Enabled Demand Forecasting in Floriculture Industry

IT20017088
Prabhashi P.A.N.
Specialization : Data Science



Research Problem

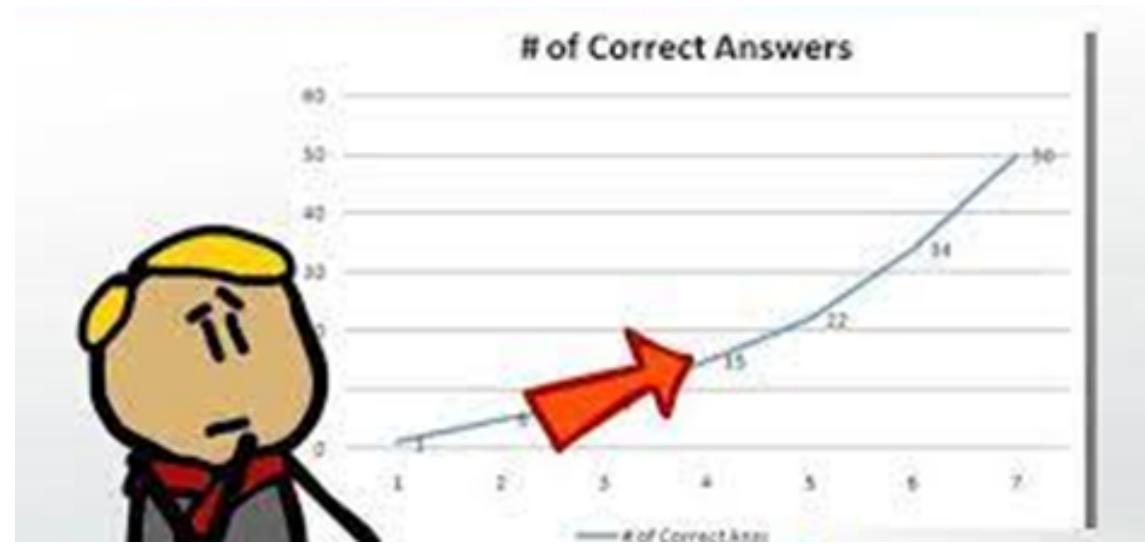
Accurate demand forecasting in the floriculture industry is crucial. And yet,

Demand is currently estimated through guesswork based on experience, rather than using more accurate methods. Which cause,

- Product inefficiencies
- Resource wastage
- Financial impacts

& more

USE BETTER
APPROACH WITH ML
AND IOT





Research Gap

Previous

Demand forecasting done in mainly the agriculture sector

Mostly used time series analysis predicting the demand with machine learning and with the user inputs

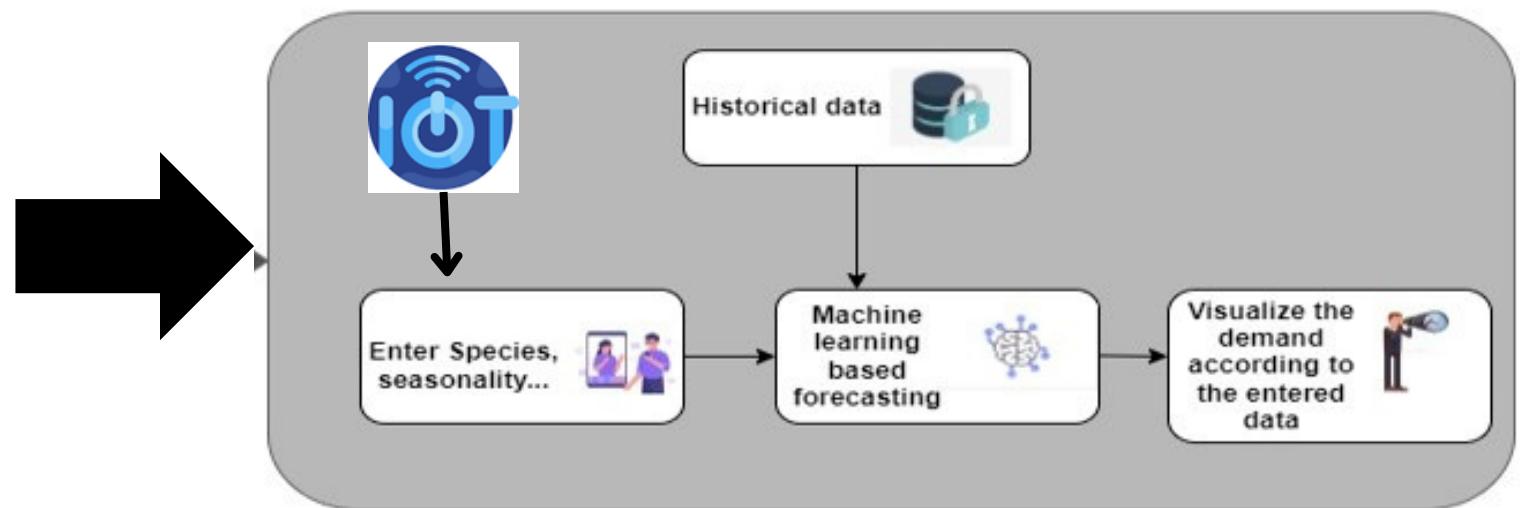
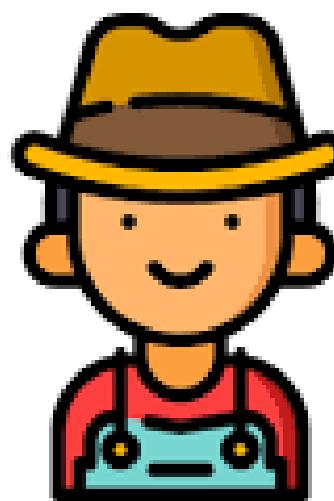
Mainly no previously done mobile app to demand forecasting.

Our app

Demand is predicted to the floriculture industry

Using Linear Regression with the IOT and User based inputs

Individual System diagram

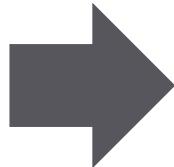




Research Progress

PP2

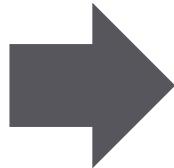
Predict demand using gradient boosting regressor



Final

Predict demand using multiple ML models and evaluate finally decide on linear regression.

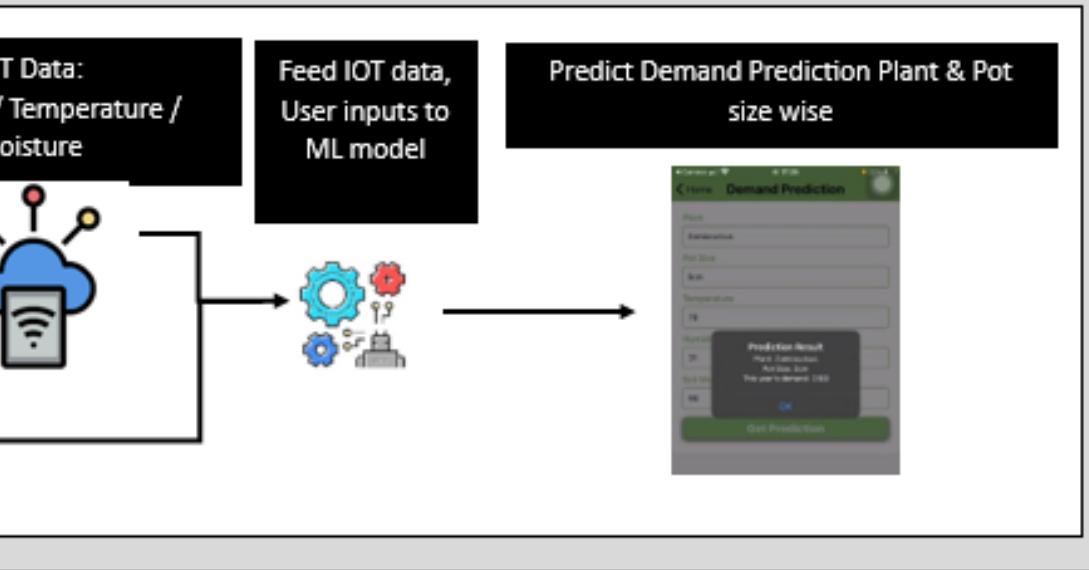
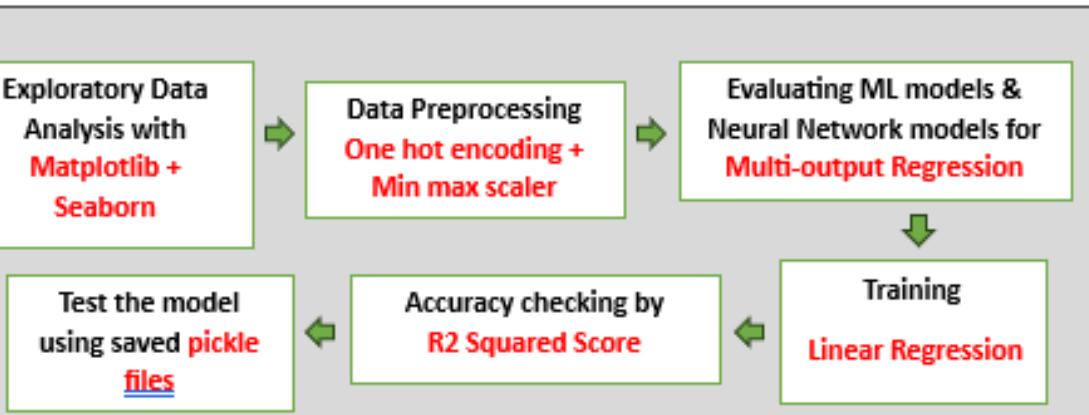
Newly added



Develop mobile app with all user input values

Take Temperature , Humidity , Soil Moisture with the IOT sensors and pot size and plant type as user inputs.

Implementation Steps





Growth Monitoring & Time-to-Size Prediction for Ornamental Plants

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Liyanage S.R

Specialization : Data Science



Research Problem



Growth Monitoring--->

Ornamental plants, a central product in the Floriculture Industry, demand meticulous care from seed to sale.

- Issue: Sri Lanka's manual, labor-heavy plant inspection.
- Solution: An automated, machine learning-based monitoring system.
- Tagline: Tech-driven insights for optimal growth.

Predictive System for Growth->

- Issue: Reliance on human intuition for growth predictions.
- Solution: A system to forecast growth duration.
- Tagline: Precise predictions, strategic decisions.

Objective: Enhancing the Floriculture Industry through technology-driven growth monitoring and predictive modeling.



Research Gap

Previous Researches

Primarily IoT-based expensive smart greenhouses

Focus on 2-3 plant characteristics

Either growth monitoring or prediction

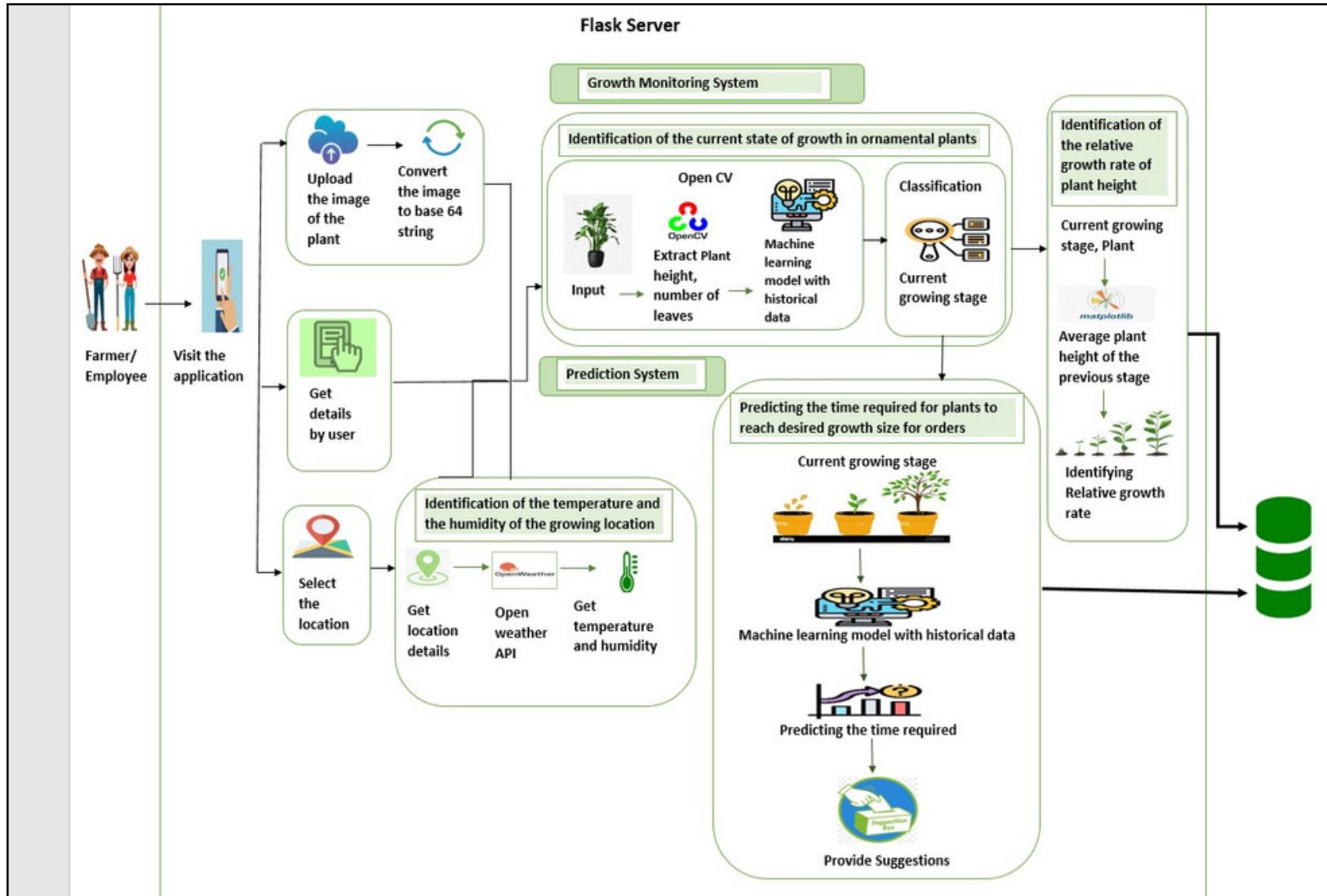
Our app

Machine learning & computer vision-driven

Analyzes 9 vital growth characteristics

Combines both, considering plant characteristics and environmental factors

Individual System diagram



Research Progress



PP2

- **Growth Monitoring System**
XGBoost Classifier: 89.5%
- **Time-To-Size Prediction**
XGBoost Regressor: 90.2%
- **Suggestion**
Automated Growth Monitoring: Automate the system

Final

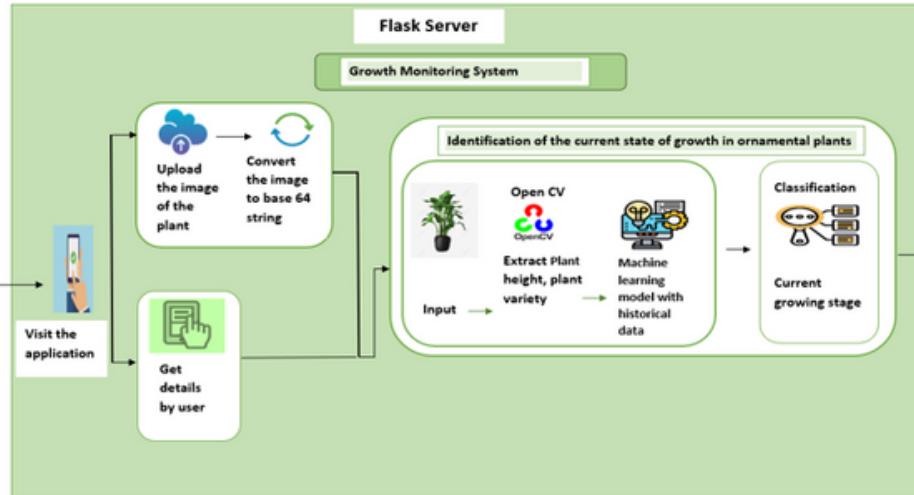
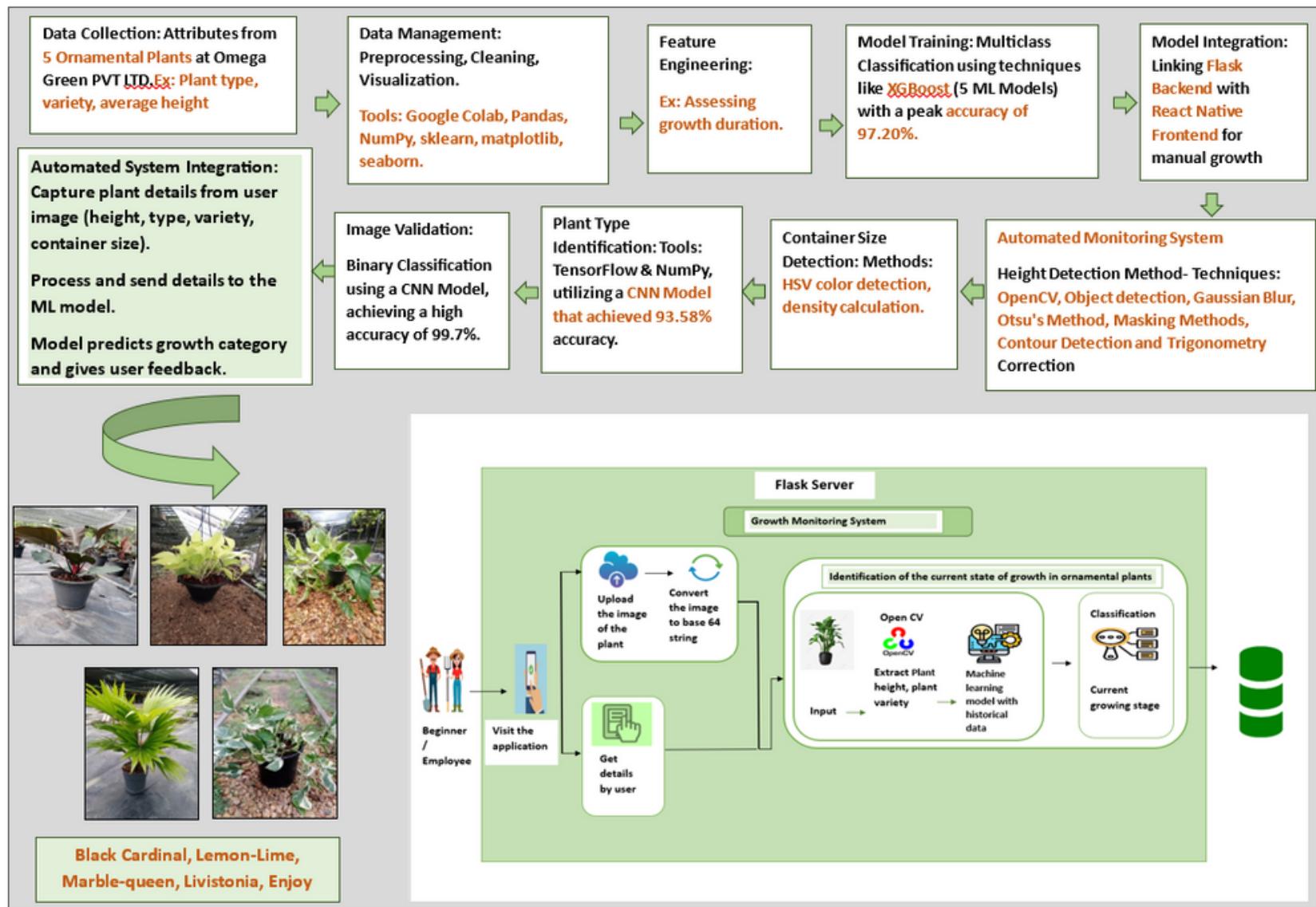
Improved XGBoost Classifier:
97.2%

Improved XGBoost Regressor:
94.958%

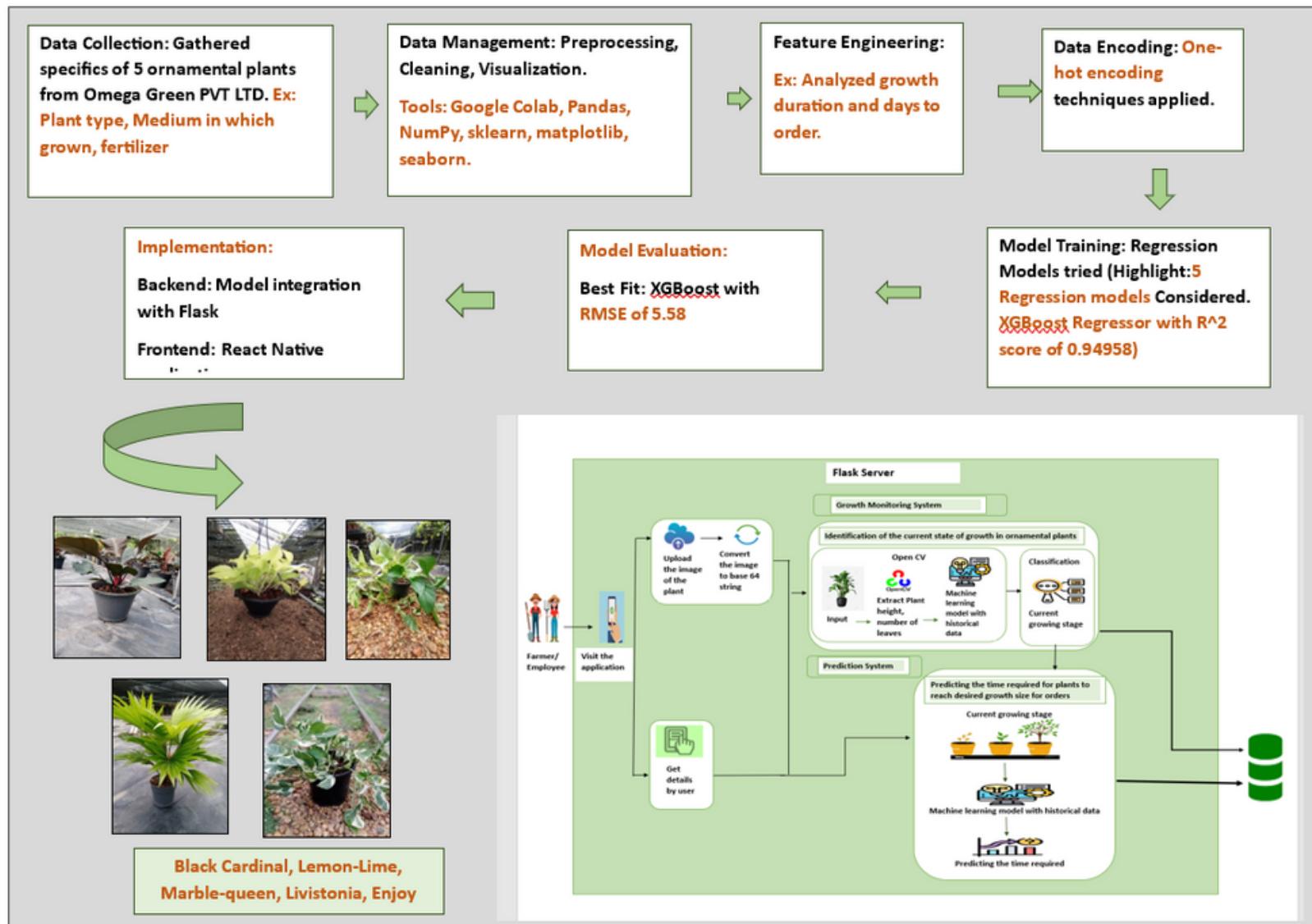
Newly
added

- Implemented: Uses image processing, CNN, computer vision. Predicts growth category based on extracted details.
- Significant UI enhancements and refinements.

Implementation Steps - Growth Monitoring



Implementation Steps -Time-To-Size Prediction



Leaf Affliction Analysis

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Basnyake N.S.N.

Specialization : Data Science



Research Problem



Have a look on
this leaf!!!

At first glance,

- Can you determine the exact percentage of the affected area?
- Can you identify this as a pest infection or nutrient deficiency?



Research Gap

Previous

Identifying the diseases

Identifying the nutrient deficiencies

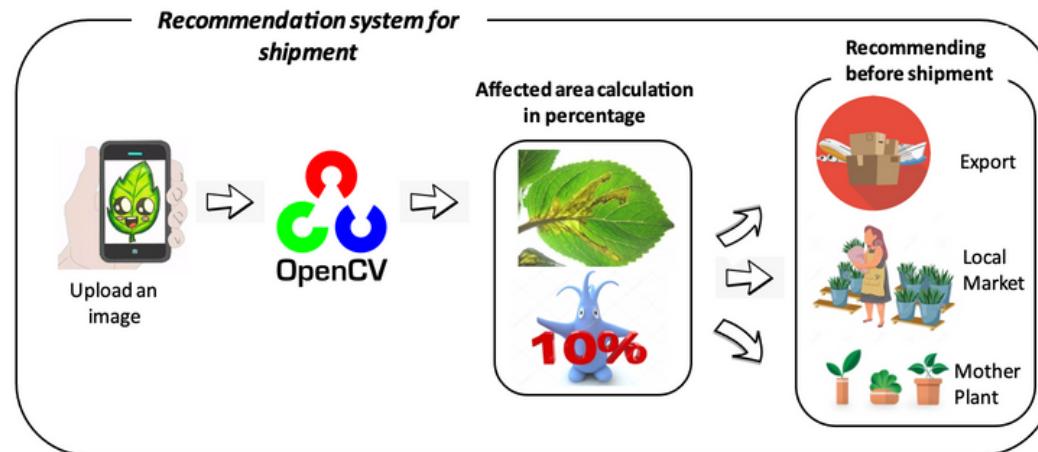
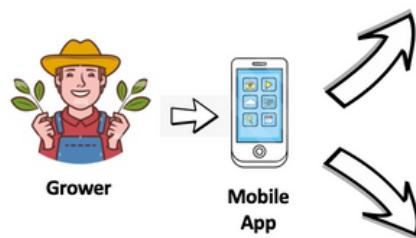
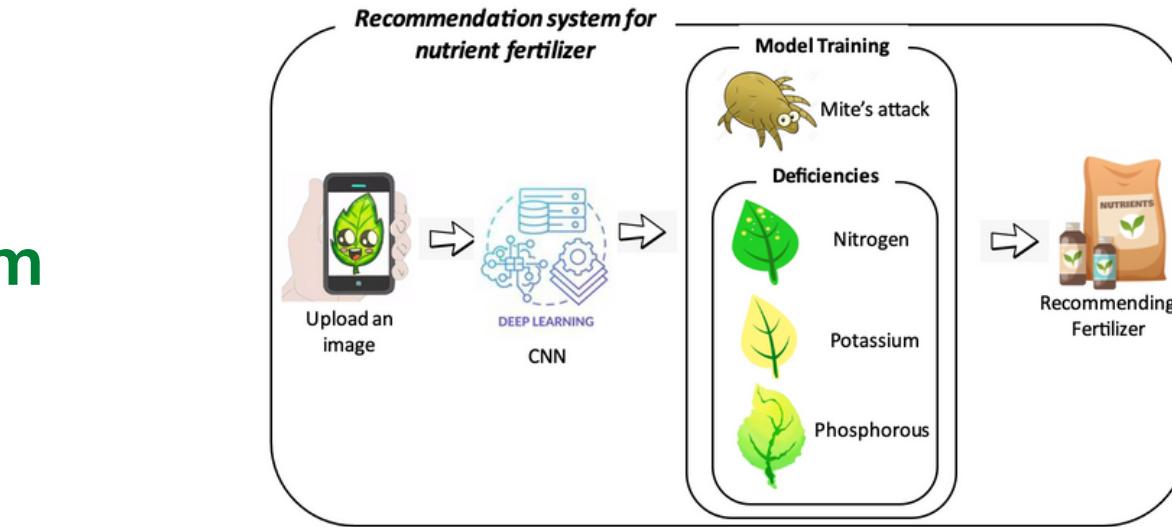
Calculated the affected area of a leaf in percentage by using a CNN model

Our app

Differentiate the diseases and nutrient deficiencies

Calculated the affected area of a leaf in percentage by finding a HSV ranges of a healthy leaf

Individual System diagram





Research Progress

PP2

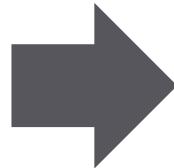
Test the leaf affliction area calculation with regular shapes



Final

Test the leaf affliction area calculation with irregular shapes

Newly added



Identify diseases and deficiencies



Full Leaf Area

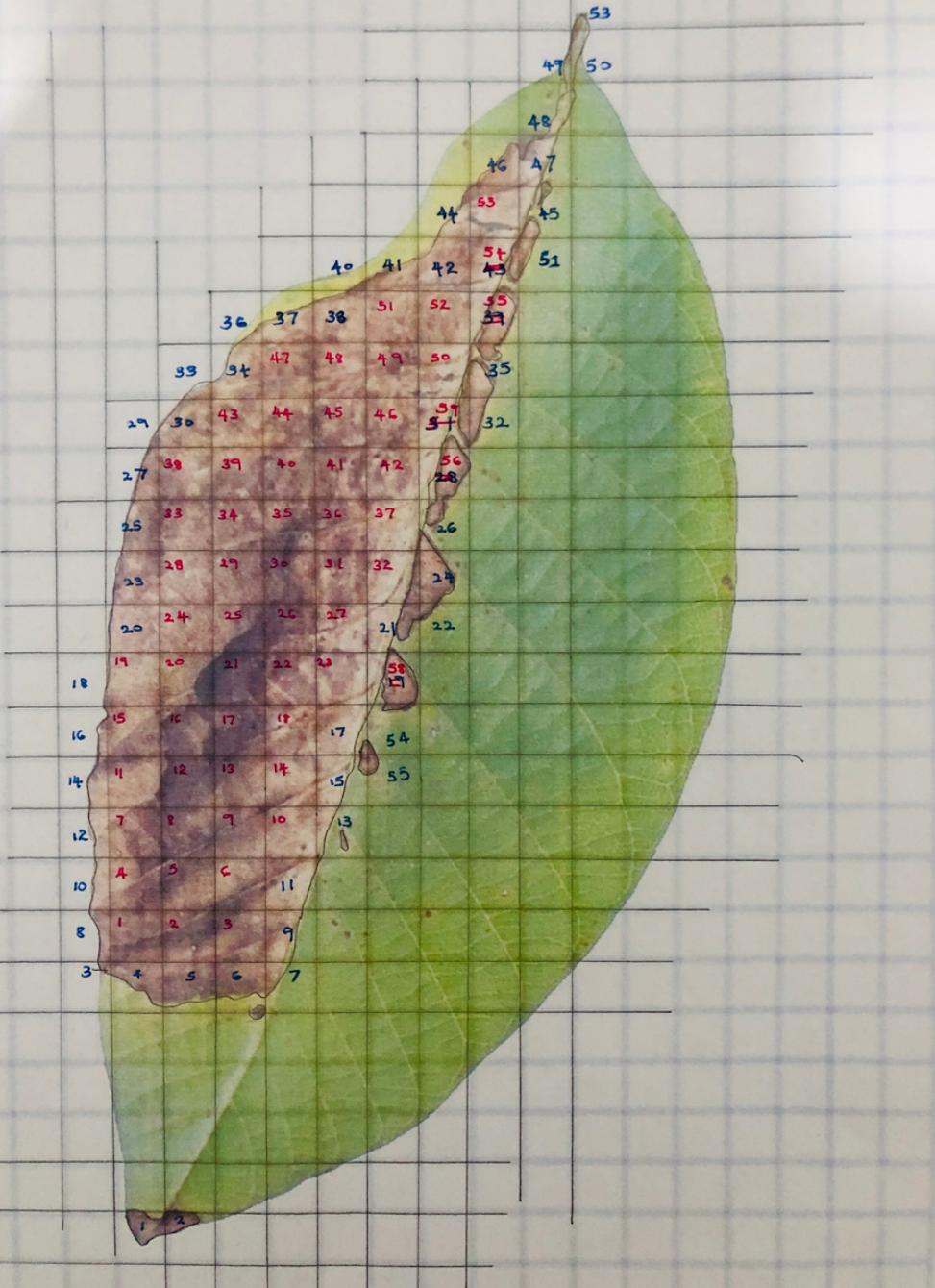
$$\begin{aligned}\text{Full size} &= 170 \times 1\text{cm}^2 \\ &= 170\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Half size} &= 56 \times 0.5\text{cm}^2 \\ &= 28\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Total} &= 170 + 28 \\ &= 198\text{cm}^2\end{aligned}$$



Affliction Leaf Area



$$\begin{aligned}\text{Full size} &= 59 \times 1\text{cm}^2 \\ &= 59\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Half size} &= 56 \times 0.5\text{cm}^2 \\ &= 28\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Total} &= 59 + 28 \\ &= 87\text{cm}^2\end{aligned}$$



Affliction Percentage:
44.26%



Sell it in local market

Got it!



From the graph:

Affliction Leaf Area Percentage

$$= (\text{affliction area} / \text{full leaf area}) \times 100\%$$

$$= (87 / 198) \times 100 \text{ cm}^2$$

$$= 43.94\%$$

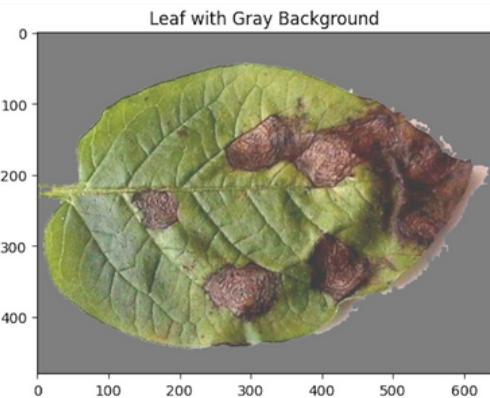
Implementation Steps

1

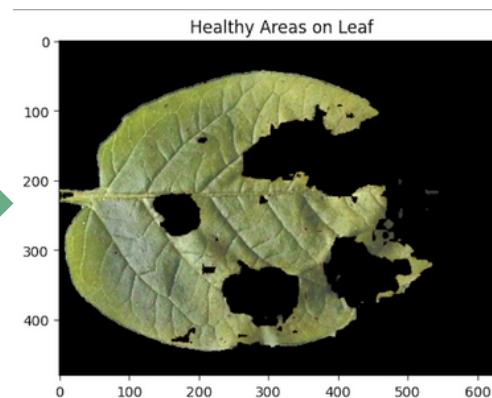
Calculate leaf affliction



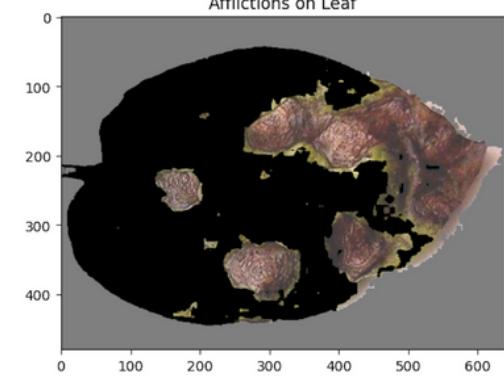
Remove Background



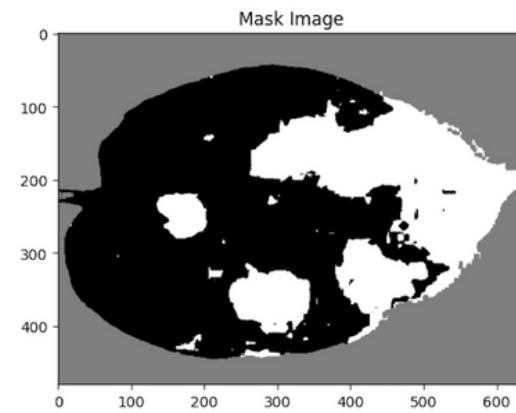
Finding Green HSV for Healthy Mask



Inverse the Healthy Mask



Final Mask Image

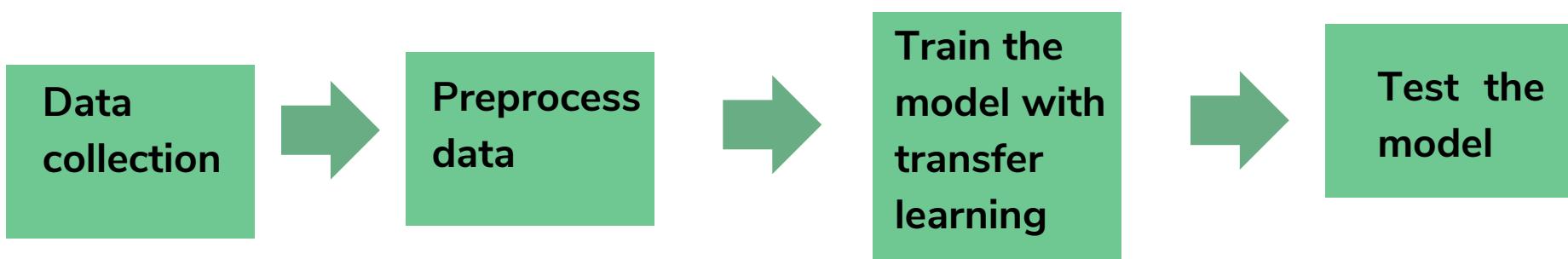


Implementation Steps



2

Identify Disease and Deficiencies



Powdery Mildew



Downy
Mildew



Rust



NPK deficiency

Cut Flower Crop Selection & Philodendron Variety Identification

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Gamage M.G.U.D.
Specialization : Data Science



2023-133

Research Problem

- **Cut flowers** : Key product in Sri Lankan floriculture.
- Wise crop choices consider:
Weather, Resources, Desired yield.
- Poor choices result in losses (money, time, resources).
- Beginners face challenges due to the lack of guidance.



- **Philodendron**: Popular in tissue culture and foliage décor.
- Many Philodendron **varieties**.
- Challenging for novice growers to differentiate.
- Limits production among beginners.



Research Gap

Previous studies

Crop selection using IoT sensors & Machine Learning

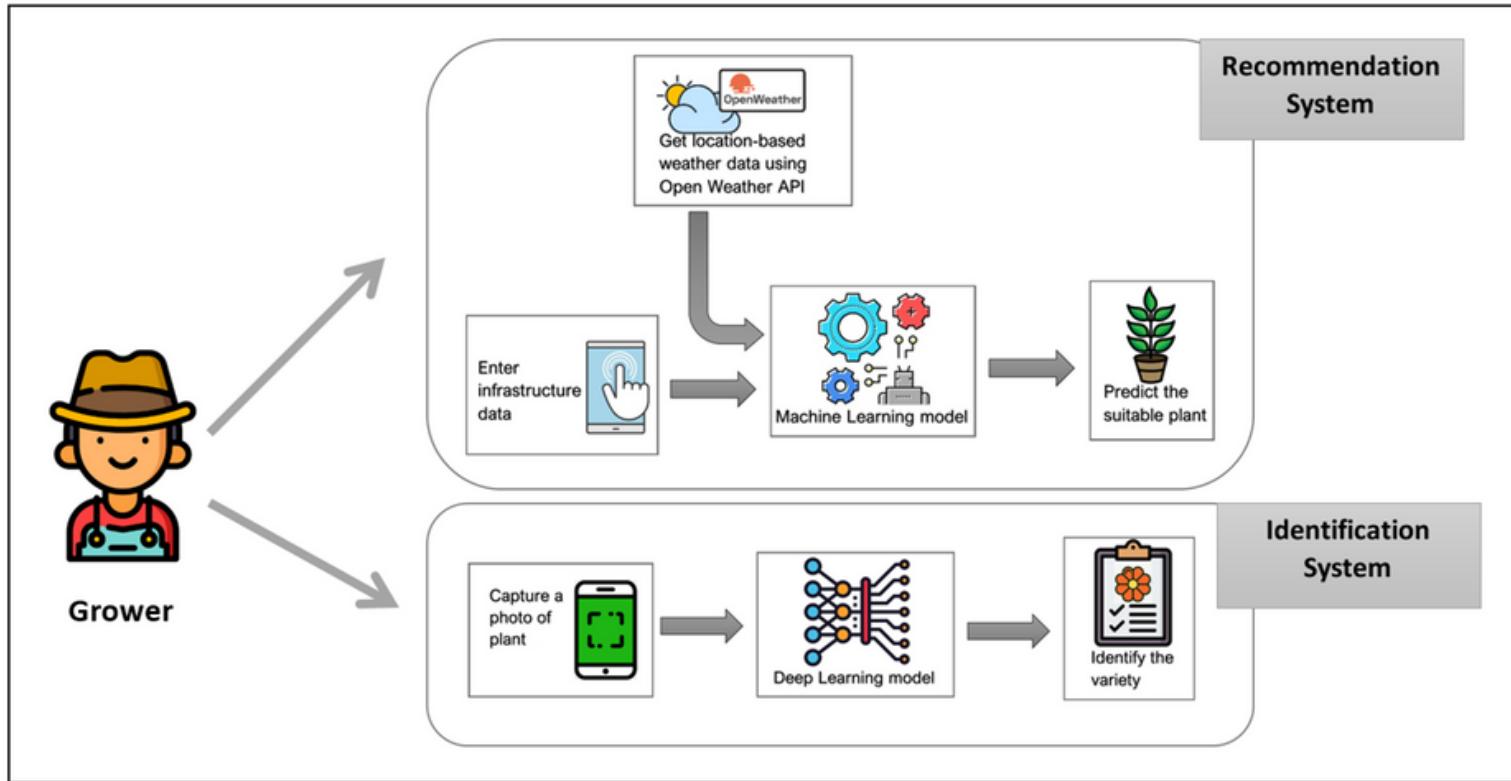
Anthurium variety identification on Android platform

Our app

Affordable **cut flower crop** selection using OpenWeather API & ML
(Cutflower Advisor)

Philodendron variety identification on **Android & iOS** platforms
(Philovariety Finder)

Individual System diagram





Research Progress

PP2

- Cut flower selection ML model
Accuracy – 99.87%
- Philodendron variety identification CNN model
Accuracy – 82.89%
- Completed app implementation
- Tested mobile app predictions

Final

- Improved Philodendron variety identification CNN model with
Accuracy- 87.16%
- Tested completed app with real users

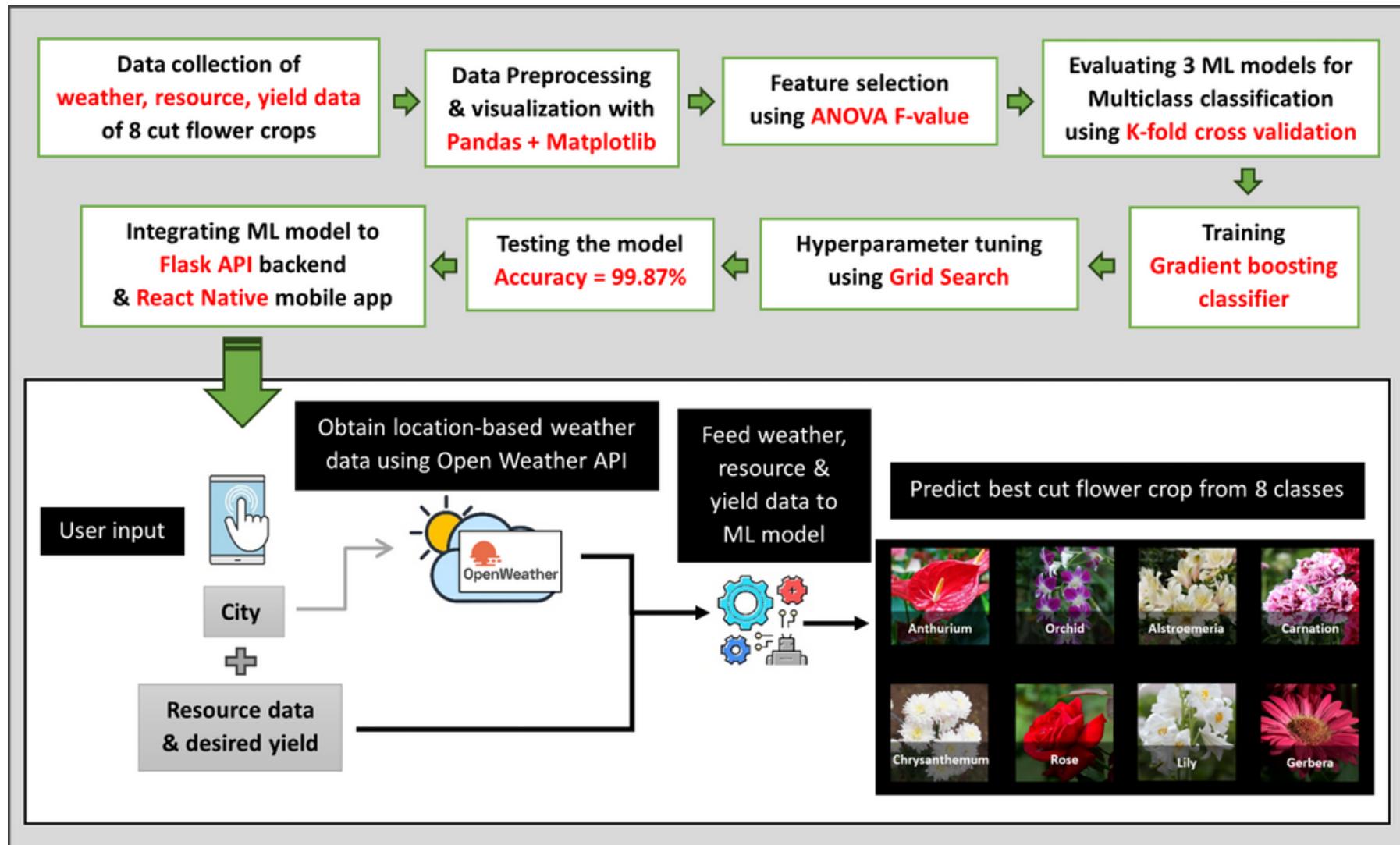


Newly added

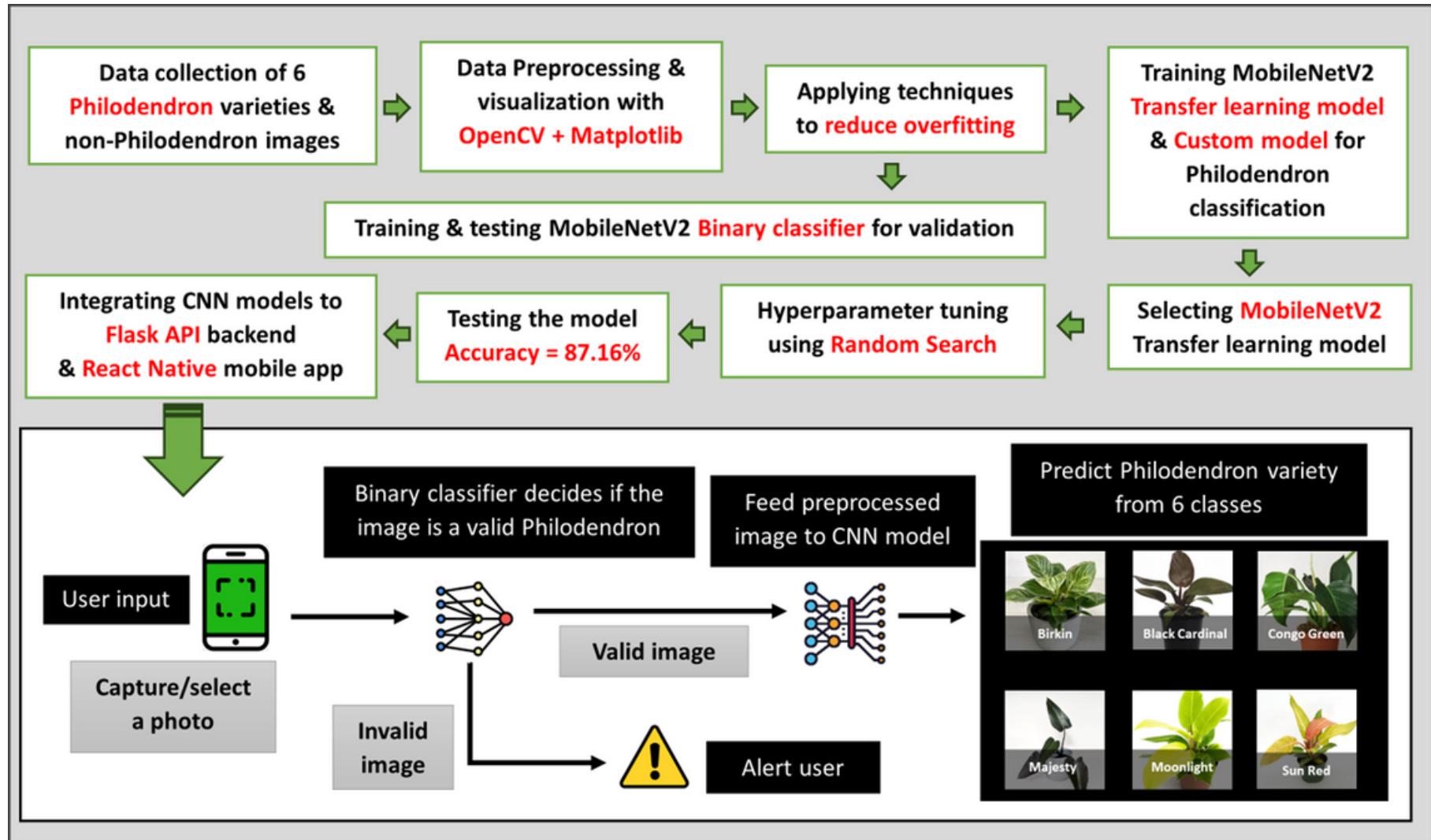


UI improvements

Implementation Steps - CutFlower Advisor



Implementation Steps - PhiloVariety Finder





Non-functional Requirements

1

Usability

User-friendly interfaces & navigation

2

Extensibility

Easily adapt to new plant varieties and crops

3

Compatibility

Work well on both iOS and Android

4

Accuracy

Consistently provide precise predictions

Commercialization

Commodity Version

Growth Monitoring

Leaf Affliction Analysis

Demand Forecasting

Philodendron Identifier

Premium Version

Growth Time Prediction

Disease Identification

IOT Facility

Cut flower Selection



Where dreams take root





Achievements - ICAC 2023



Acceptance Notification: 5th International Conference on Advancements in Computing

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Microsoft CMT <email@msr-cmt.org>
to me ▾

Sat, Oct 14, 2:33AM ★

Dear Sanduni R Liyanage,

Congratulations! We are pleased to inform you that your paper has been accepted to be presented at the 5th International Conference on Advancements in Computing 2023.

Paper ID: 87

Paper Title: Smart Assistance for the Floriculture Industry

Please visit <https://cmt3.research.microsoft.com/5ICAC2023/Submission/Index> to view the reviews given during the double-blind review process.

When preparing the camera-ready version of your paper, please address all the review comments and follow the camera-ready guidelines given in the <https://icac.lk/for-authors>

Please note that the camera-ready deadline is 1st of November 2023.

Camera-ready Submission Guidelines for Authors:
(also available at <https://icac.lk/for-authors>)

Our research paper was accepted for the 5th International Conference on Advancements in Computing (ICAC) organized by SLIIT.

Achievements - KandyUni open week

PlantPal mobile app was exhibited during SLIIT KandyUni Open Week on the 9th, 10th, & 11th of October.





THANK YOU



PlantPal
Where Dreams Take Root