

# AloeGreen

Smart Support System for Aloe Vera

Presented by  
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# Meet Our Team



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# Introduction to problem



**Limited research exists on an integrated smart system for Aloe Vera cultivation. Most studies focus on individual aspects like disease management, yield prediction, or market analysis separately.**



**This gap presents significant challenges for farmers and stakeholders, who require a comprehensive, data-driven tool to improve crop health, optimize yields, and make informed market decisions.**

# Previous Research & Shortcomings

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Lacked smart tech integration for crop management



Ignored localized weather-based crop planning



Neglected farmer-centered and data-driven solutions



No predictive analysis of market trends



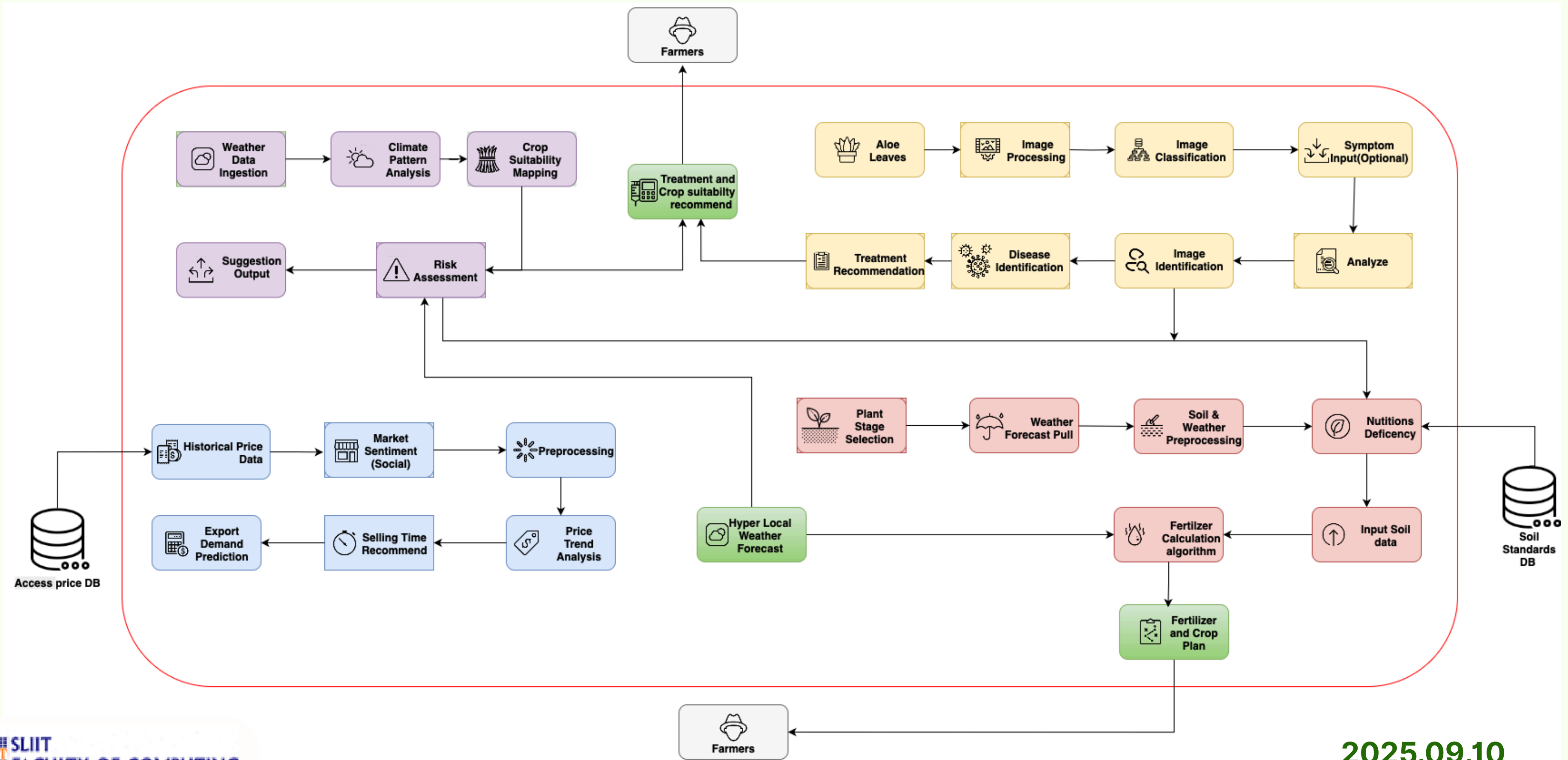
Limited data on fertilizer optimization for Aloe Vera

# Research Question



**How can a smart agricultural support system integrating disease detection, weather-based yield prediction, fertilizer management, and market price forecasting enhance Aloe Vera cultivation and improve farmer decision-making in Sri Lanka?**

# System Diagram



# Commercialization



**Application cost: \$20(Per Month)**

Target Audience:  
**Farmers**  
**Entrepreneurs**



**FREE PLAN**

**Free**



**PREMIUM PLAN**

**20\$ per month**



# Gantt Chart

TASK NAME	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
Research topic selection	█											
Topic assesment	█	█										
Project charter		█										
Study on research area	█	█	█									
Project proposal report			█									
System design and planning			█	█								
Implementation of functions				█	█	█						
Integration level 1					█	█						
Testing level 1						█						
Progress presentation 1							█					
Check list 1							█					
Prepare research paper							█	█	█	█		
Research paper							█	█	█	█		
Implementation of function							█	█	█	█		
Testing level 2									█	█		
Progress presentation 2										█		
Check list 2										█		
Final report										█	█	
Final presentation												█

# Aloe Vera Yield & Forecasting Prediction System



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## Problem Definition

- Farmers currently rely on manual observation → inaccurate yield estimation.
- No localized system for Aloe Vera in Sri Lanka.



## Shortcomings of Existing Systems

General crop models don't adapt to soil, rainfall, and micro-climate variability.

Lack of integration with real-time IoT data.



## Creative Solution

IoT-based environmental data collection (soil pH, moisture, rainfall, temperature, sunlight).

Machine Learning & Deep Learning models for yield forecasting.

Provide farmers with actionable insights (expected yield, trends).

Task	Key Domains of Specialization	Latest Technologies
<b>Environmental data collection (soil, weather, sunlight)</b>	Internet of Things (IoT)	IoT gateways (LoRa, Wi-Fi, MQTT)
<b>Data preprocessing &amp; feature engineering</b>	Data Science, Big Data Analytics	ETL pipelines, anomaly detection, noise filtering, statistical normalization
<b>Yield prediction &amp; forecasting</b>	Machine Learning, Deep Learning	Random Forest, Gradient Boosting, LSTM, CNN-LSTM hybrids for time-series forecasting
<b>Visualization &amp; farmer insights</b>	Human-Computer Interaction (HCI), Data Analytics	Mobile app(React Native + Python Flask backend)
<b>Decision support &amp; recommendations</b>	Machine Learning	Recommendation algorithms

## Evaluation & Success

- Accuracy metrics: RMSE, MAE, R<sup>2</sup>.
- Pilot testing with Sri Lankan Aloe Vera farms.
- Target: >85% forecasting accuracy.

## Data Availability & Ethical Clearance

### Data Source

- IoT sensor data from Aloe Vera farms (soil pH, moisture, temperature, rainfall, sunlight).
- Supplemented with government weather datasets.
- Build a custom dataset combining environmental factors with historical Aloe Vera yield records.

### Ethics

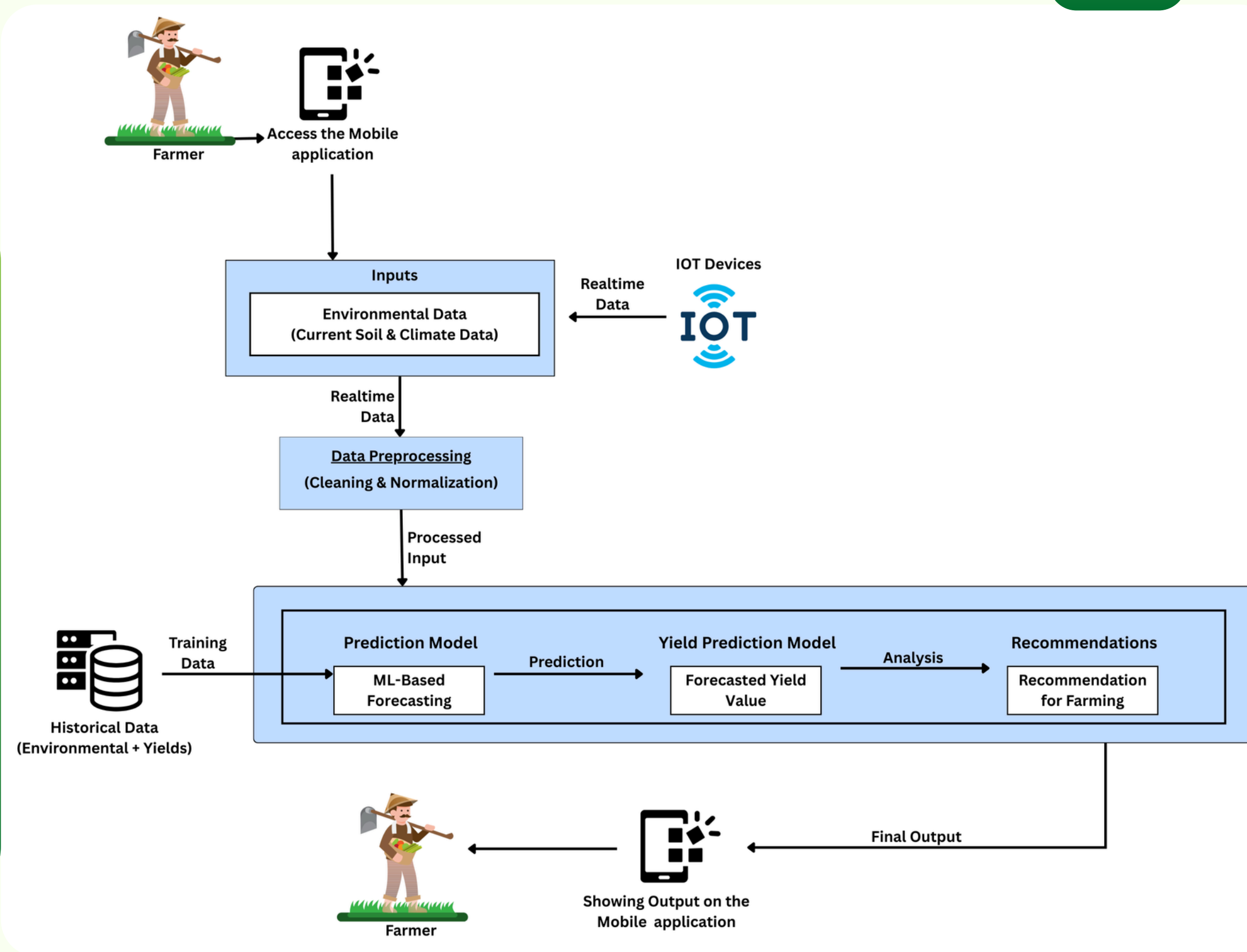
- Anonymization of farm-level data (no disclosure of farmer identity or location).
- Data collected with farmer consent and institutional approval.
- Ensure fair use of data only for research & yield forecasting purposes.

## System Diagram



### HOW TO USE IN REAL-WORLD SCENARIO

- IOT inputs data (soil pH, moisture, temp, rainfall via sensors/app).
- Model: ARIMA / LSTM (time-series preprocessing)
- System analyzes conditions using past + current data.
- Model: Random Forest / Gradient Boosting (regression)
- App predicts yield & advice (e.g., “2.8 tons/acre, irrigation needed”).
- Model: CNN-LSTM hybrid (deep learning)
- Farmer gives feedback (actual harvest vs predicted).
- Model: Reinforcement / Active Learning (continuous improvement)



# Aloe Vera Disease Detection Using Leaf Images & Farmer-Reported Symptoms



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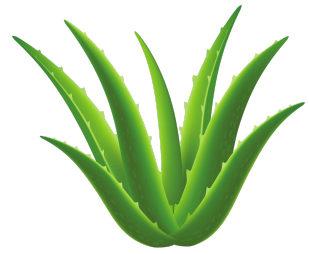


# Aloe Vera Disease Detection Using Leaf Images & Farmer-Reported Symptoms

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## Proven Gap / Creative Solution

- First dual-mode system combining CNN (leaf images) + NLP (multilingual text/voice symptoms)
- Inclusive for farmers with low digital literacy through Sinhala/Tamil/English voice input
- Real-time treatment advice + feedback loop → continuous learning system

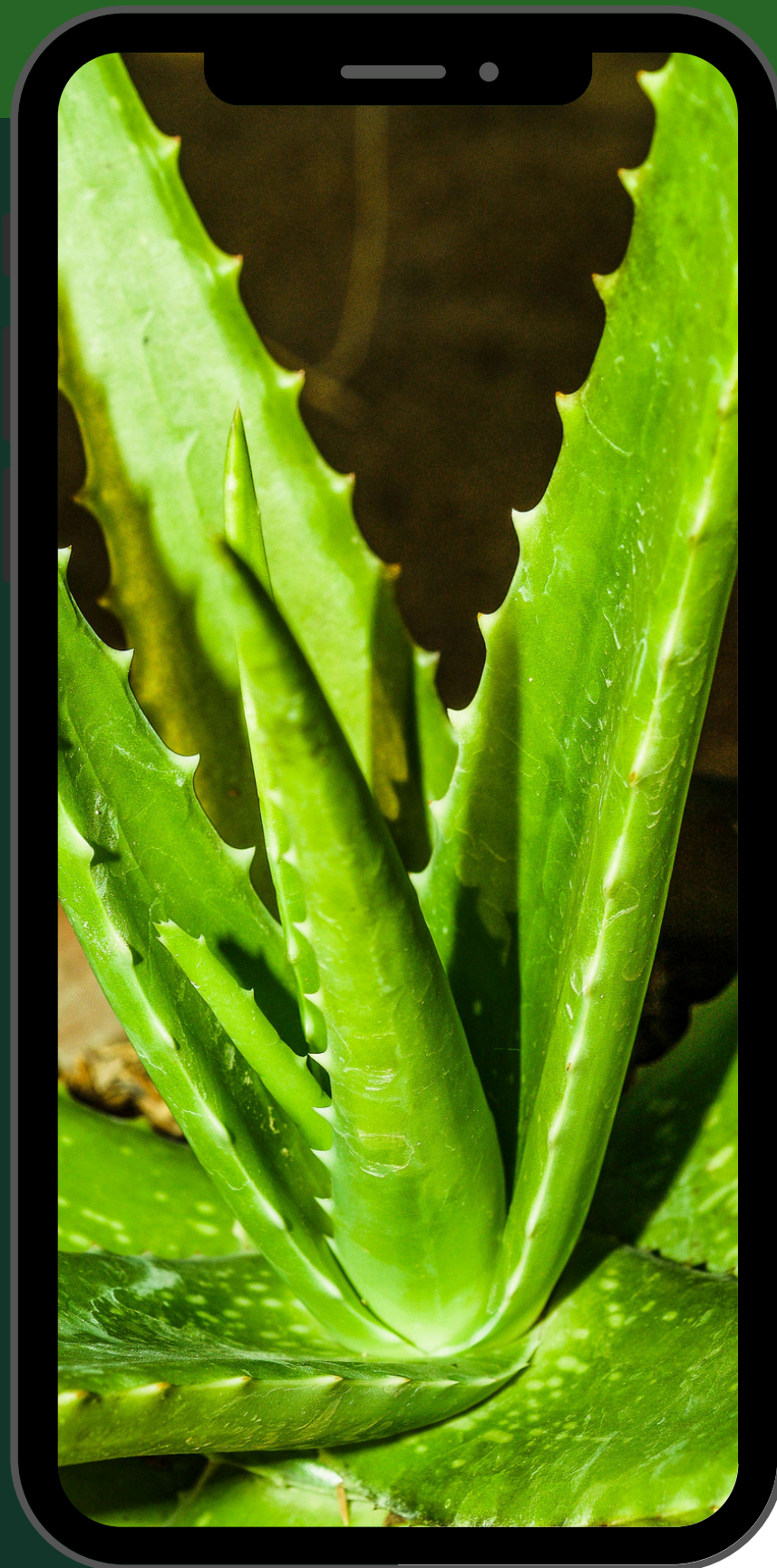


## Knowledge Gap / Problem Definition

- Farmers face yield loss due to late/incorrect disease detection
- Current tools rely only on image-based detection and English input → excludes local farmers

## Shortcomings of Existing Systems & Proposed Solution

- Existing: Focus only on photo analysis, limited datasets, lack of local language support
- Proposed: Image + symptom inputs, multilingual NLP, real-time treatment, scalable for more diseases



## ◆ Evaluation & Validation

- Dataset split → Training (70%), Validation (15%), Testing (15%)
- Expected Accuracy >85% for CNN model
- Confusion matrix & precision/recall for disease classification
- User testing with farmers → symptom matching & treatment feedback

## ◆ Data Availability & Ethical Clearance

- Data Sources: Aloe Vera leaf images (public datasets + field collection), farmer symptom inputs
- Ethics: Informed consent from farmers for symptom/voice data
- Data anonymization → farmer identity protected
- Research aligned with agricultural and ICT ethical guidelines

# Aloe Vera Disease Detection Using Leaf Images & Farmer-Reported Symptoms

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## KEY DOMAINS OF SPECIALIZATION

- AI & Deep Learning → CNN for leaf disease detection
- Natural Language Processing (NLP) → Multilingual text & voice inputs
- Mobile & Cloud Computing → Real-time diagnosis, farmer-friendly mobile app

## LATEST TECHNOLOGIES USED

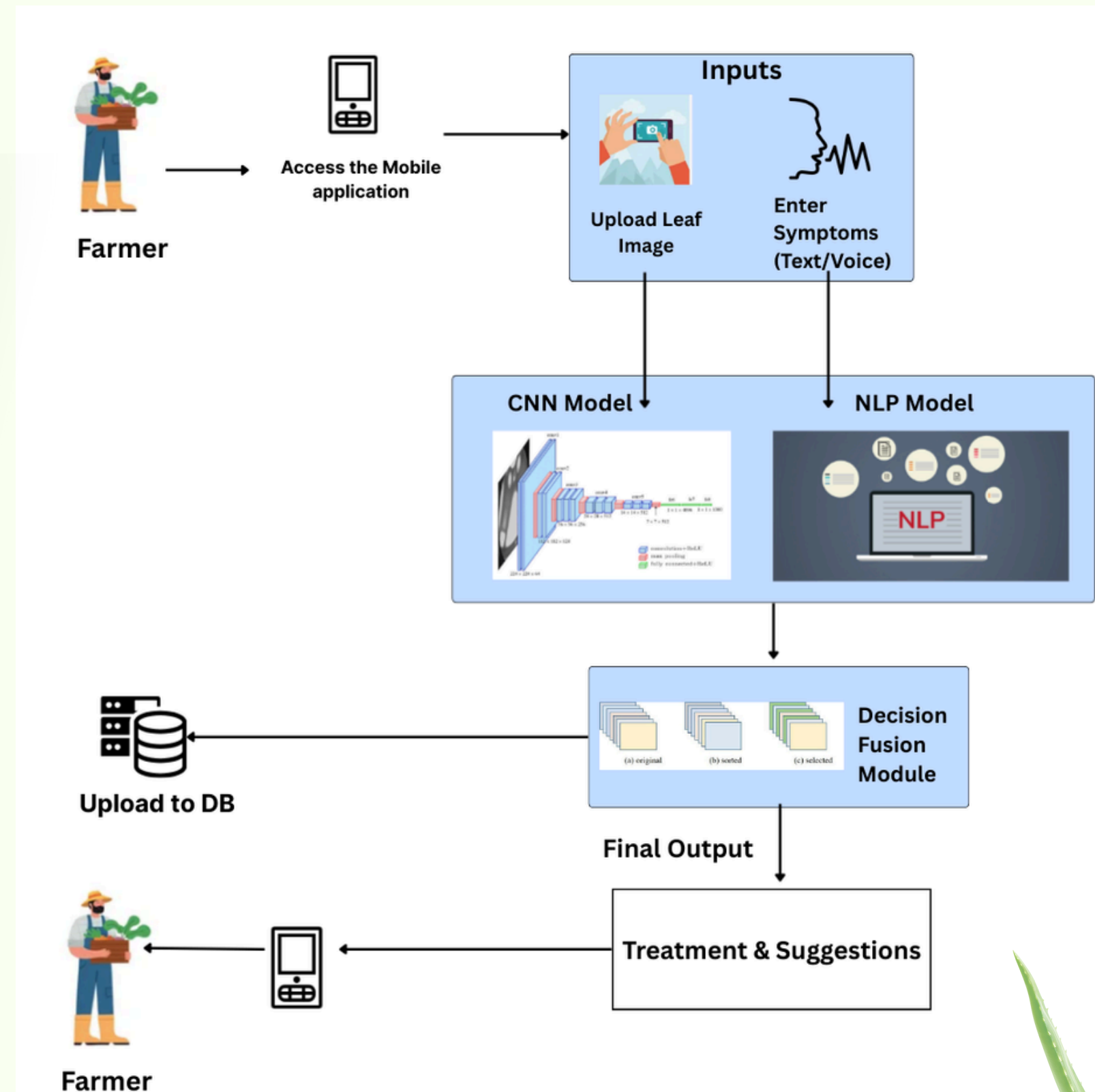
- CNN models (TensorFlow/Keras, pretrained architectures like ResNet/MobileNet)
- Multilingual NLP (transformers, Google Speech-to-Text API)
- React Native for cross-platform mobile app
- Firebase/Cloud DB for storage

# Aloe Vera Disease Detection Using Leaf Images & Farmer-Reported Symptoms



## HOW TO USE IN REAL-WORLD SCENARIO

- Farmer captures leaf photo via mobile app
- Adds symptom description (text/voice in Sinhala, Tamil, English)
- App uses CNN + NLP to analyze inputs
- Provides disease name & treatment in simple local language with icons
- Farmer applies treatment & gives feedback → system learns & improves



# Aloe Vera Price Forecasting System



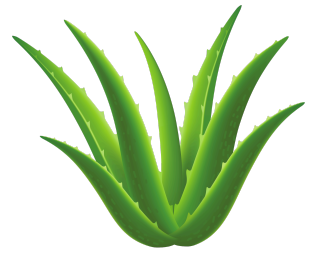
IT22360946 - Yasodara S A D S

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## Proven Gap / Creative Solution

- No existing system in Sri Lanka predicts Aloe Vera prices in real time.
- Farmers lack guidance on when and how to sell, leading to reduced profits.
- My solution provides real-time price forecasting for Aloe Vera farmers.

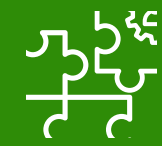


## Knowledge Gap / Problem Definition

- Current market data (Dambulla Centre) only publishes static prices, not future predictions.
- Farmers depend on middlemen → lack bargaining power and often undersell.

## Shortcomings of Existing Systems & Proposed Solution

- Existing systems: Provide raw data only, no forecasting, no advisory.
- My solution: Uses historical prices, machine learning models →, provides dynamic forecasts in Sinhala/English.



## Key Domains of Specialization Knowledge

**Data Science & Machine Learning** → Time-series forecasting.

**Agricultural Economics** → Price trends, market demand, and value chain analysis.

**Software Engineering** → Mobile app for user interface.



## Technologies

**ML frameworks: Python programming**

**Cloud: AWS/GCP for real-time data pipelines.**

**Cloud: Visualization: Interactive charts with dashboards.**

## How to Evaluate and Prove Success

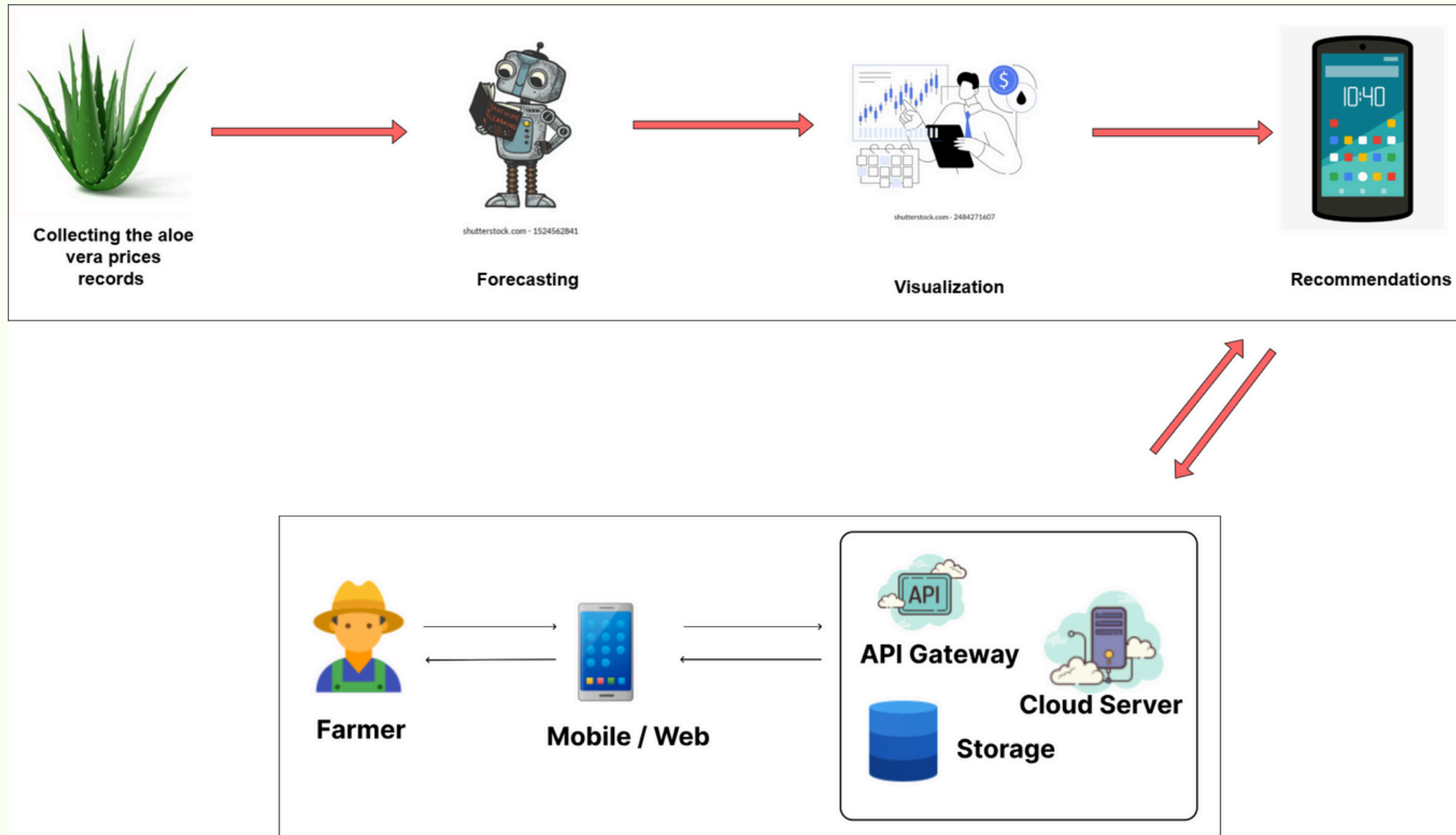
- Accuracy: Compare predictions vs actual Aloe Vera prices
- Reliability: System performance tested with cross-validation.
- Usability: Farmer feedback surveys in pilot testing.

## Data Availability & Ethical Clearance

- Data sources: HARTI bulletins, DOA, Dambulla Economic Centre, Tridge global prices
- Ethics: Public datasets, farmer consent for feedback.
- No personal or sensitive data used → ethical clearance not an issue.



## System Overview



## Real World Application

- **Collect daily Aloe Vera prices from local & global markets**
- **Forecast future prices using ML models**
- **Store and process data in the cloud (API Gateway, servers, storage)**
- **Deliver results through a mobile app**
- **Farmers can view charts and selling advice in Sinhala/English**
- **Farmers decide when and how to sell → maximize profit**

# Aloe Vera Fertilizer Plan Recommendation System



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## Problem Definition

- Farmers rely on traditional practices without precise nutrient analysis → over/under-fertilization.
- No localized, real-time fertilizer management system for Aloe Vera in Sri Lanka.



## Shortcomings of Existing Systems

General guidelines not adapted to Sri Lankan soil conditions and Aloe Vera growth stages.

Lack of integration of real-time soil data, image-based crop health monitoring, and localized recommendations.



## Creative Solution

IoT-based environmental data collection (pH, moisture).

Image Processing + Machine Learning models for nutrient deficiency detection from crop image

Provide farmers fertilizer plan (type, dosage, time) with what nutrition type is plant lack of.

Task	Key Domains of Specialization	Latest Technologies
<b>Soil &amp; nutrient data collection</b>	Internet of Things (IoT),	Soil pH sensors, IoT gateways
<b>Crop health monitoring</b>	Image Processing, Computer Vision	CNN-based image analysis for nutrient deficiency detection, data augmentation techniques
<b>Data preprocessing &amp; nutrient profiling</b>	Data Science, Big Data Analytics	ETL pipelines, anomaly detection, feature extraction, normalization
<b>Fertilizer recommendation &amp; scheduling</b>	Machine Learning, Deep Learning	Random Forest, XGBoost, CNN-LSTM hybrids, AI-driven fertilizer algorithms
<b>Decision support &amp; farmer insights</b>	Artificial Intelligence, Human-Computer Interaction (HCI)	Mobile app(React Native + Python Flask backend)

## Evaluation & Success

- Collect real-time soil data (pH, Nitrogen, Phosphorus, Potassium).
- Analyze nutrient status → detect deficiencies or excesses.
- Generate AI-based recommendations: correct fertilizer type, dosage & timing.
- Provide actionable advice through a mobile app dashboard for farmers.

## Data Availability & Ethical Clearance

### Data Source

- IoT sensor data from Aloe Vera farms (soil pH value).
- Supplemented with nutrition and fertilizer datasets.
- Build a custom dataset combining environmental factors with historical Aloe Vera records.

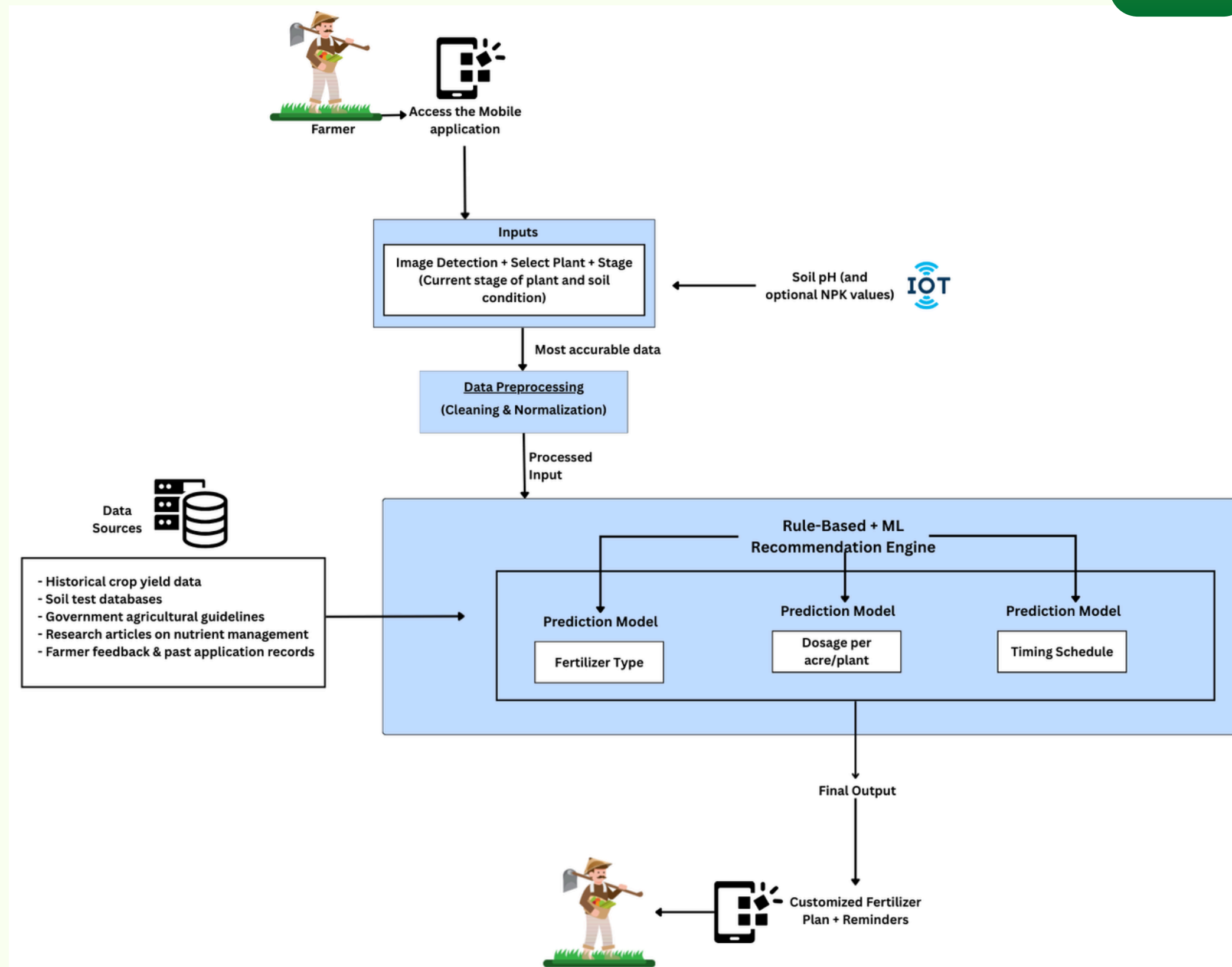
### Ethics

- Farm-level data will be anonymized to secure farmer identity and location.
- Data will be collected with the approvals of necessary institutions.
- Ensure fair use of data only for research & fertilizer recommendation purposes.



## HOW TO USE IN REAL-WORLD SCENARIO

- Farmer captures leaf photo via mobile app
- Select the plant stage and add the ph value of the soil.
- App uses CNN + NLP to analyze inputs
- Provides description about the nutrition lack of and provide the fertilizer plan.
- Farmer applies fertilizer & gives feedback → system learns & improves



# Thank You!

