CCDC

# CCDC: Centre for Crop Disease Control

Team name: NEUON AI

Members: Chang Yang Loong, Sophia Chulif, Heng Kiat Jing, Danish Ezwan

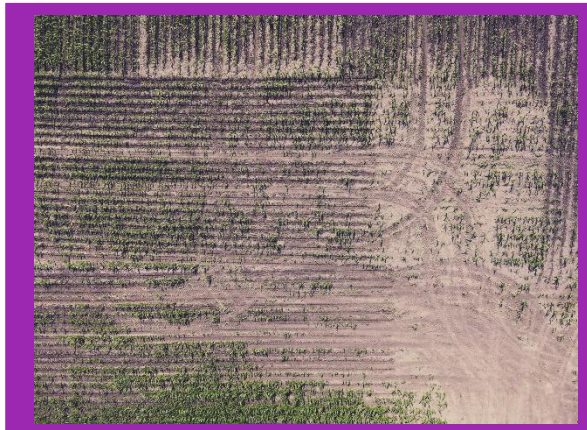
# Our focus

## Agriculture

# Introduction

Crops make up the vast majority of agricultural production

Farmers depend on healthy crop yield



Crop diseases result in the loss of crop yield and income

# Problem statement

1. How can we create a sustainable farming solution?
2. How can we empower rural farmers to utilize data mining to improve their farm's efficiency while at the same time lowering their farm operating cost?

# Importance of crop disease recognition

- Enable curative measures
- Prevent spread of disease
- Reduce crop loss
- Prevent recurring outbreaks in the future

# Existing problems

Unavailability of human expertise

e.g. plant pathologist in rural farm

Outbreak and spreading of disease from slow crop disease detection

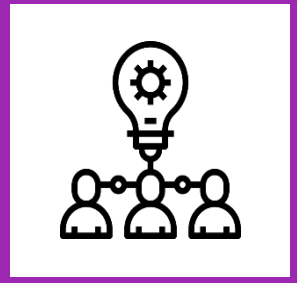
# Solution

Plant expert knowledge

Machine

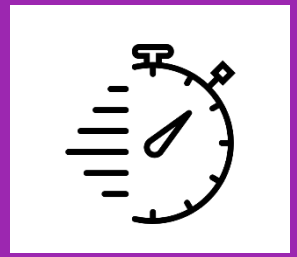
Crop disease recognition assistant

# How it will solve



Introduce a collaborative platform

Assist smallholder farmers without research infrastructure or support



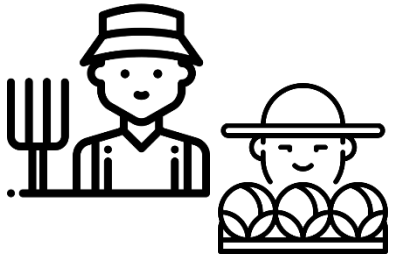
Enable timely control response

# Technical challenges

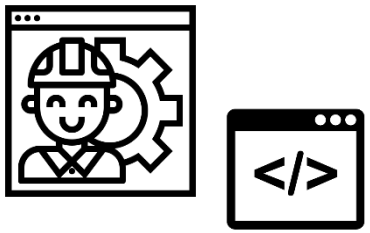
- Existing plant disease data is not region invariant
- Data required for deep learning task is large
- Data needs to be diverse in terms of capturing condition, disease stages and image quality

# Centre for Crop Disease Control

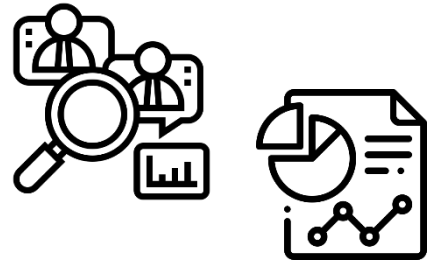
Authorisation bodies



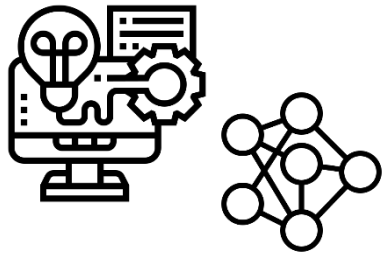
Farmers



Software developers



Researchers / experts



Machine learning / AI

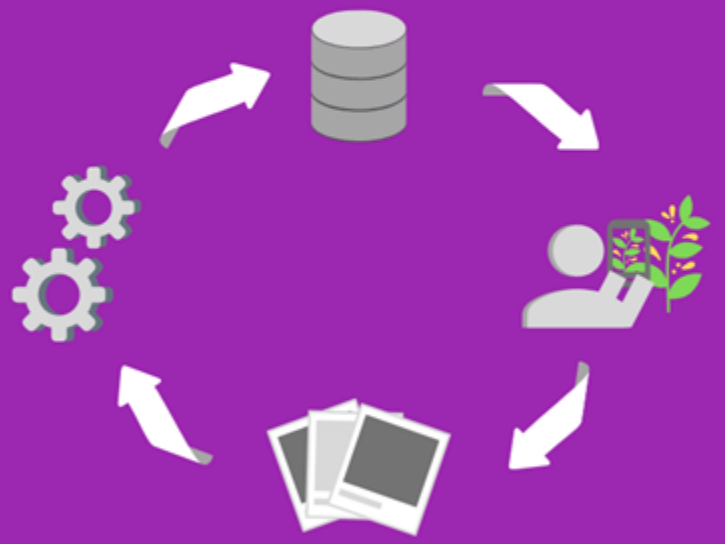
# Methodology

**AI & model database**

Machine learning

Recognition

**Artificial neural network / Machine learning algorithms**



**Disease recognition**

Training data

Feedback from farmers or researchers

**Images of crop diseases**

# Features

## Recognise disease

- Using AI model
- Deploy on app

## Manage disease data

- Annotate
- Store

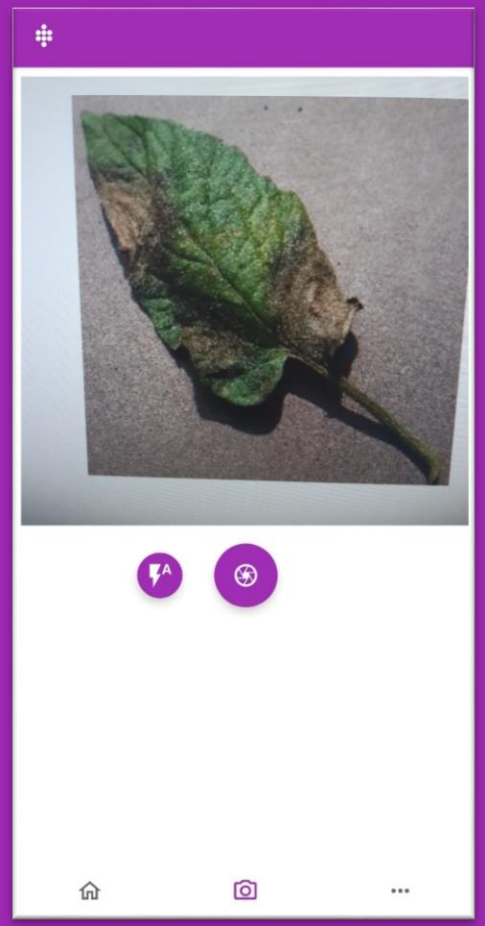
## Sharing / community platform

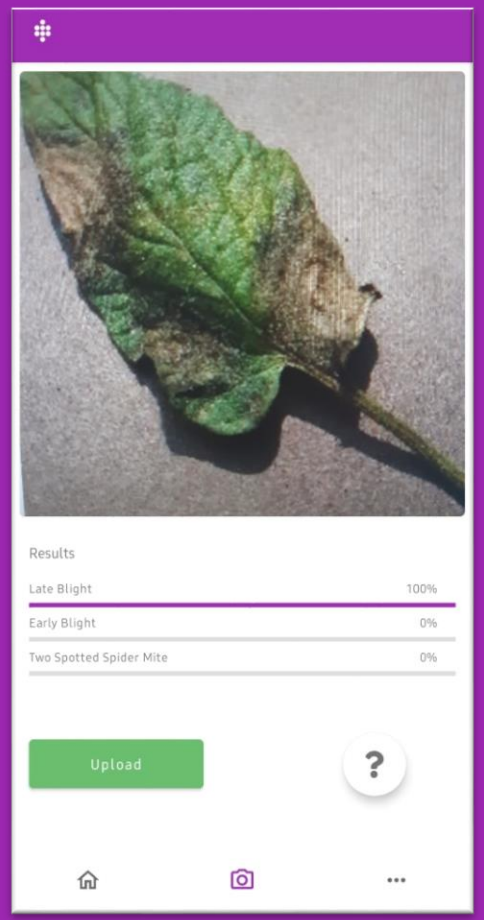
- Share diseases detected
- Help to identify cause
- Predict spreading magnitude
- Enable timely response from authorities

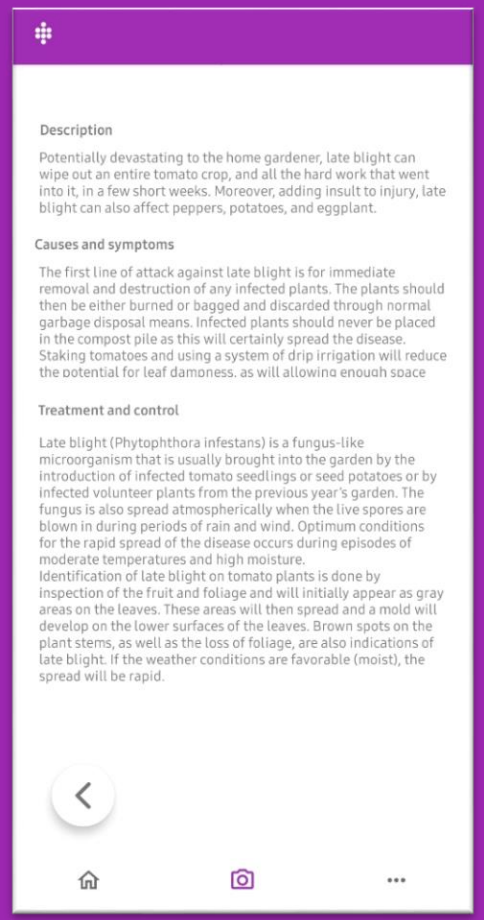
# Prototype

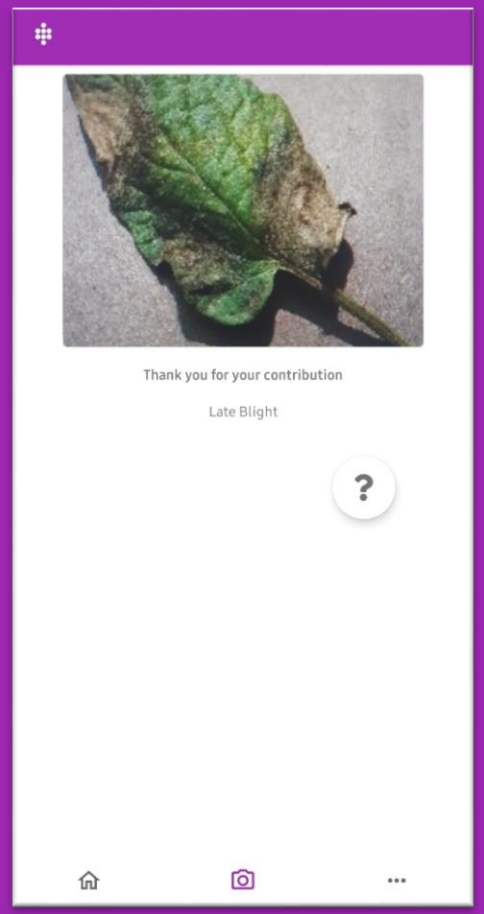
Automated tomato plant disease recognition system

# Prototype UI (Android App)

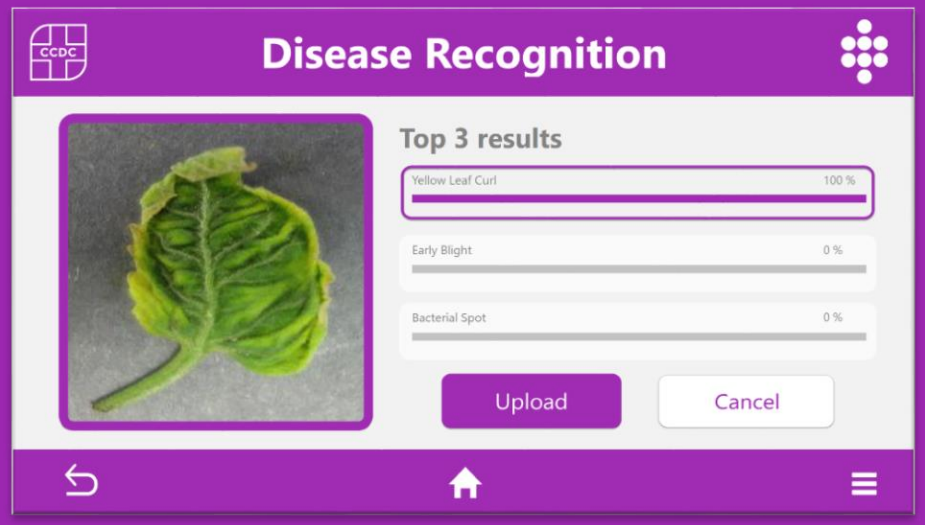


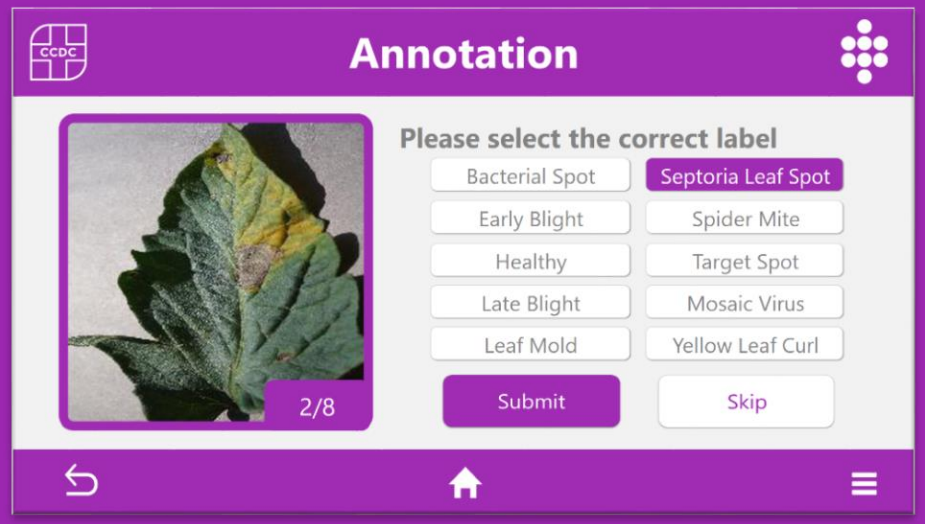


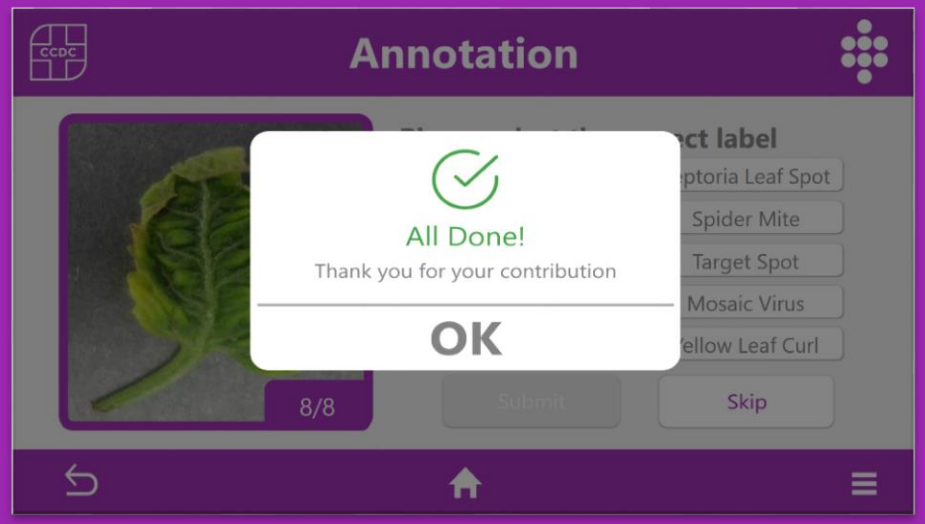



# Prototype UI (Windows PC)

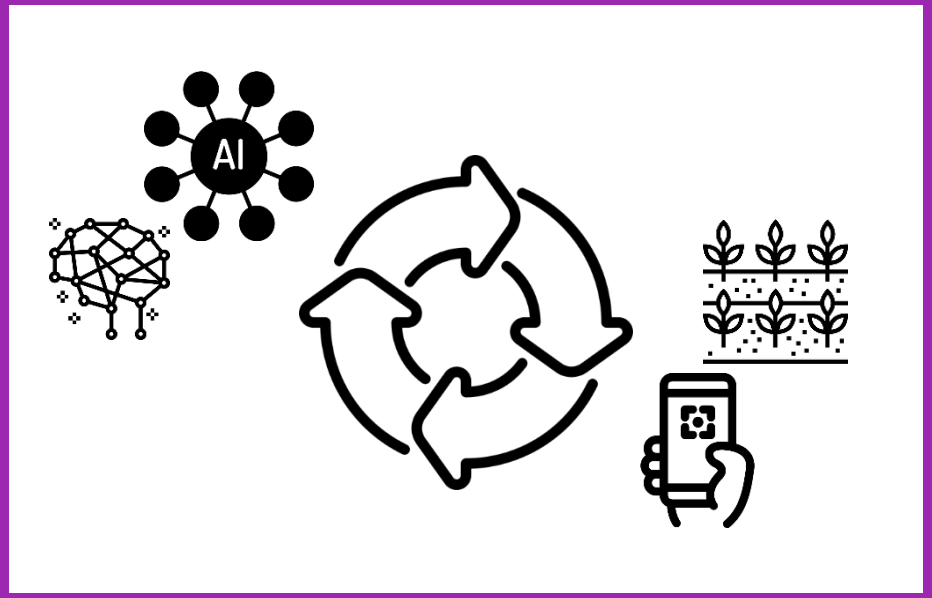


# Notable outcomes

- A reliable and continuously learning AI for crop disease

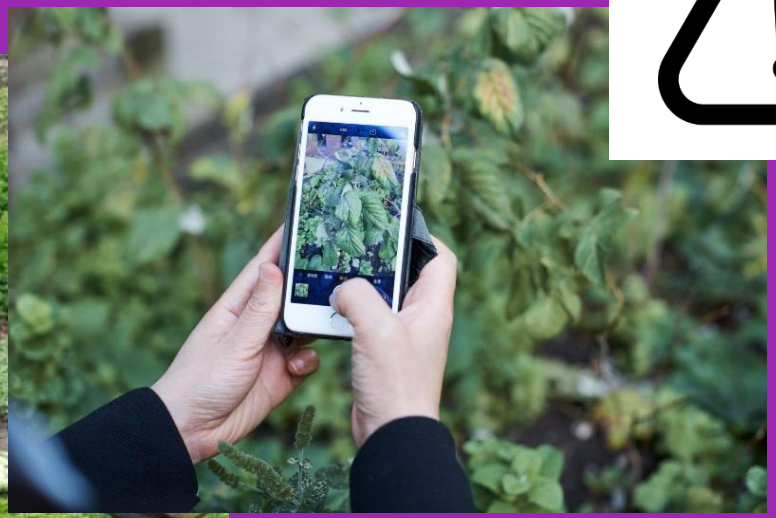


# Notable outcomes

- Reduce the cost of data collection by crowdsourcing the community

# Notable outcomes

- Early detection of crop disease
  - Increase of production quality & quantity
  - Increase of farmer and State income



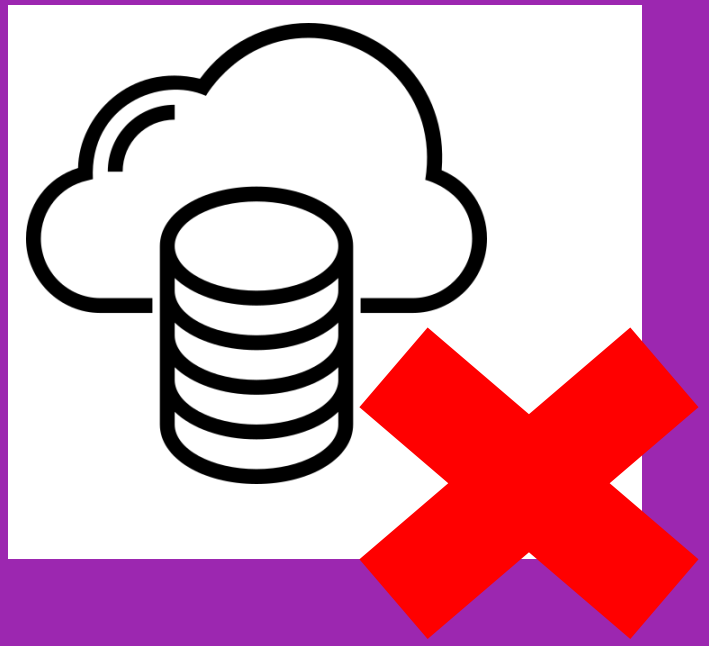
# Notable outcomes

- Study, analyse, detect and control crop disease outbreak with the collaboration of agricultural authority within the community

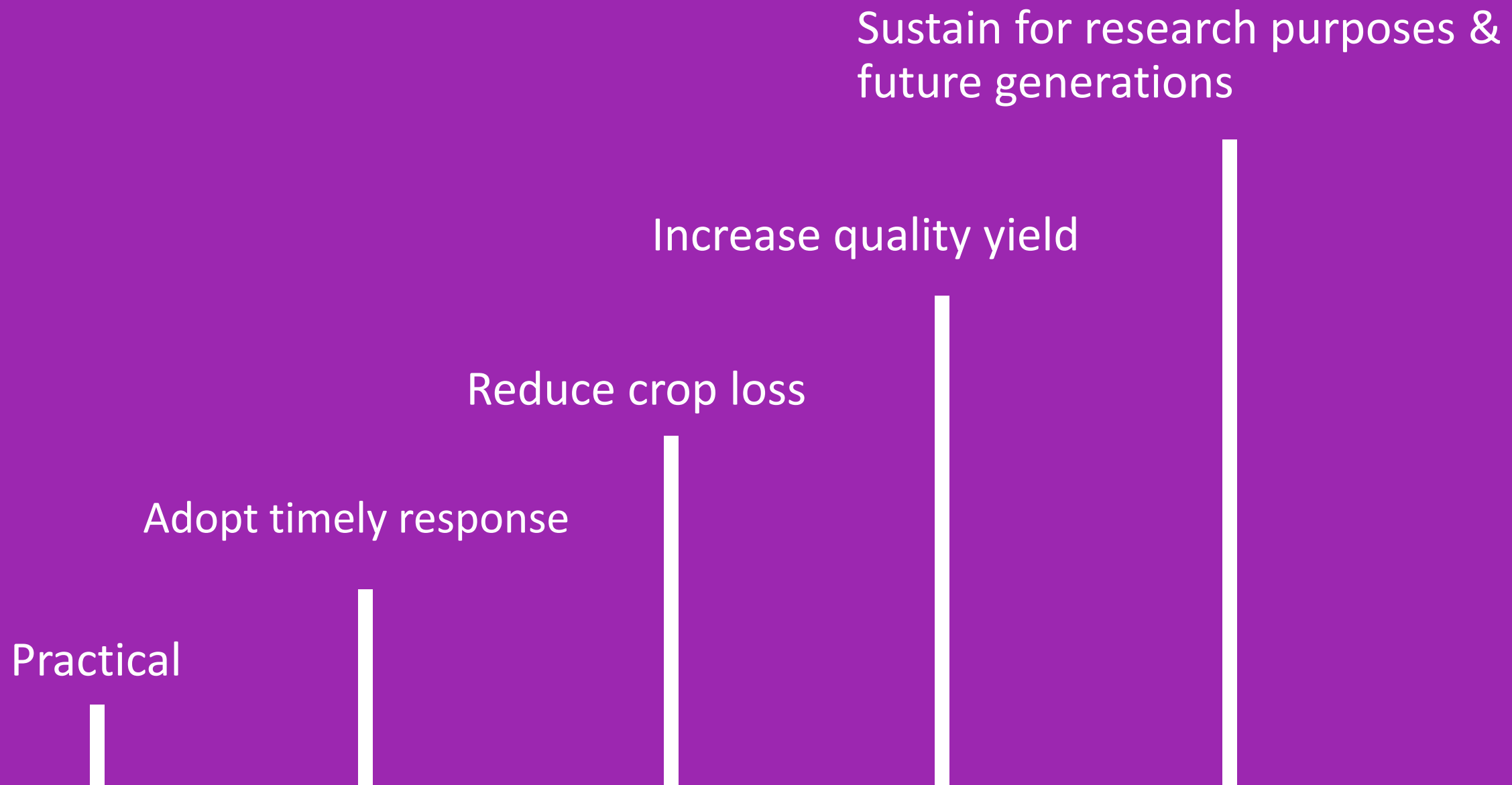
* Potential authorisation bodies

# Notable outcomes

- Light-weight and independent AI model for offline disease detection



# Conclusion


Practical
Adopt timely response
Reduce crop loss
Increase quality yield
Sustain for research purposes & future generations

# Trained model results

| Accuracy | Model | |
|---|---|---|
| | 1 (Mobile Net v2) | 2 (Inception Resnet v2) |
| **Training (Top 1)** | 88.13 % | 96.88 % |
| **Validation (Leaf Scan - Top 1)** | 97.94 % | 99.75 % |
| **Validation (Non-leaf Scan - Top 1)** | 64.44 % | 78.89 % |
| **Validation (Leaf Scan - Top 3)** | 99.92 % | 100.00 % |
| **Validation (Non-leaf Scan - Top 3)** | 93.33 % | 91.11 % |