CCDC: Centre for Crop Disease Control

Team name: NEUON AI

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Our focus

Agriculture

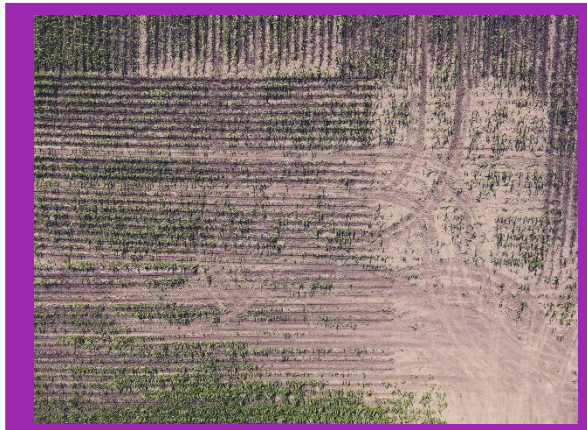
Problem statement

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?

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

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

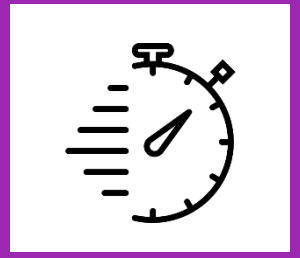
Solution

Plant expert knowledge

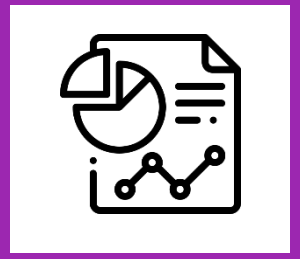
Machine

Crop disease recognition assistant

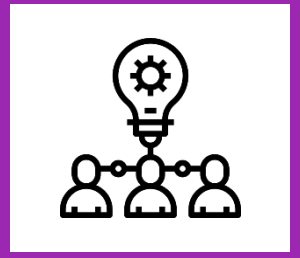
How it will solve



Enable timely control response



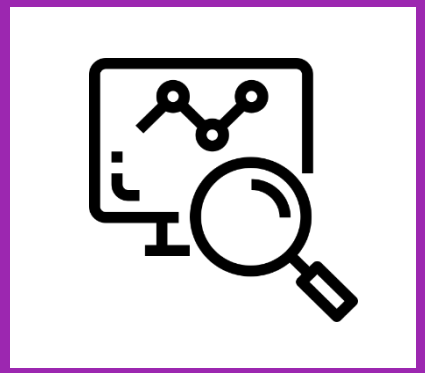
Assist smallholder farmers without research infrastructure or support



Introduce a collaborative platform

Target Users

Farmers



Researchers / experts

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

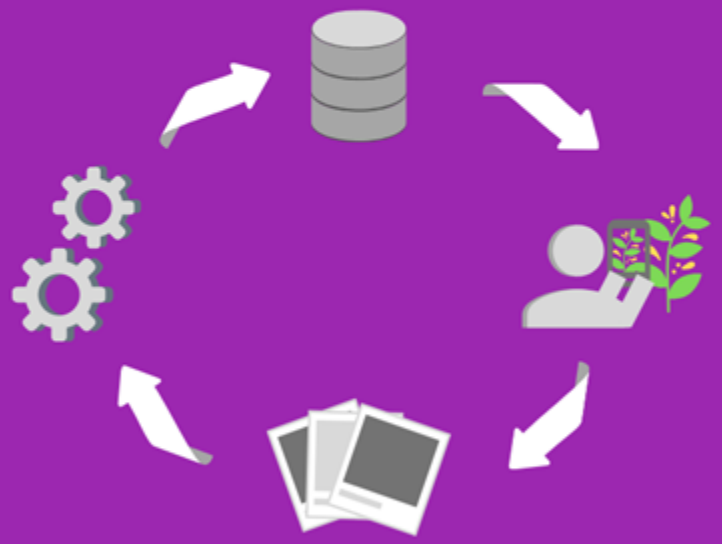
Methodology

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

Prototype

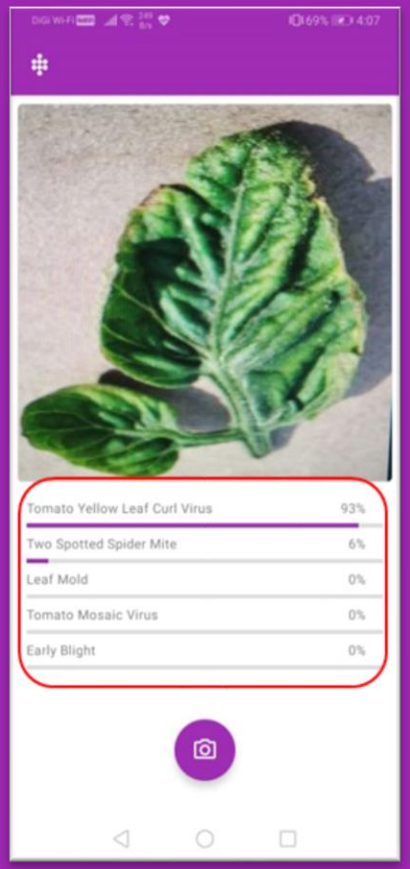
Automated tomato plant disease recognition system

Trained model results

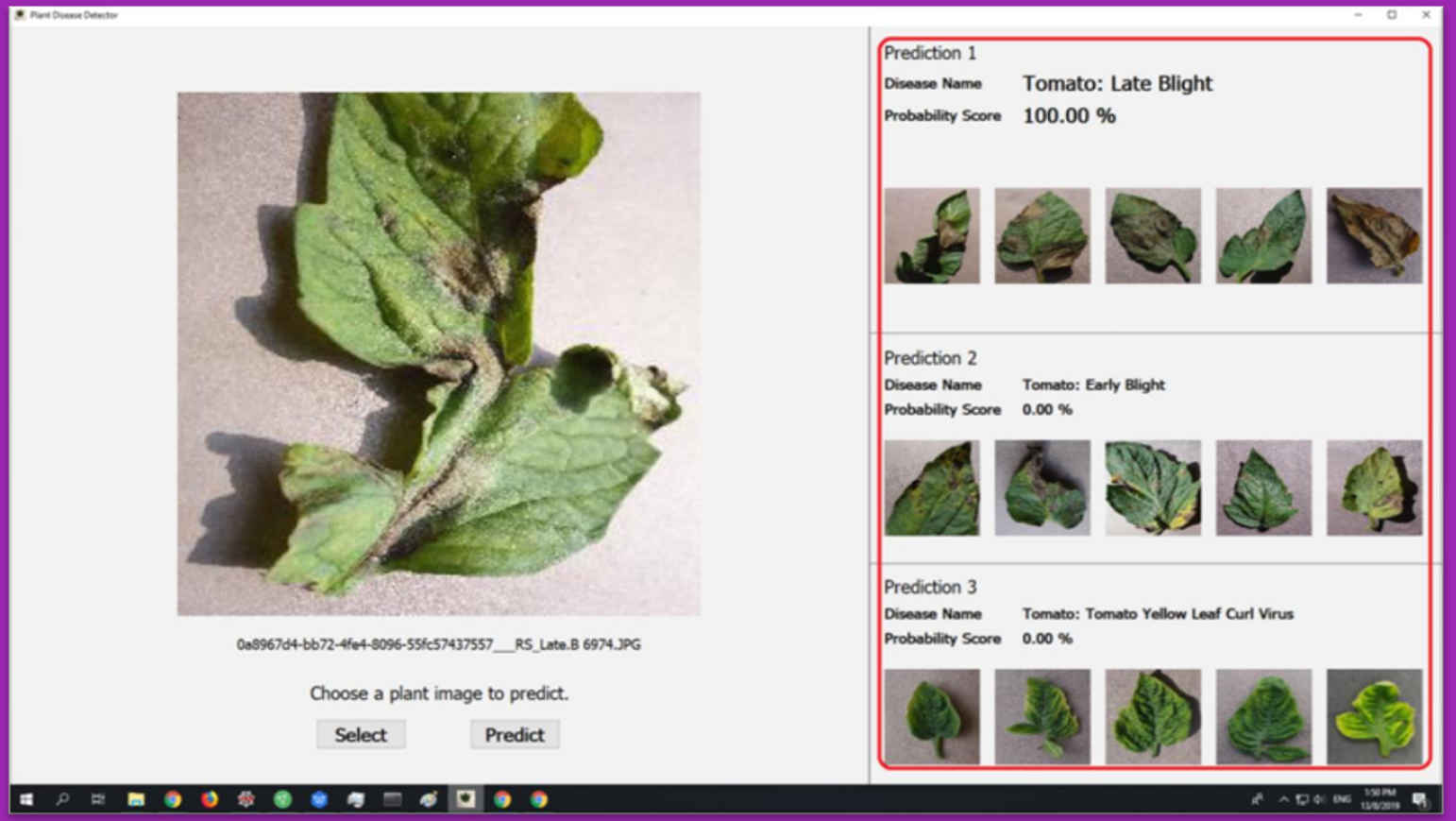
Accuracy	Model	
	1 (Mobile Net v2)	2 (Inception Resnet v2)
Training (Top 1)	88.13 %	96.88 %
Validation (Leaf Scan - Top 1)	97.94 %	99.75 %
Validation (Non-leaf Scan - Top 1)	64.44 %	78.89 %
Validation (Leaf Scan - Top 3)	99.92 %	100.00 %
Validation (Non-leaf Scan - Top 3)	93.33 %	91.11 %

Prototype UI

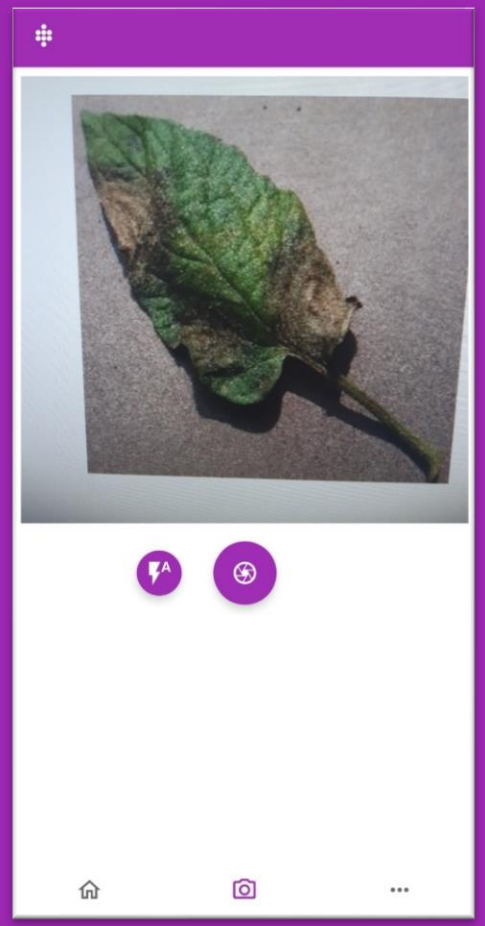
Android app

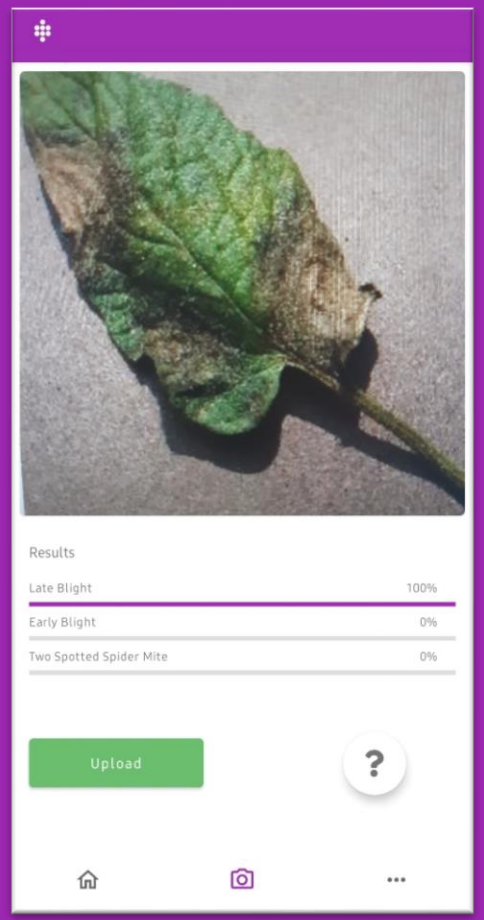


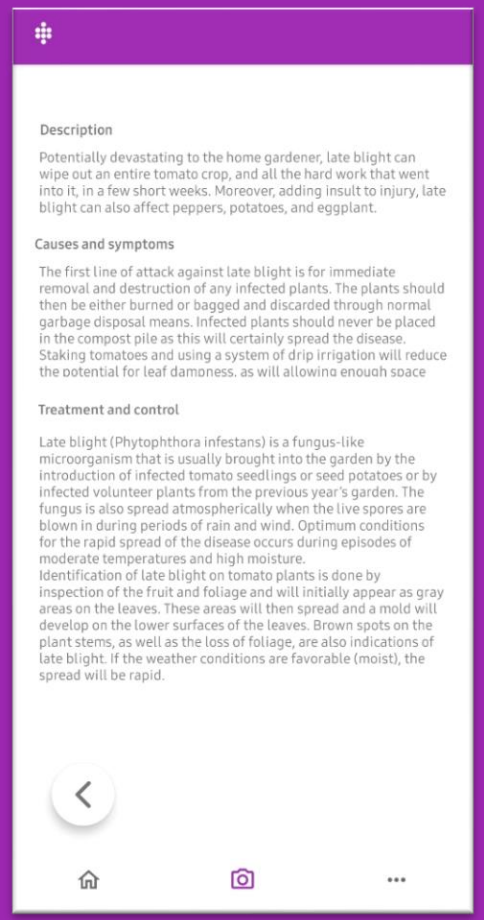
Windows PC

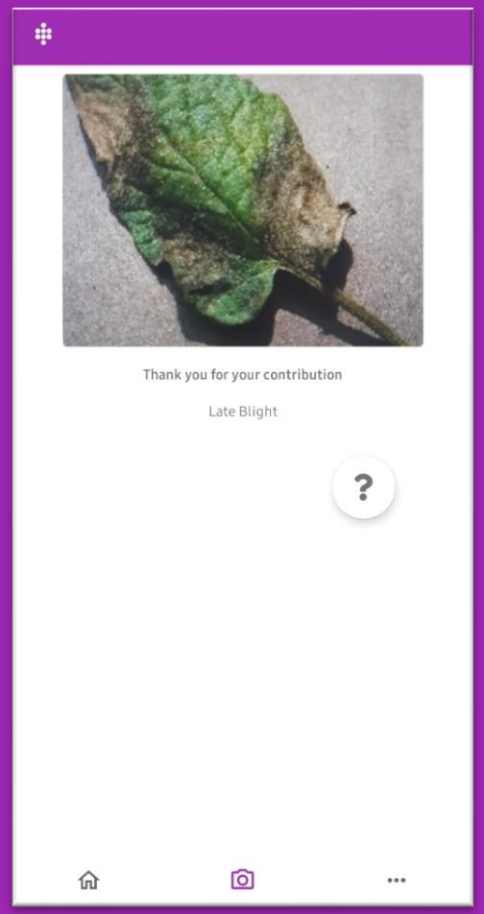


Prototype UI (Android App)

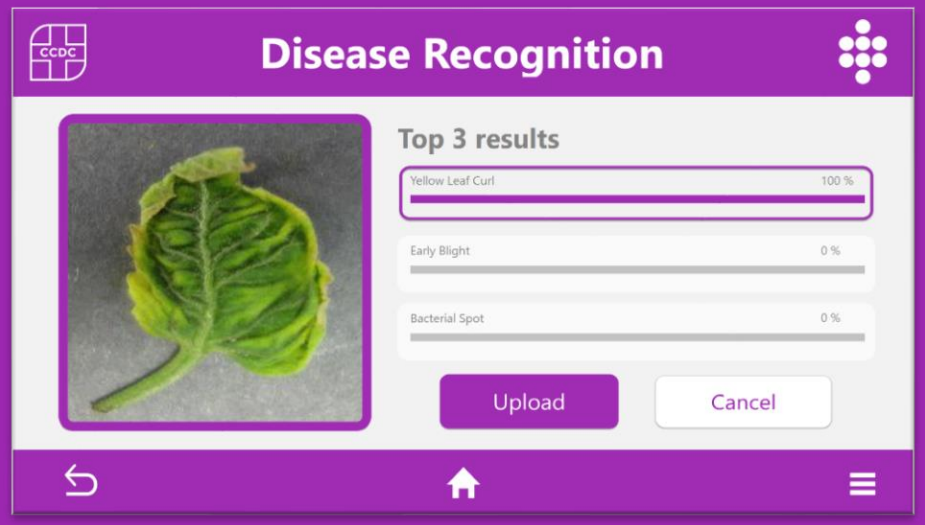


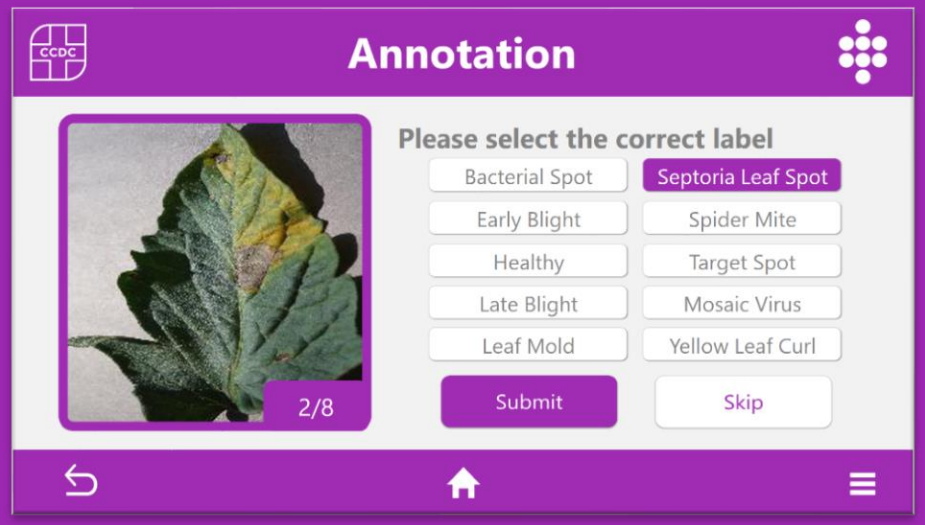


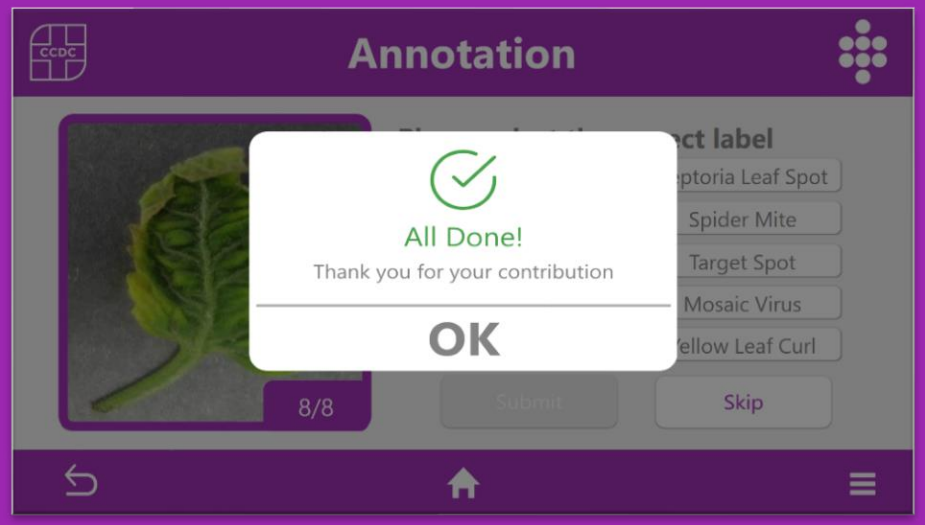




Prototype UI (Windows PC)

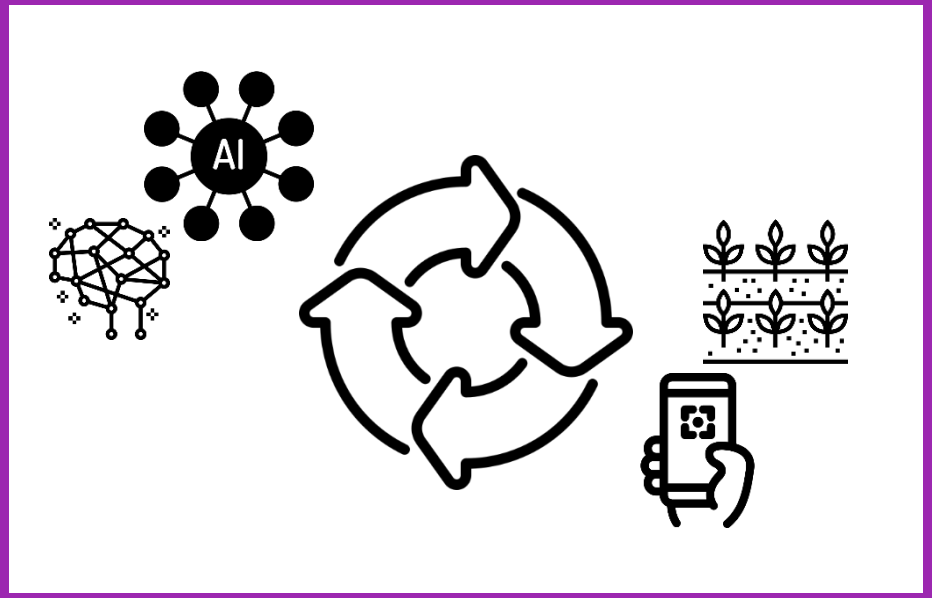






Notable outcomes

- A reliable and continuously learning AI for crop disease

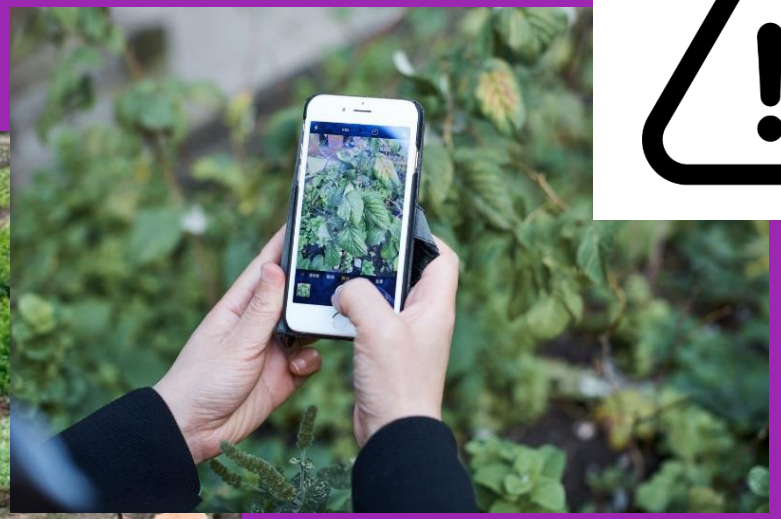


Notable outcomes

- Reduce the cost of data collection by crowdsourcing the community

Notable outcomes

- Early detection of crop disease to ensure quality yield at the same time maintain production quantity



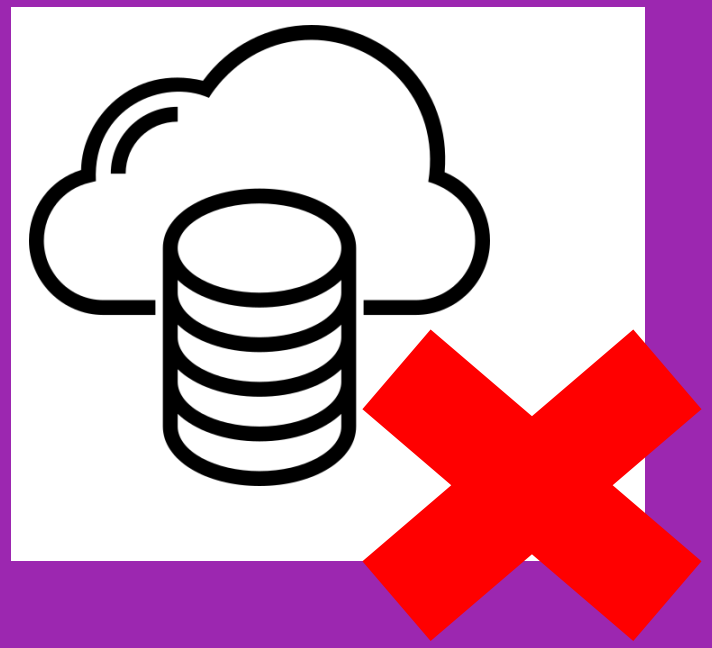
Notable outcomes

- Detection and control of disease outbreak by related agricultural authority within the community

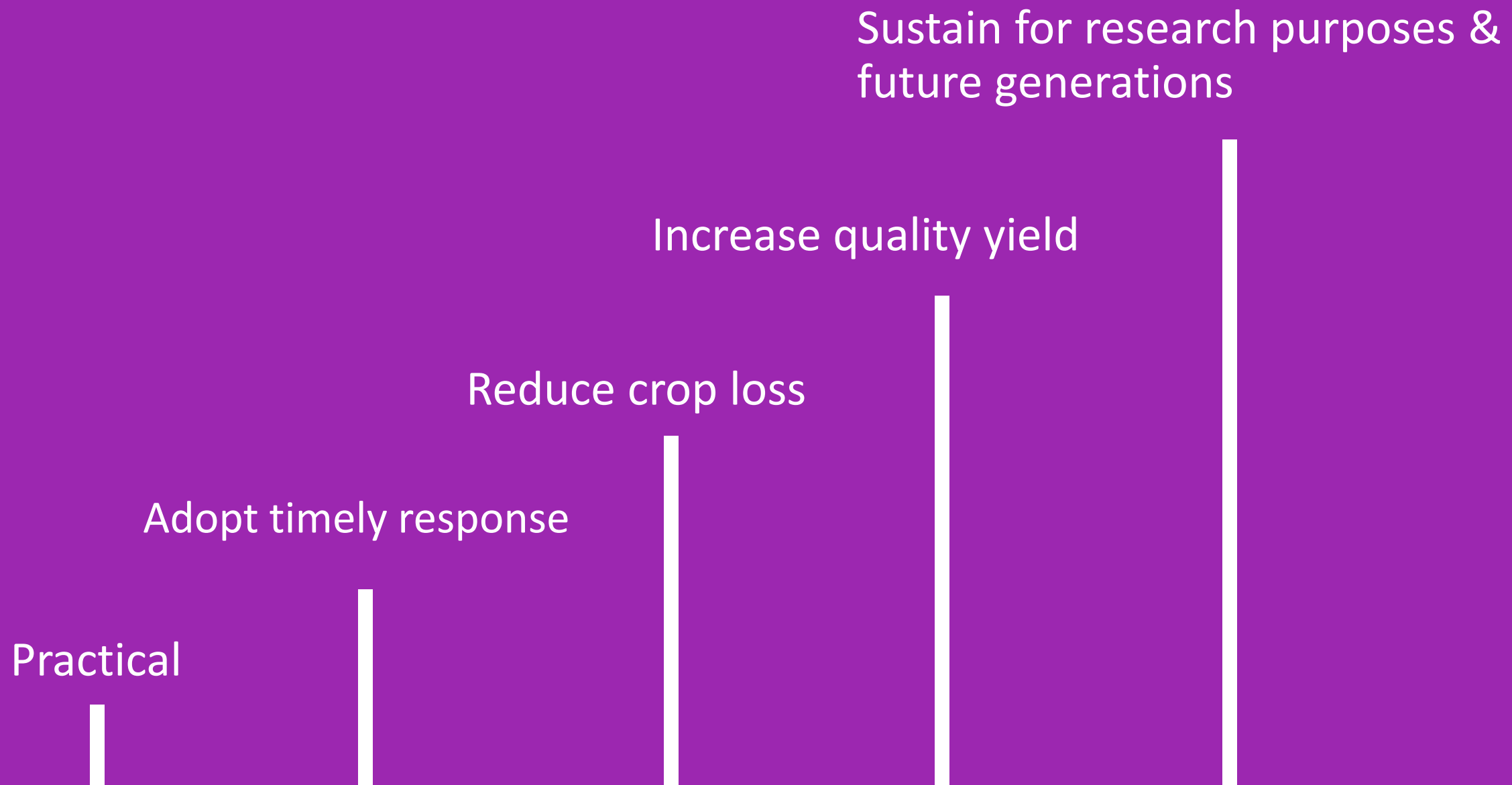
* Potential authorisation bodies

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