National Institute of Applied
Science and Technology

# Plant disease Detection

Realised by:
Bilel Bekalti
Khalil El Amine
Moemen Ben Hamad
Yassine Fendi

# Our Team

Bilel Bekalti

Khalil El Amine

Moemen Ben Hamad

Yassine Fendi

# MOTIVATION & OBJECTIVES

# Motivation

Late blight and early blight are two diseases that pose significant threats to crops like tomatoes and potatoes, impacting agricultural production and food security. These diseases spread rapidly, driven by abundant spore production and favorable environmental conditions. Detecting and managing plant diseases is crucial for maintaining crop yield and global food security.

# Objective:

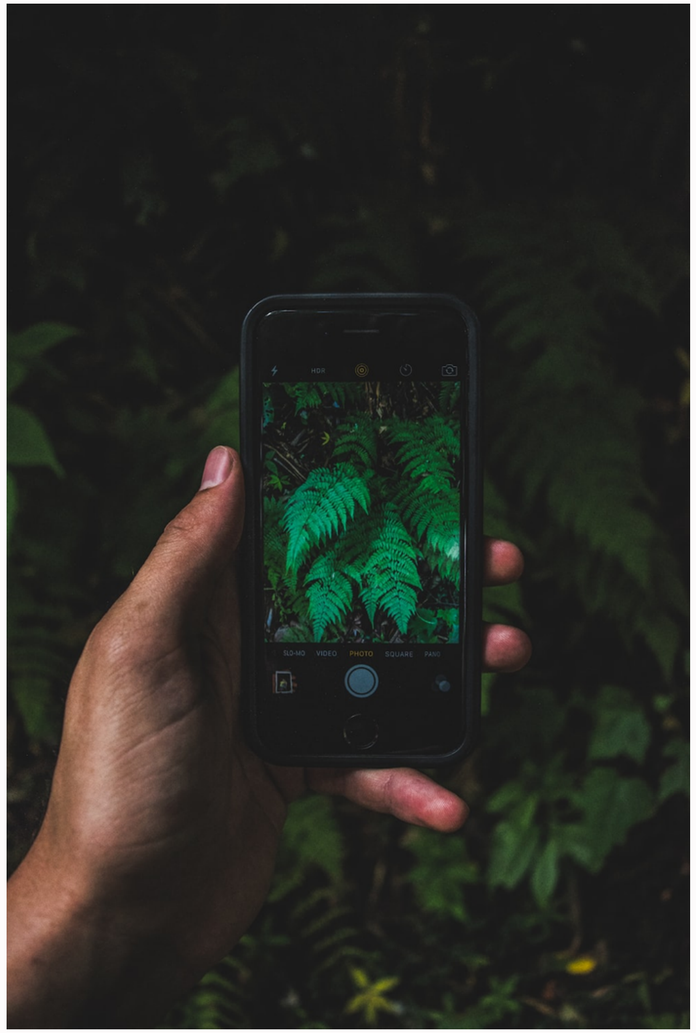
The main objective of this project is to develop a robust deep learning model using Convolutional Neural Networks (CNNs) for the accurate detection of late blight and early blight diseases in plants. By leveraging the power of CNNs, we aim to improve disease detection accuracy, scalability, and real-time monitoring capabilities. Through extensive data collection, preprocessing, and model training, we seek to create a reliable and efficient system for detecting plant diseases, contributing to enhanced crop health, increased agricultural productivity.

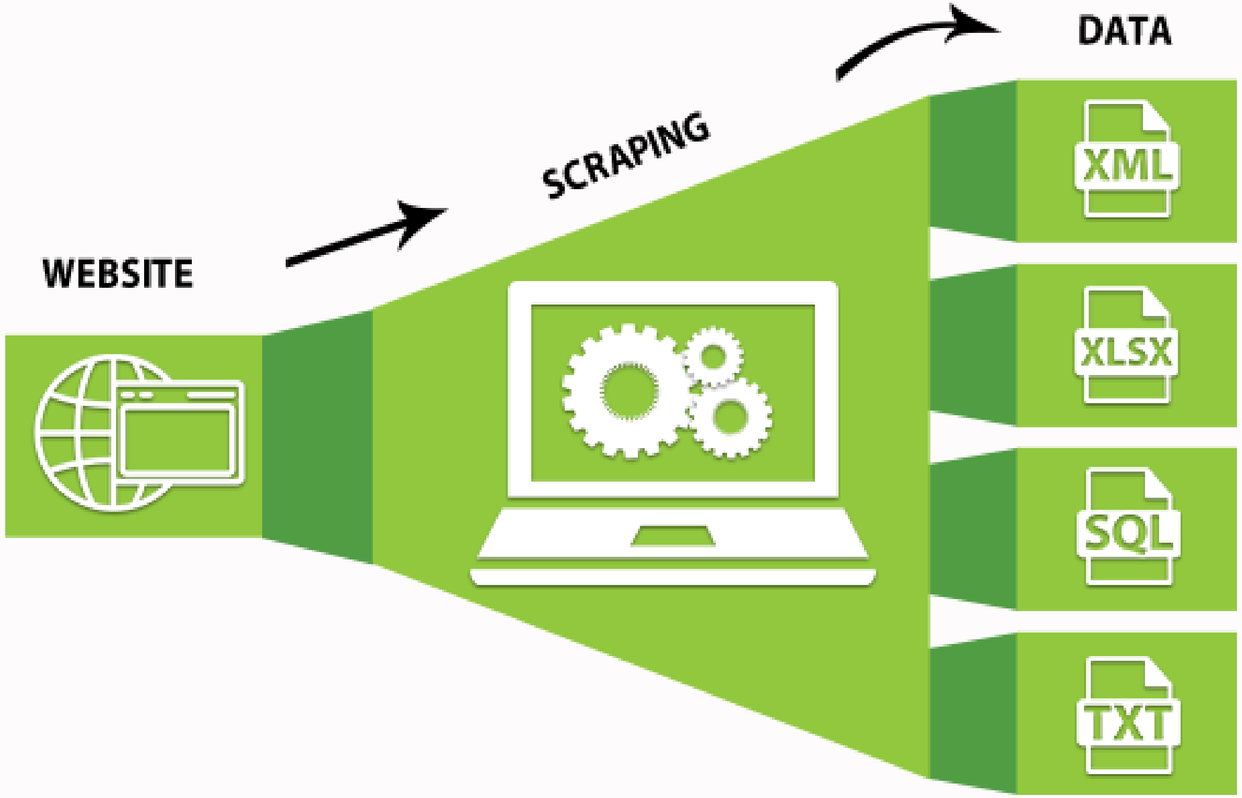
# Contents



# DATA COLLECTION AND PREPROCESSING

# Data collection





# Data collection

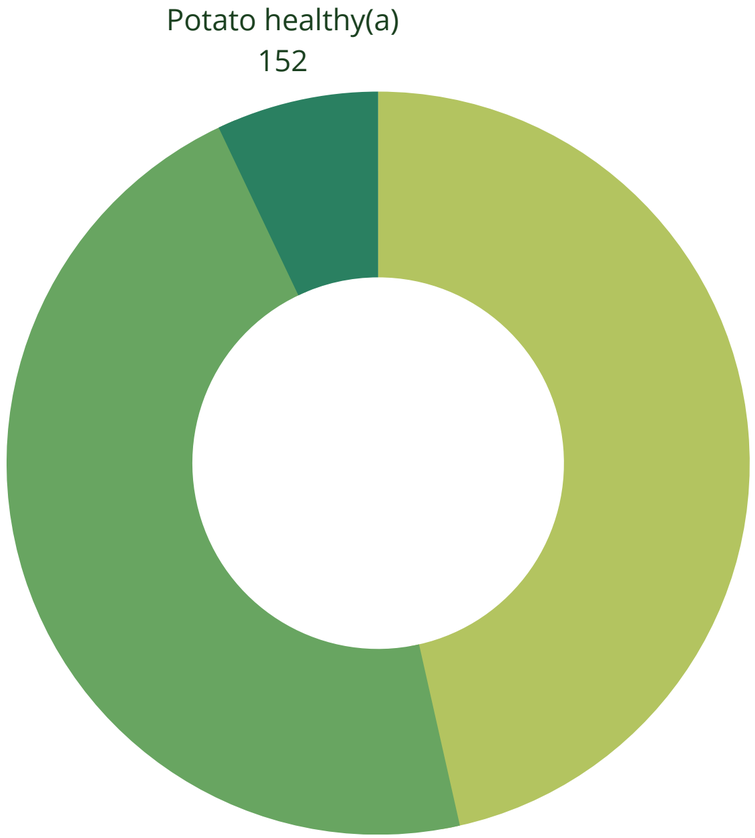
kaggle

# Samples of the Potato Dataset

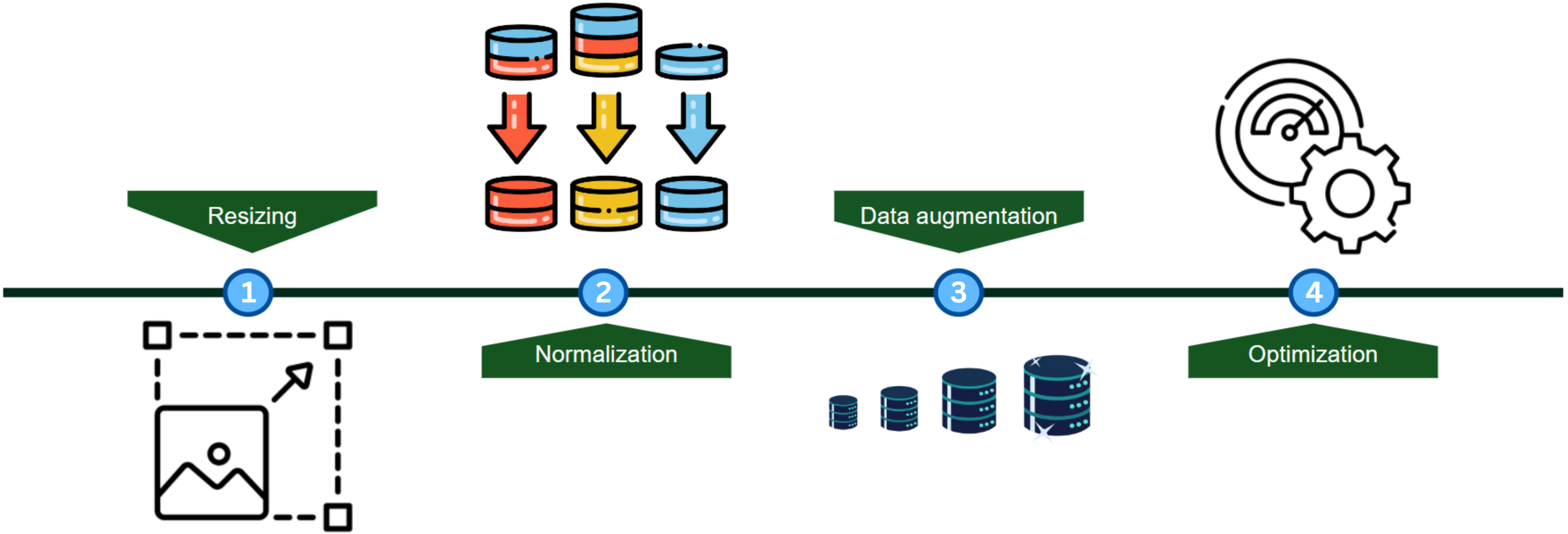
(a)

(b)

(c)



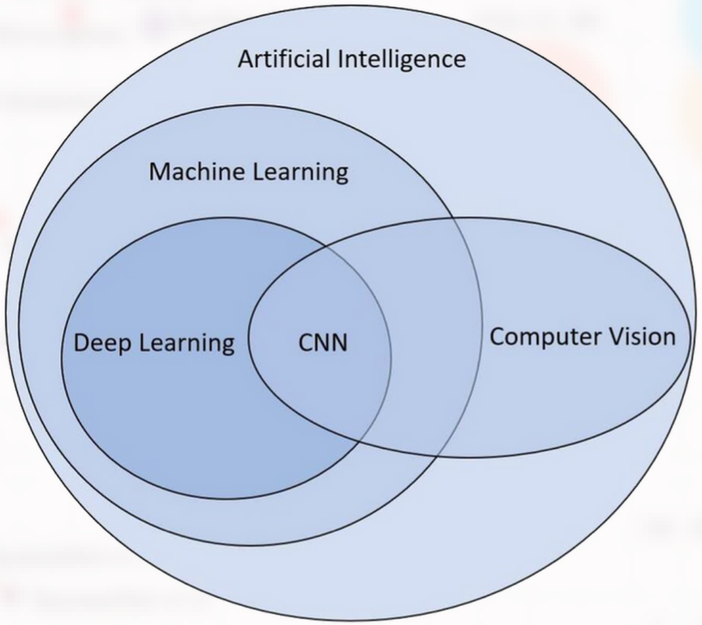
# Dataset Preprocessing



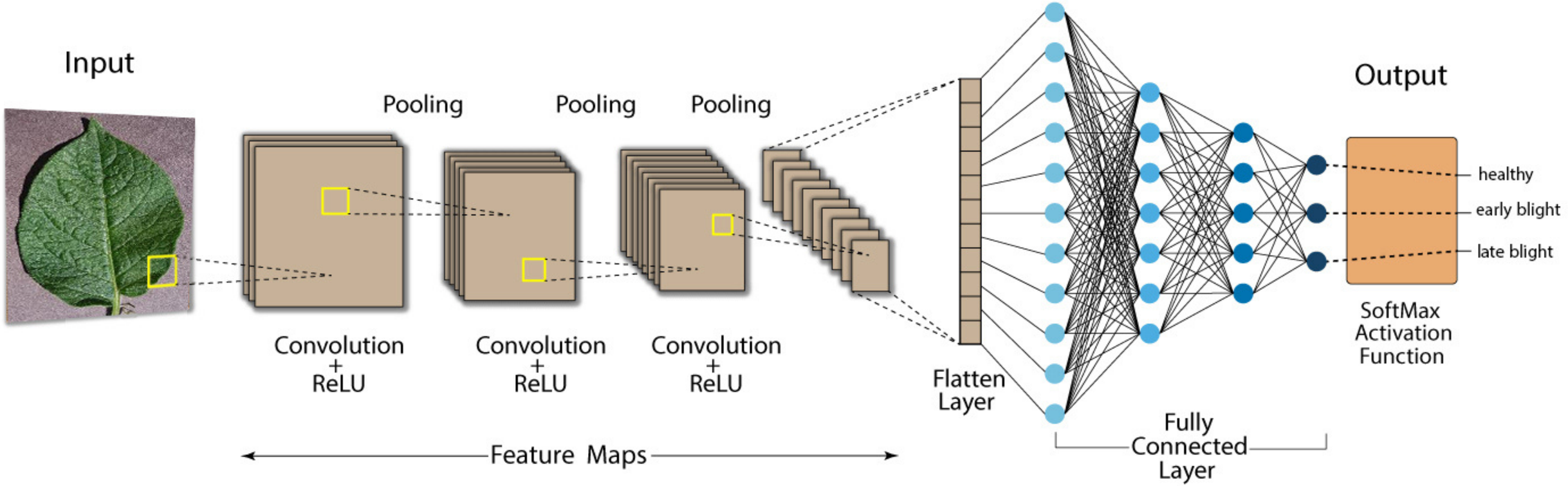
# MODEL ARCHITECTURE

# WHAT IS A CNN?

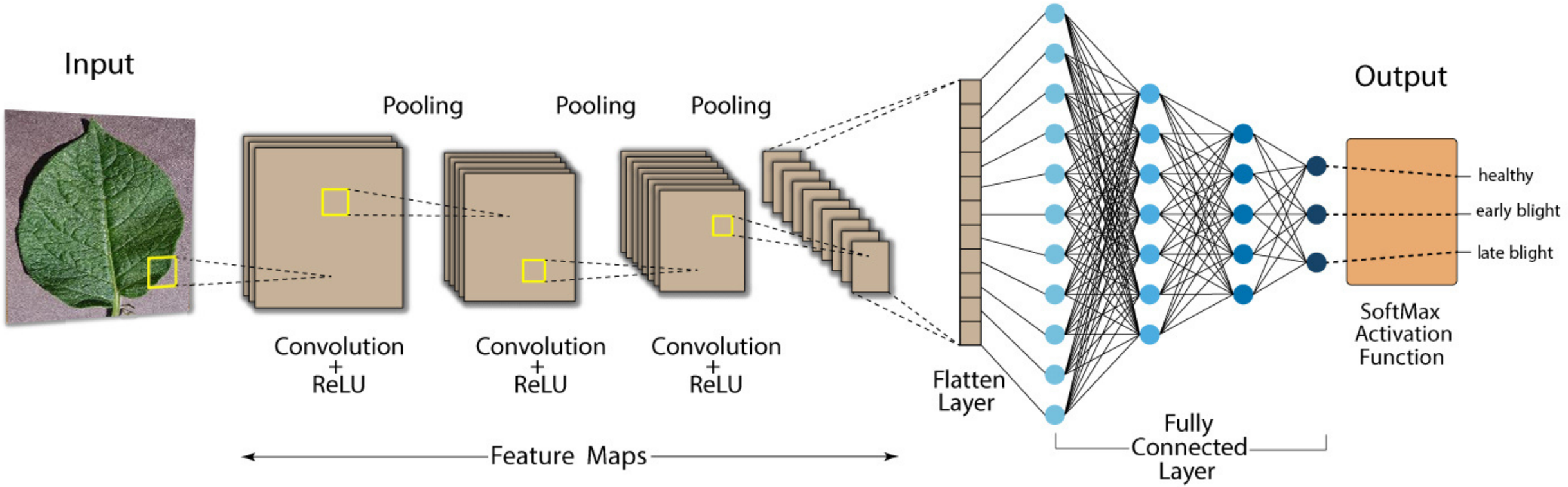
Convolutional Neural Networks (CNNs) are feed-forward artificial neural networks that process visual information by detecting specific features, such as edges, orientations, and patterns. CNNs excel in tasks involving images and videos

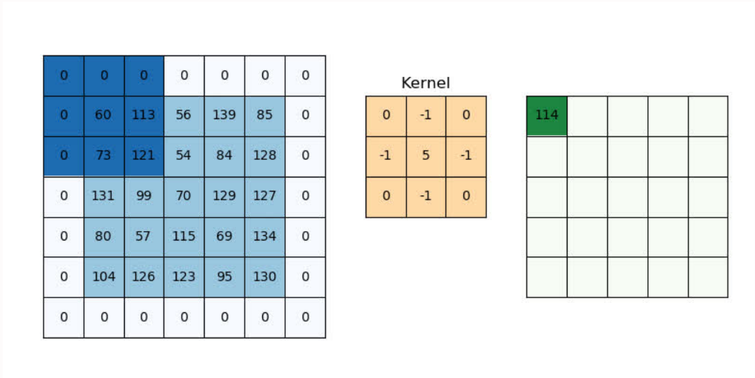


# Convolutional Neural Network Architecture

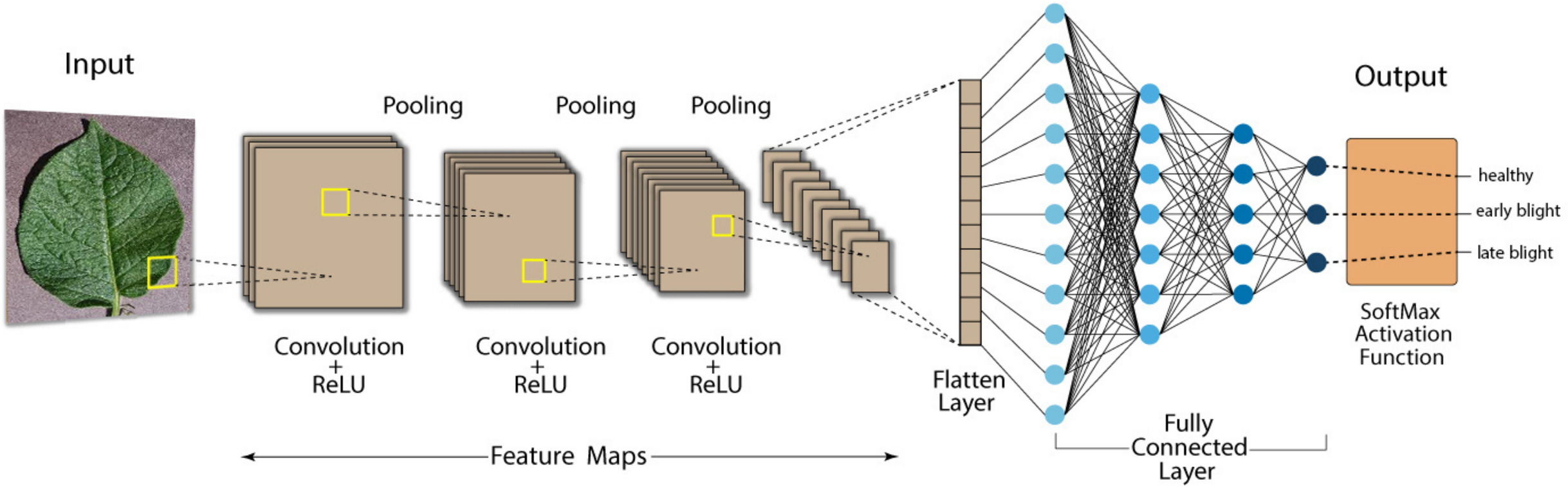


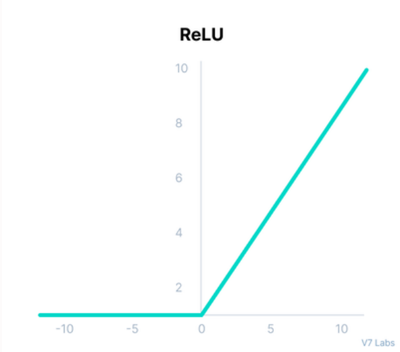
# Convolutional Neural Network Architecture

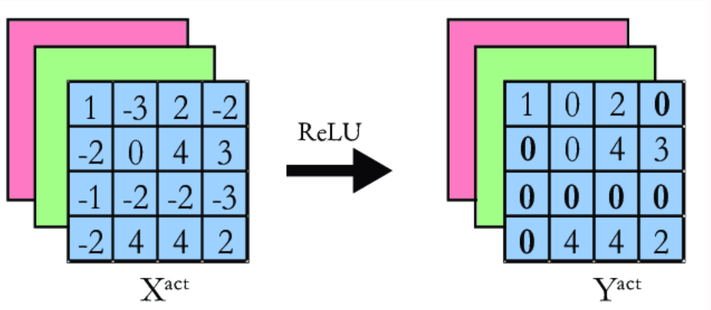


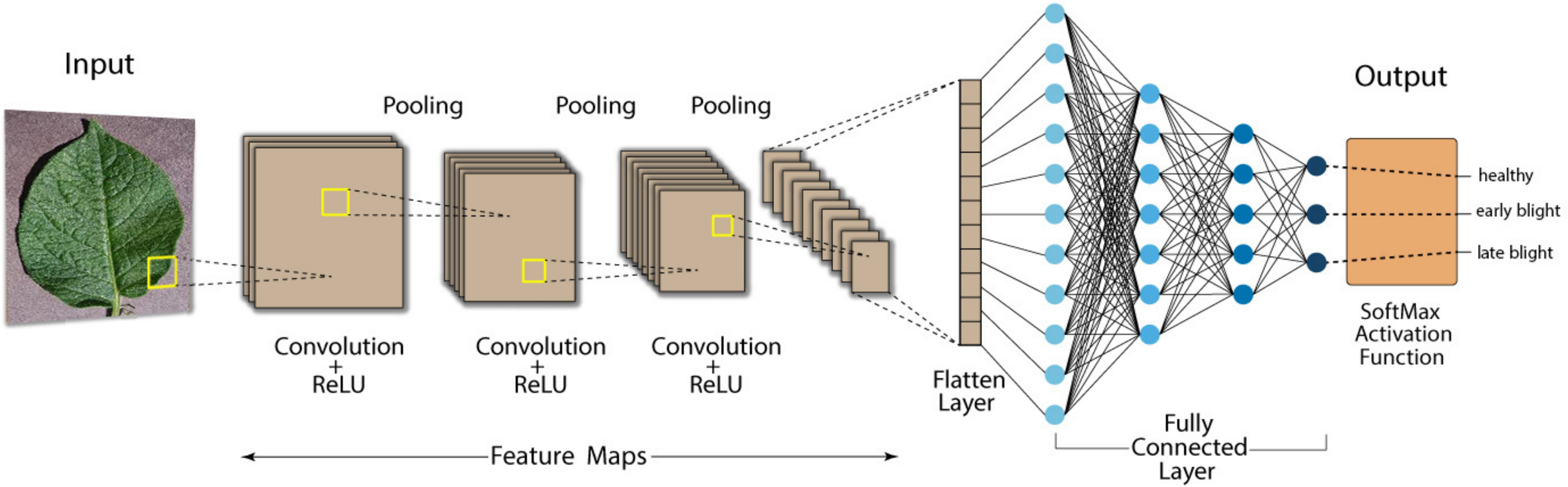
# Convolutional Neural Network Architecture

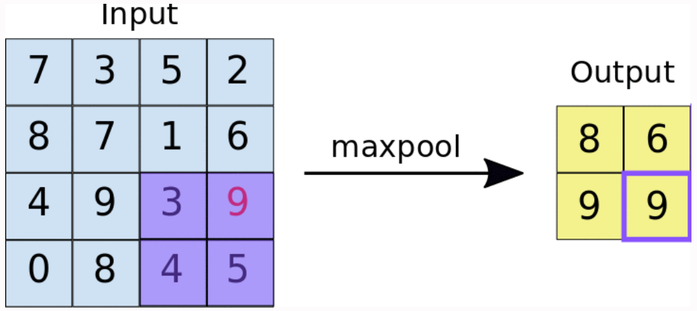


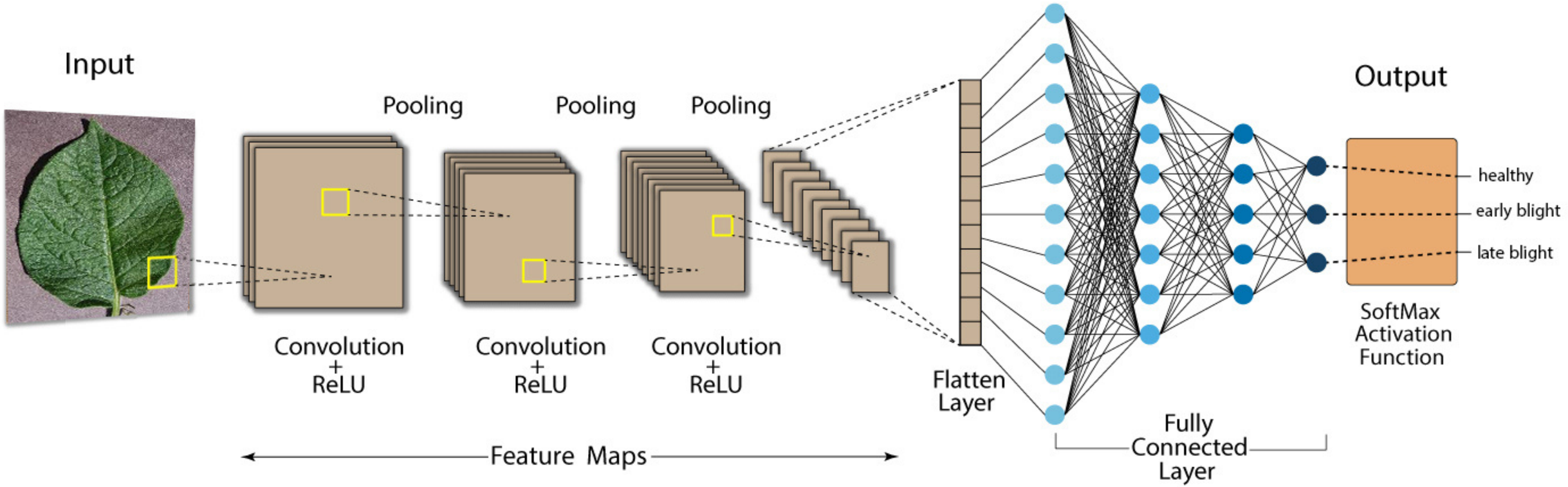



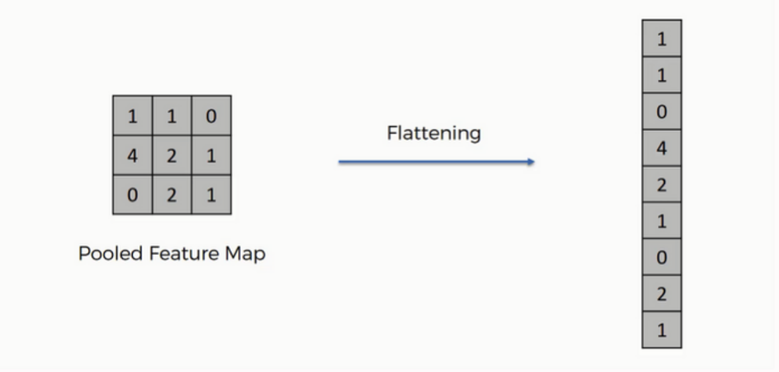
# Convolutional Neural Network Architecture



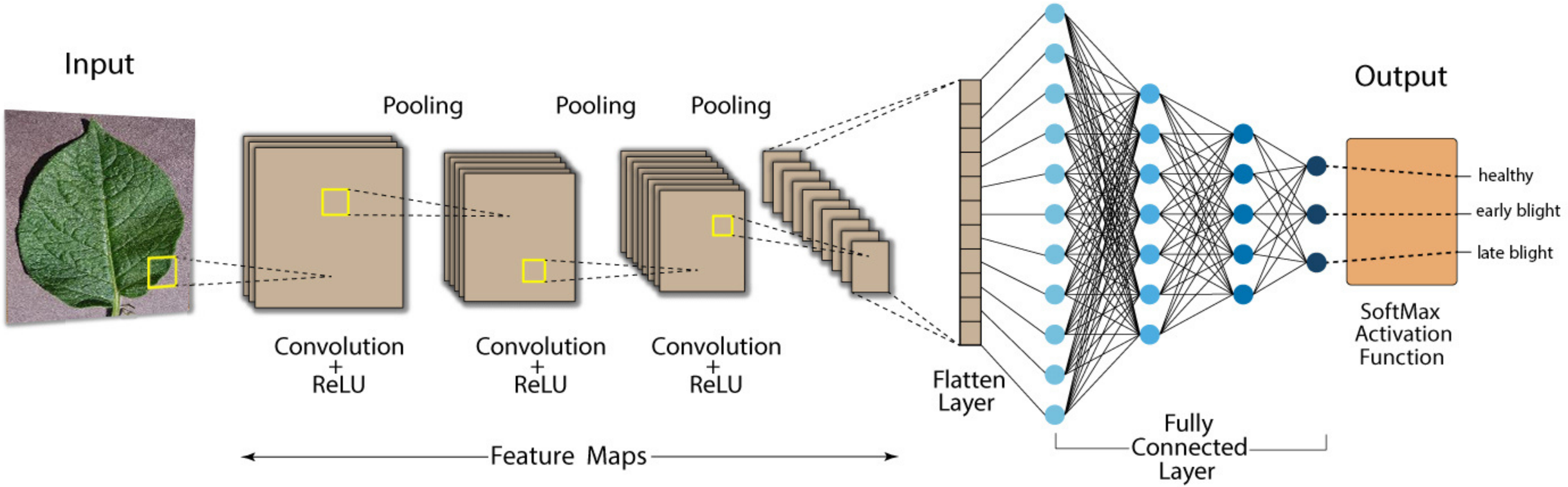



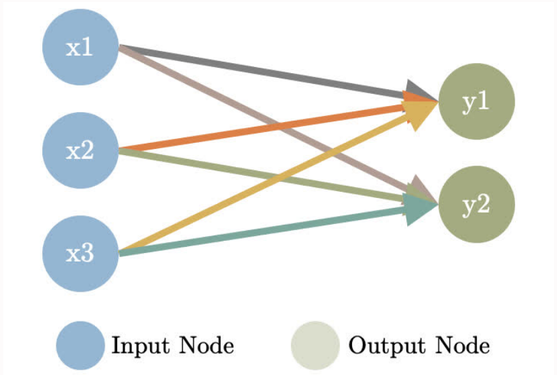
# Convolutional Neural Network Architecture



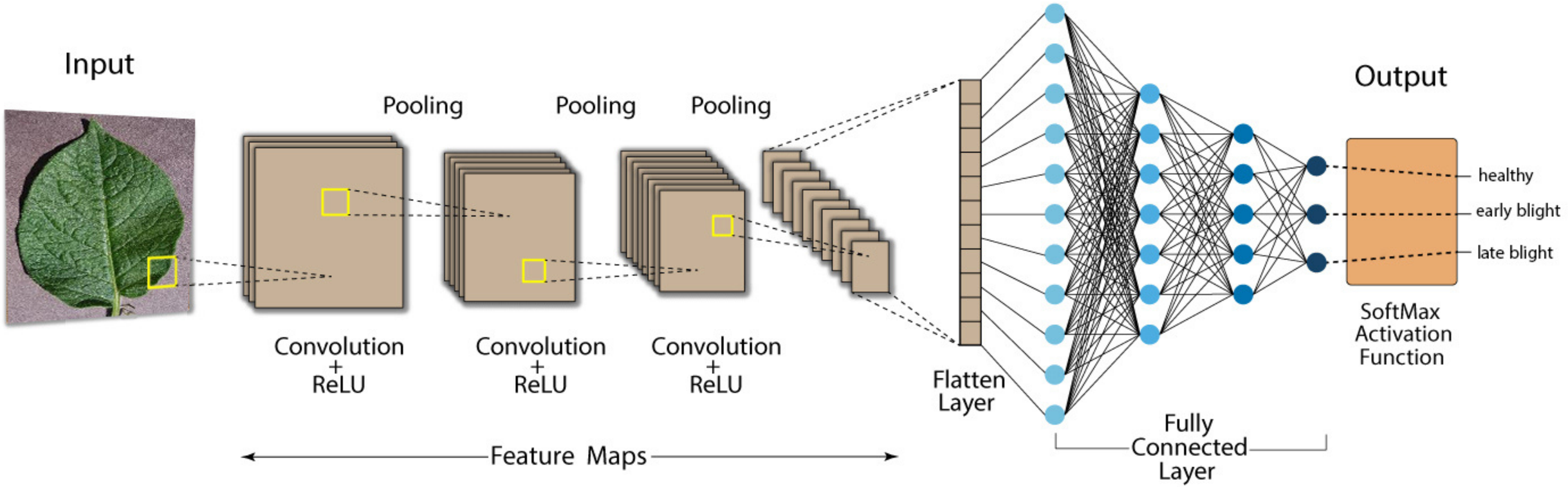



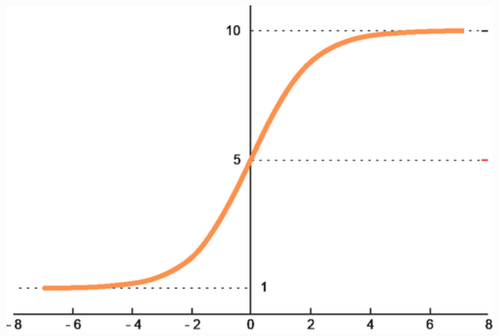
# Convolutional Neural Network Architecture



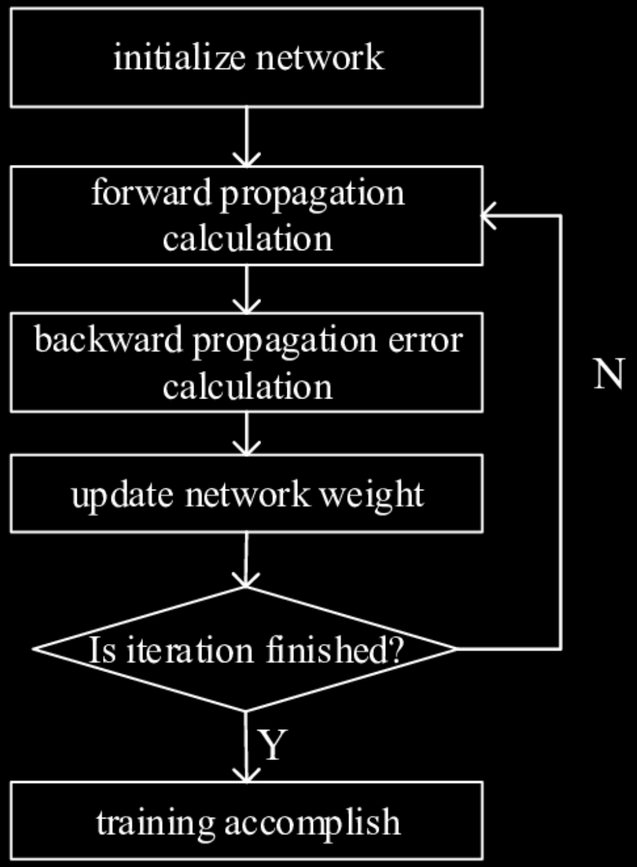



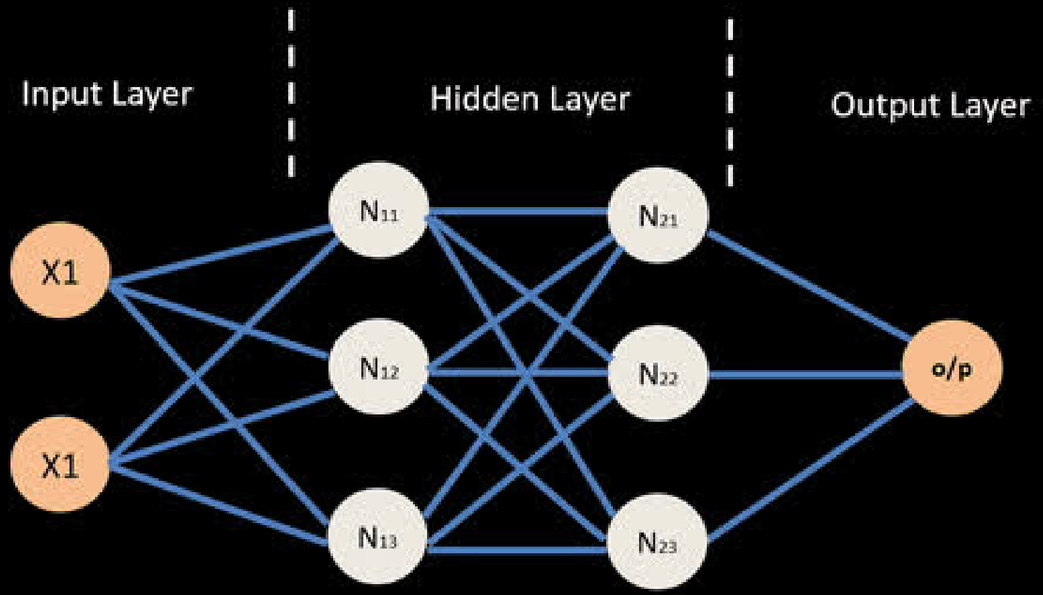
# Convolutional Neural Network Architecture



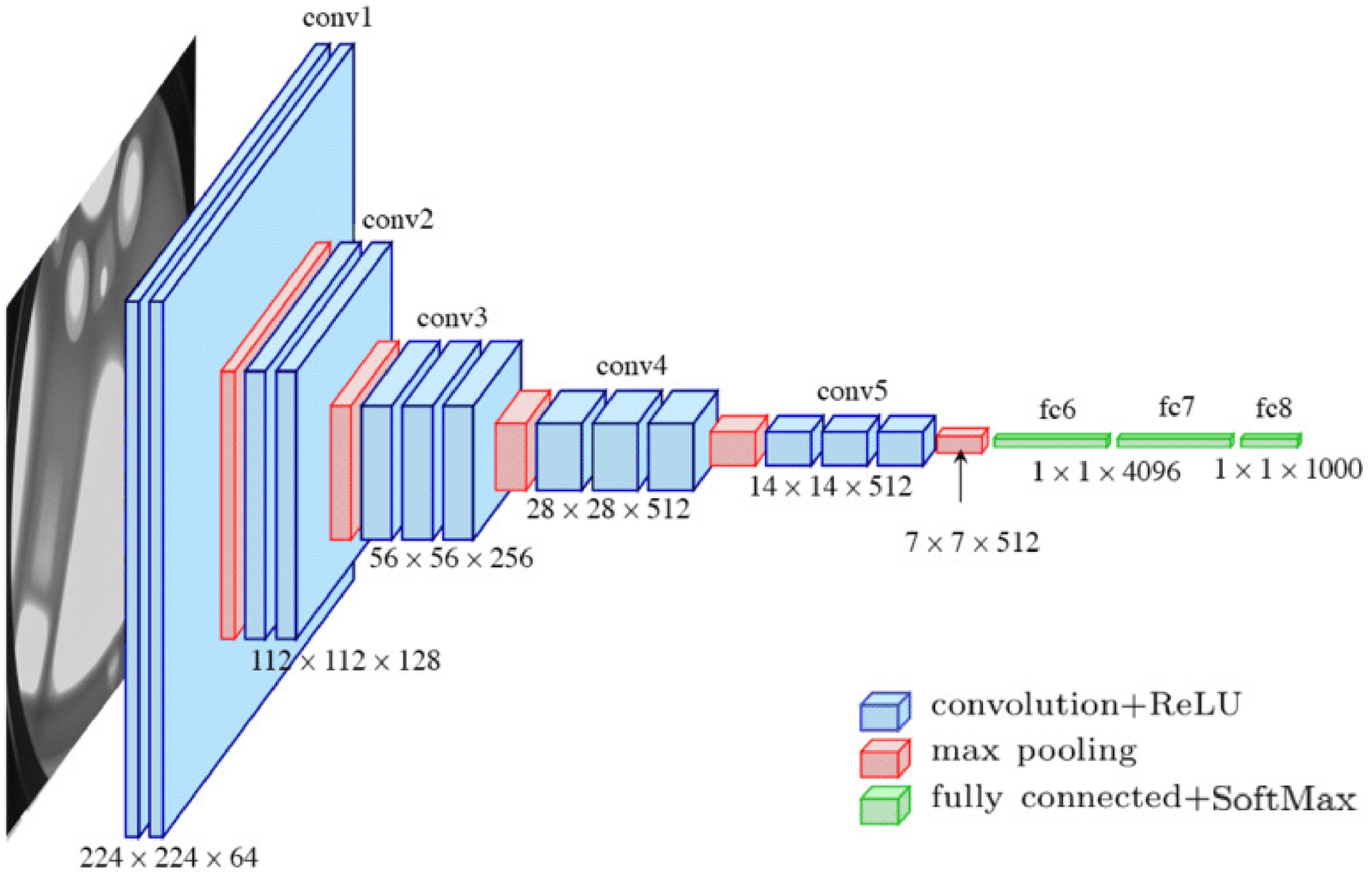
# TRAINING PROCESS


initialize network
forward propagation calculation
backward propagation error calculation
update network weight
Is iteration finished?
N
Y
training accomplish

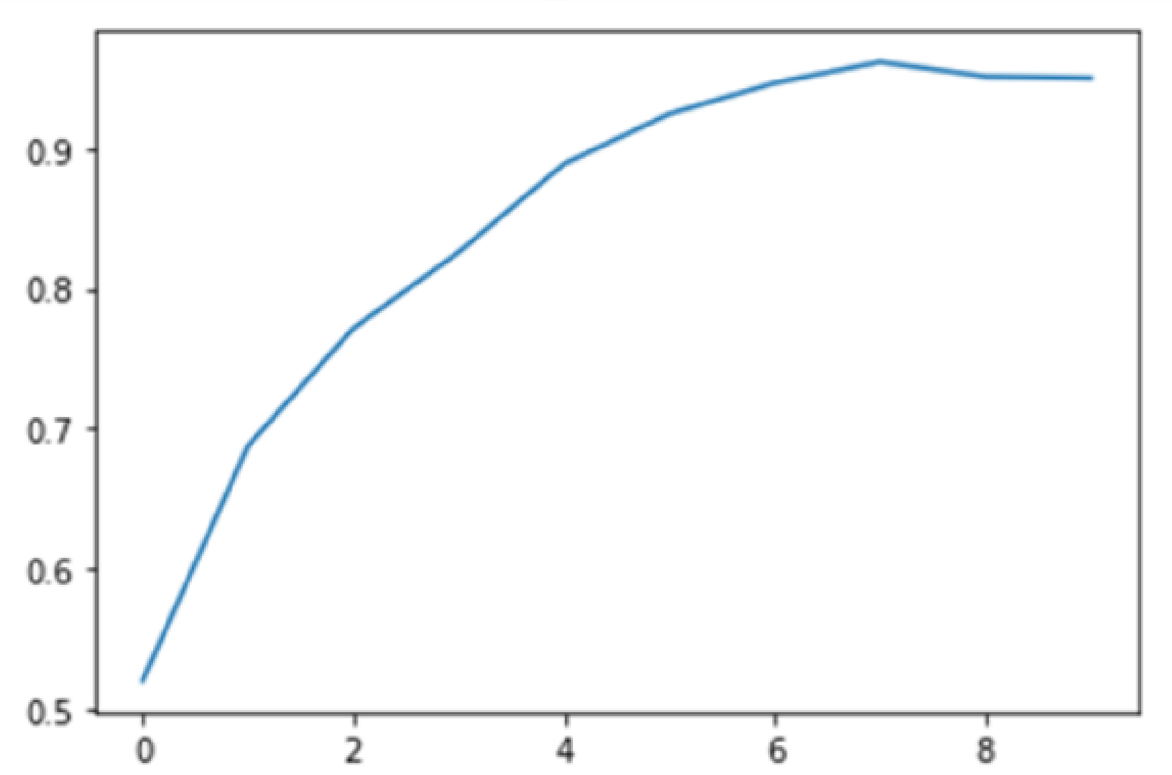

Input Layer
Hidden Layer
Output Layer
X1
X1
N11
N12
N13
N21
N22
N23
o/p

# VGG16

# VGG16 Architecture

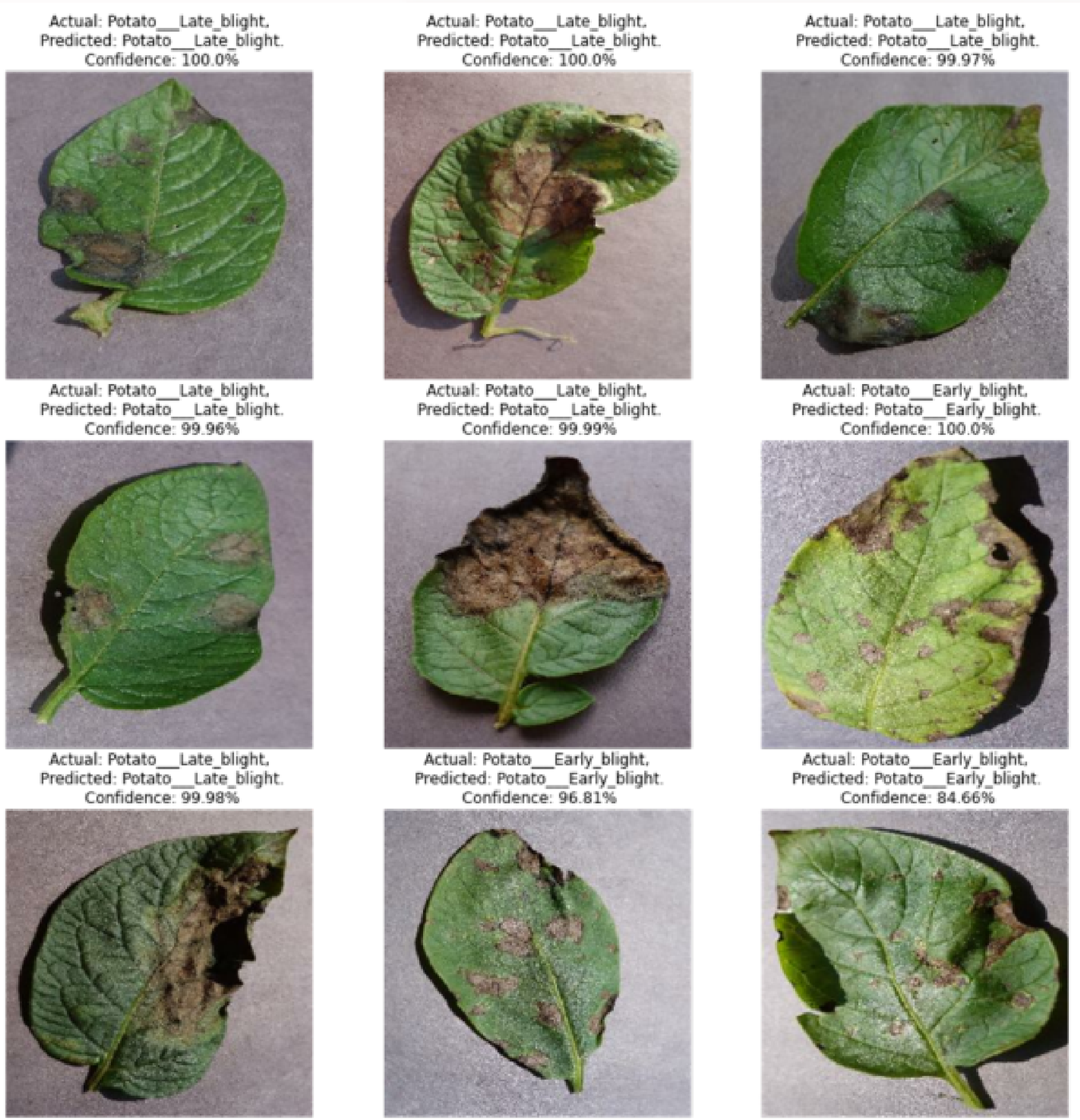


# VGG16 Training results




Final accuracy: 96%

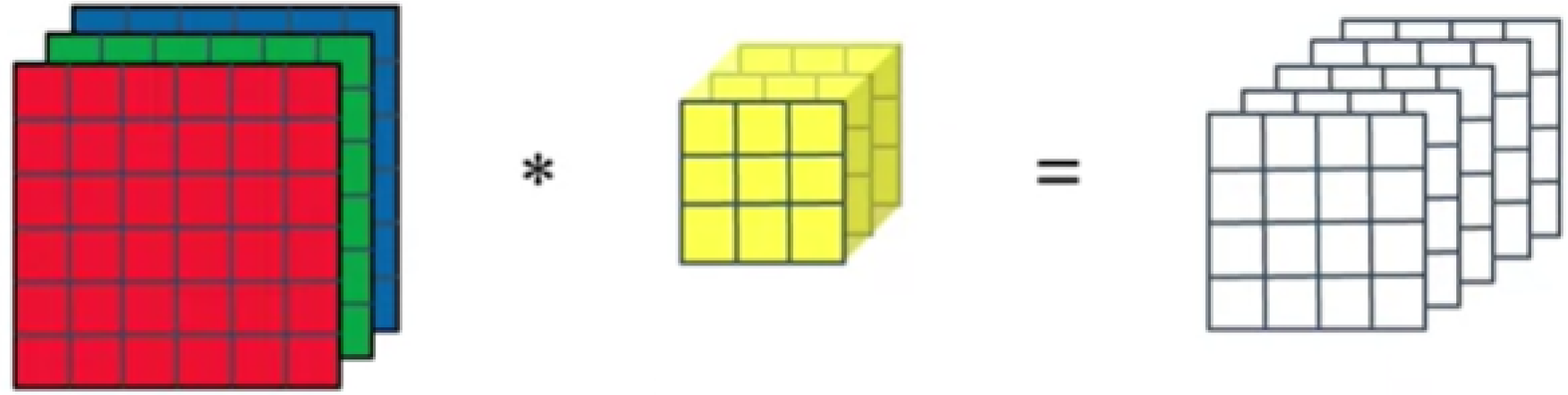
# VGG16 results for the test set



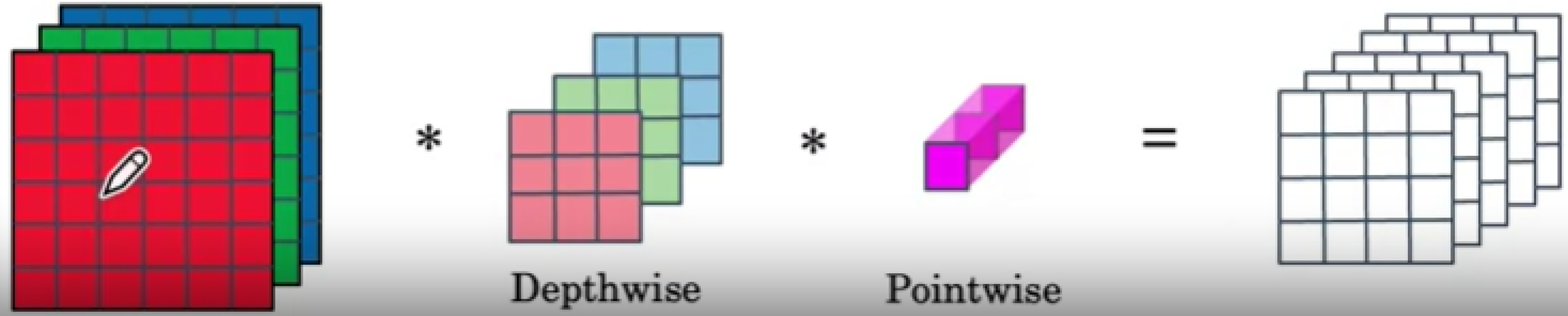
# MOBILENET

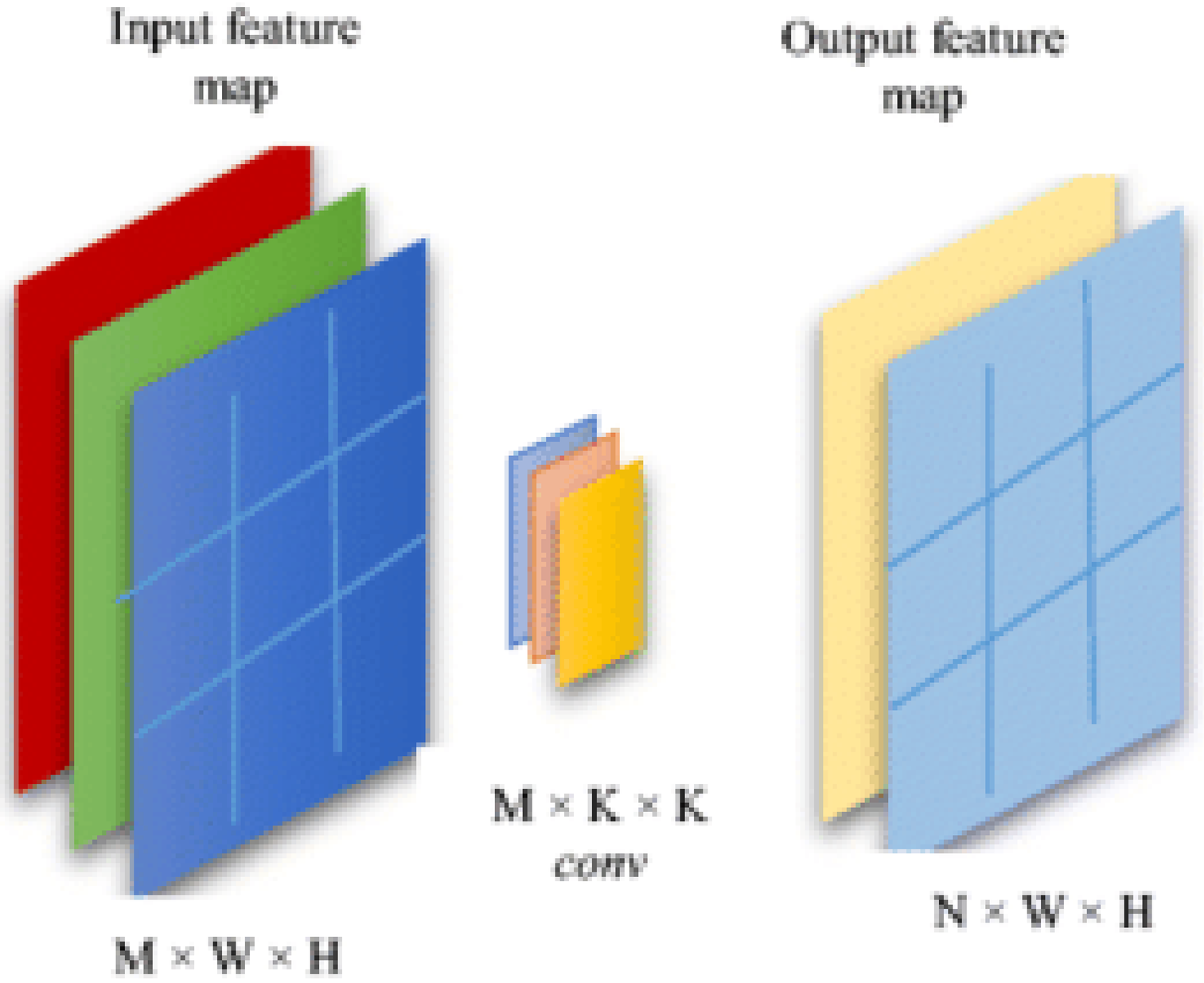
# MobileNet

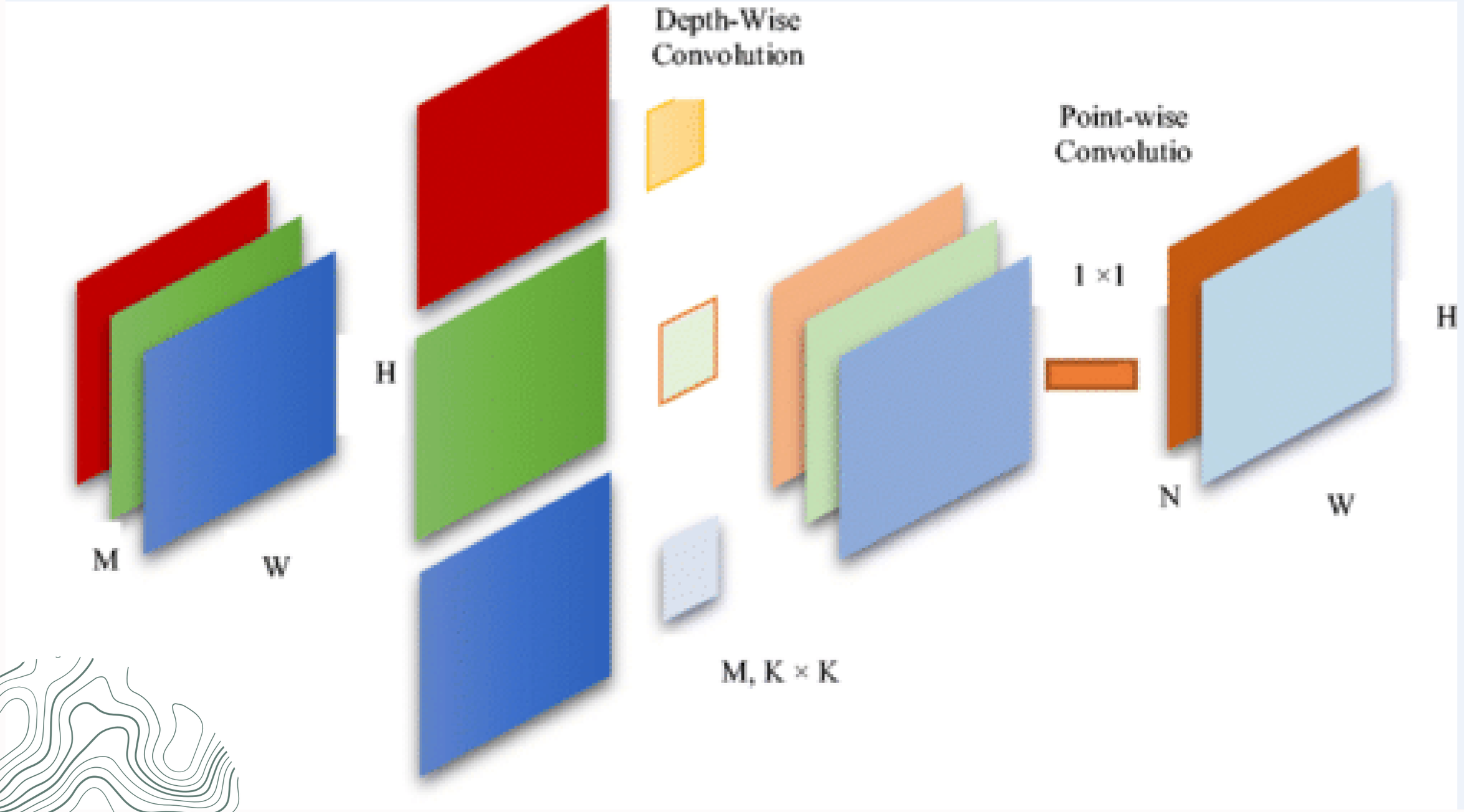
Normal Convolution

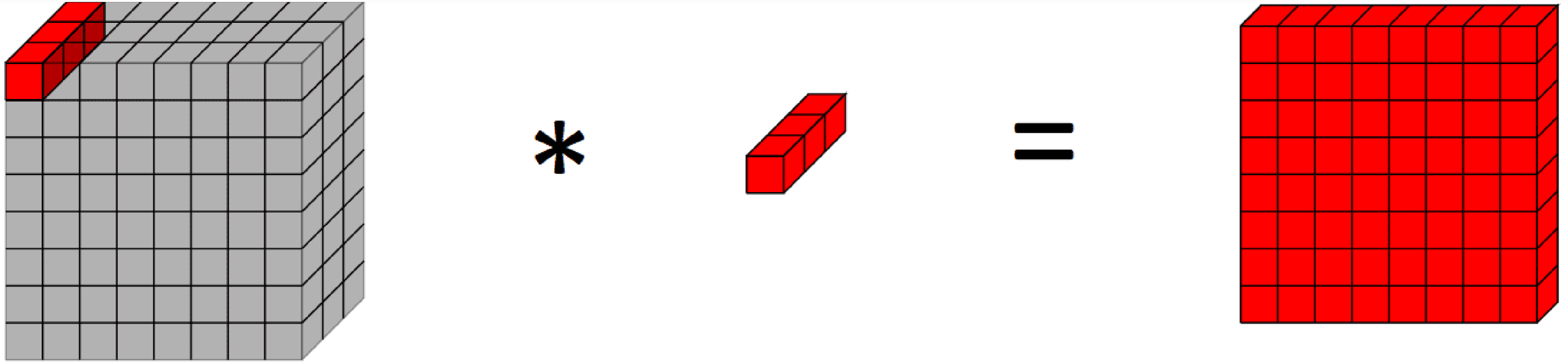


Depthwise Separable Convolution

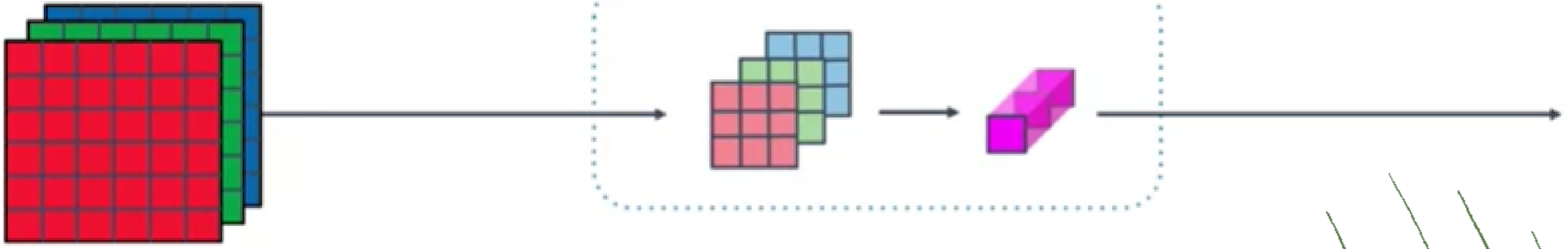



Input feature map
Output feature map
M × K × K
conv
M × W × H
N × W × H


Depth-Wise
Convolution
Point-wise
Convolutio
1 ×1
H
M
W
H
N
W
M, K × K



MobileNet v1



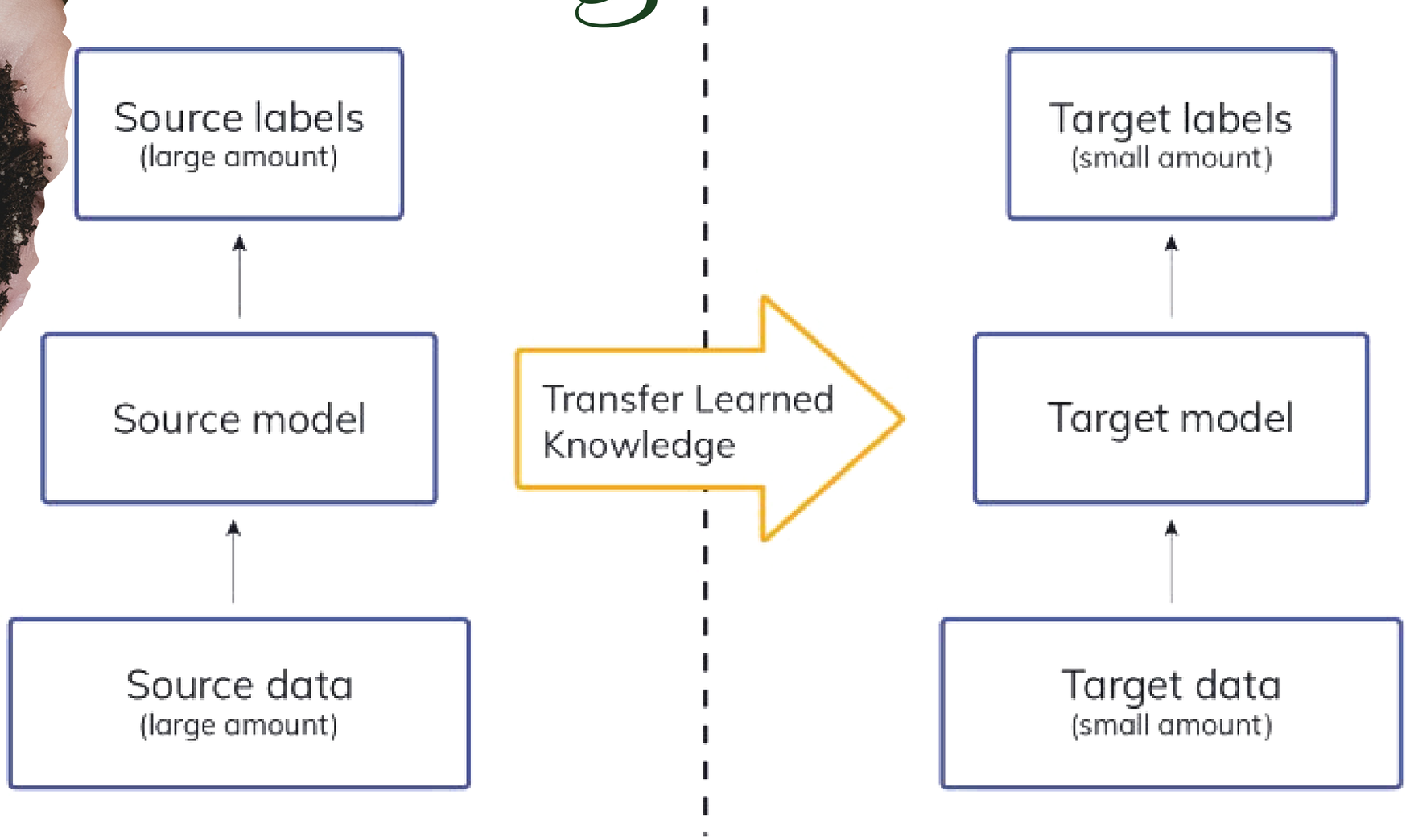
Actual: Potato___Late_blight,
Predicted: Potato___Late_blight.
Confidence: 99.82%

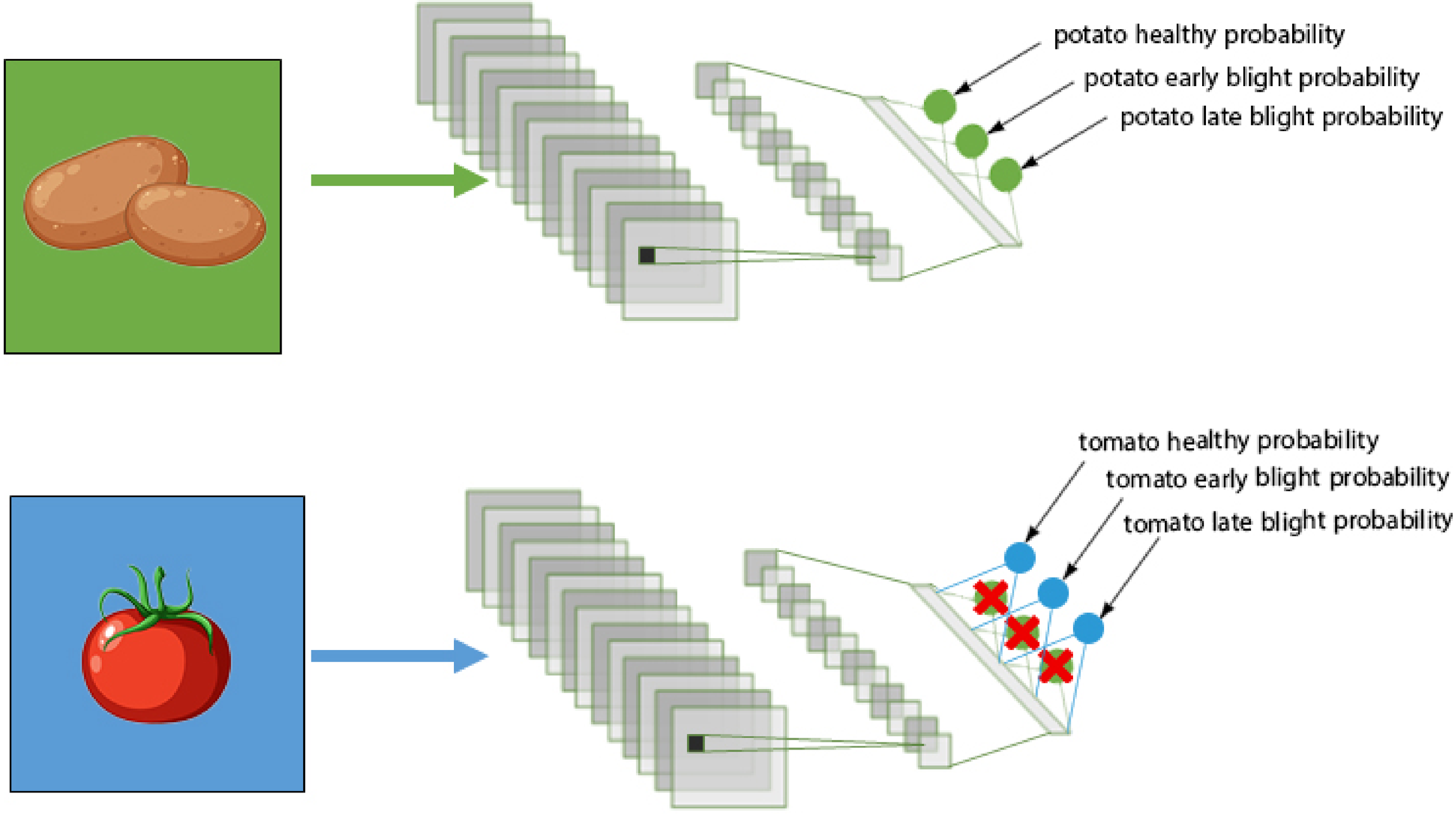
Actual: Potato___Late_blight,
Predicted: Potato___Late_blight.
Confidence: 99.96%

Actual: Potato___Early_blight,
Predicted: Potato___Early_blight.
Confidence: 99.99%

# TRANSFER LEARNING

# Transfer learning




potato healthy probability
potato early blight probability
potato late blight probability
tomato healthy probability
tomato early blight probability
tomato late blight probability

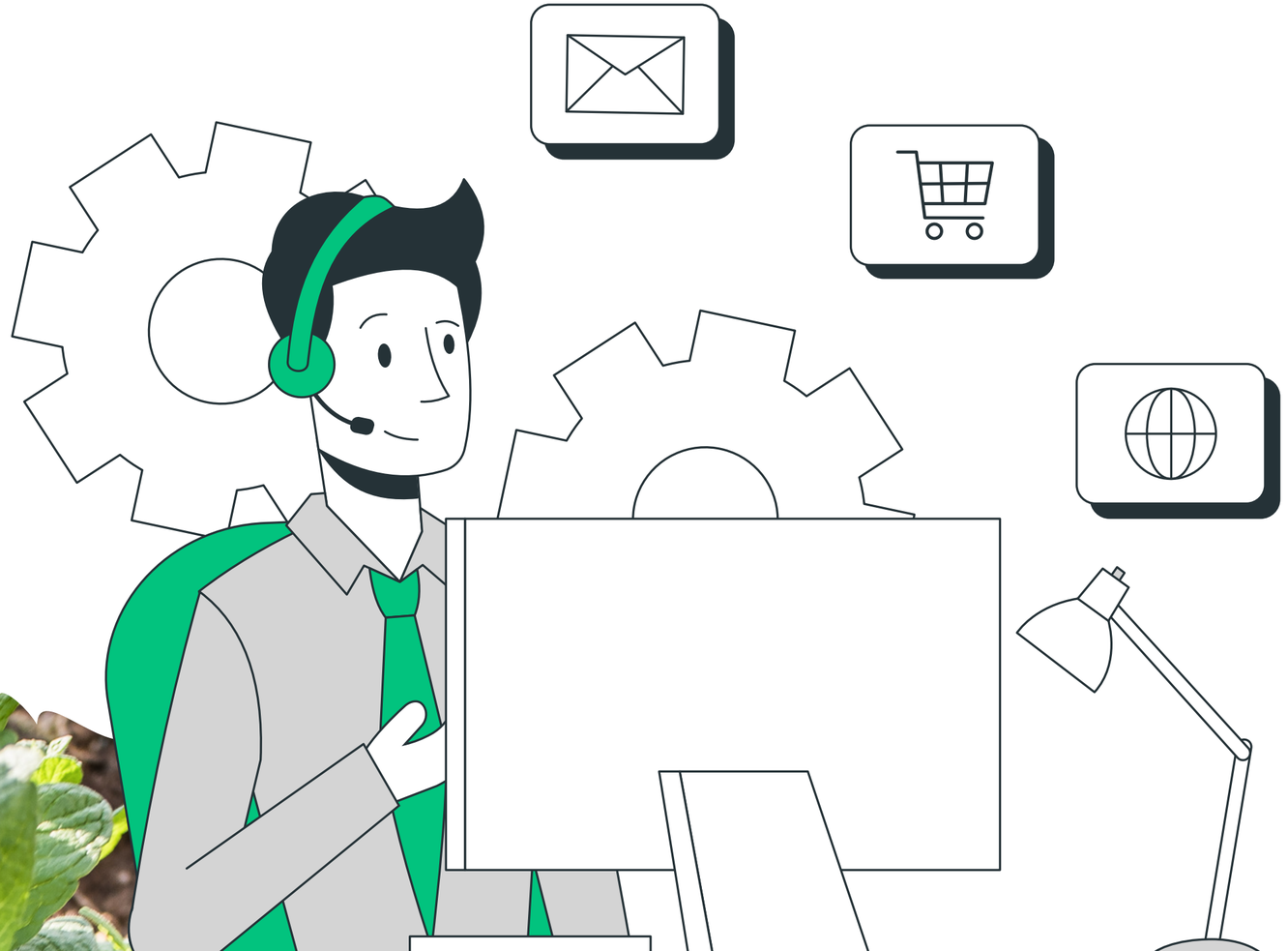
Actual: Tomato_healthy.
Predicted: Tomato_healthy.
Confidence: 100.0%

Actual: Tomato_Early_blight.
Predicted: Tomato_Early_blight.
Confidence: 99.4%

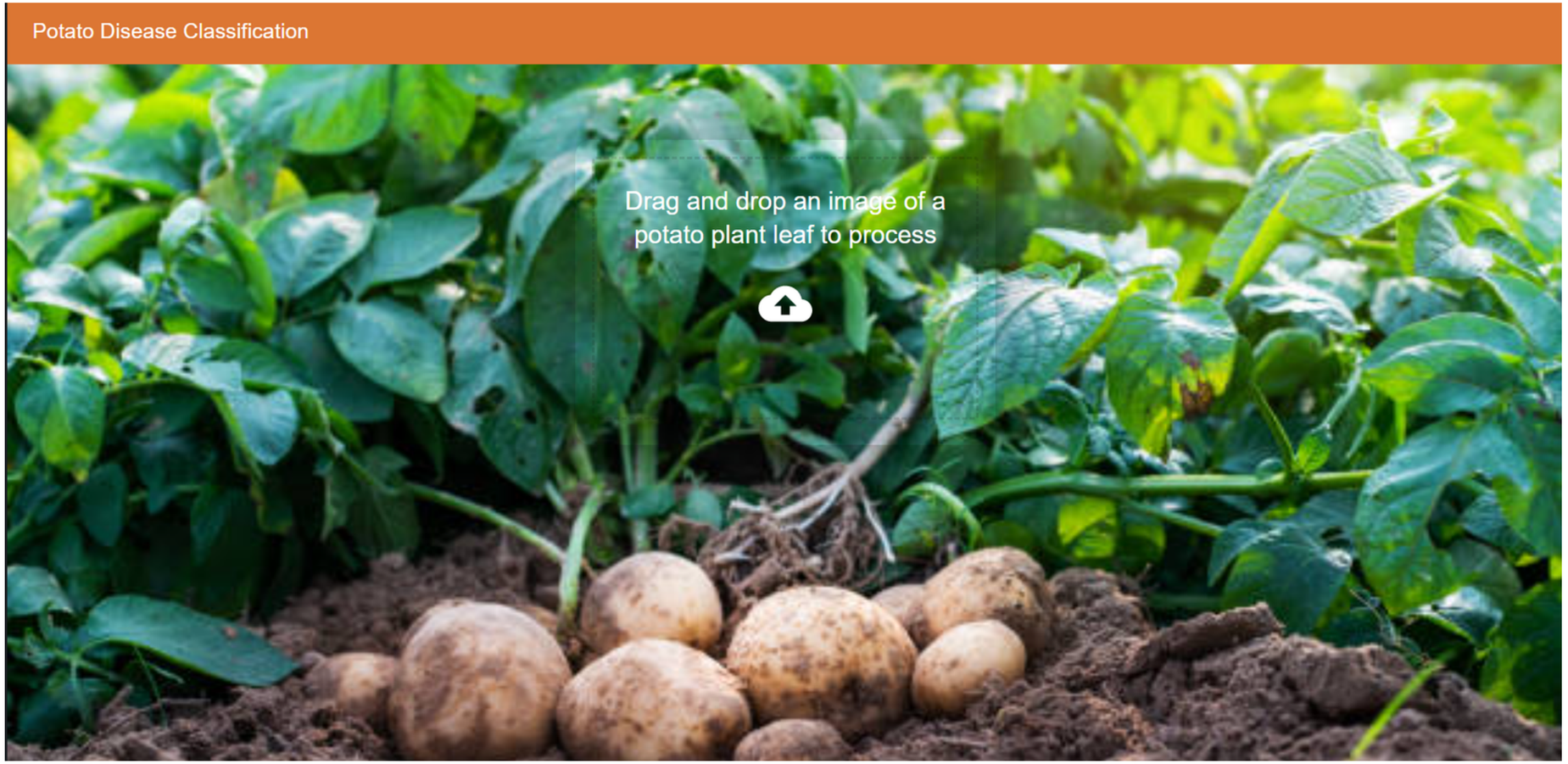
Actual: Tomato_Early_blight.
Predicted: Tomato_Early_blight.
Confidence: 99.96%

# USER INTERFACE

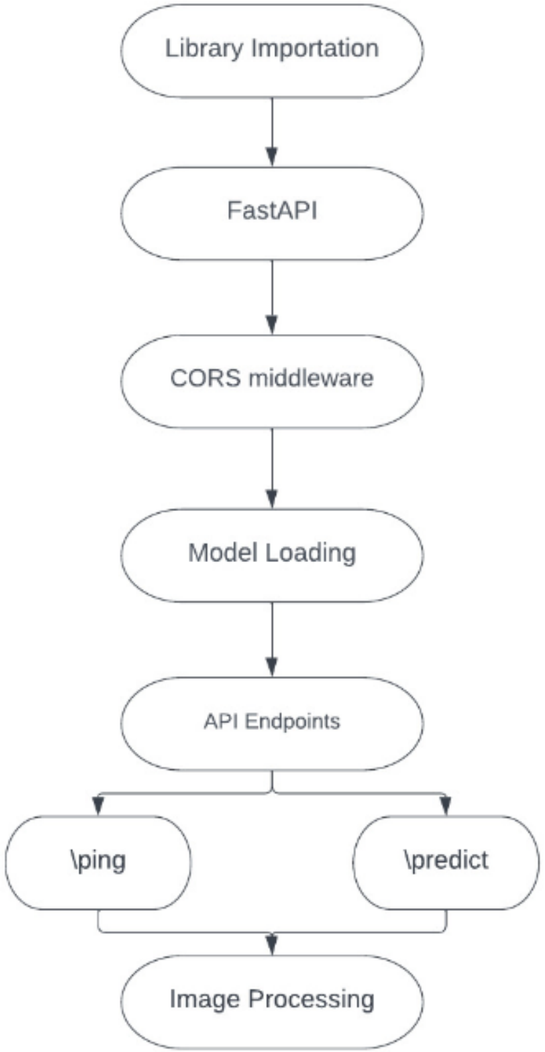
# Web page interface



# Web page interface

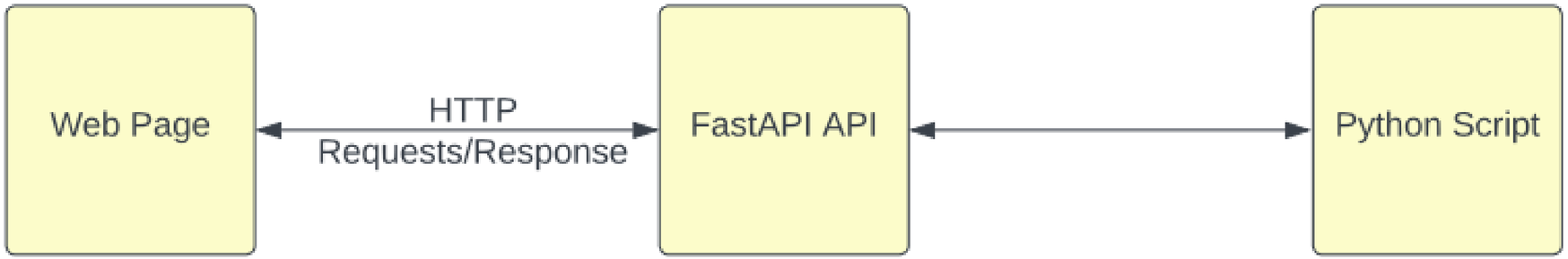


# FastAPI



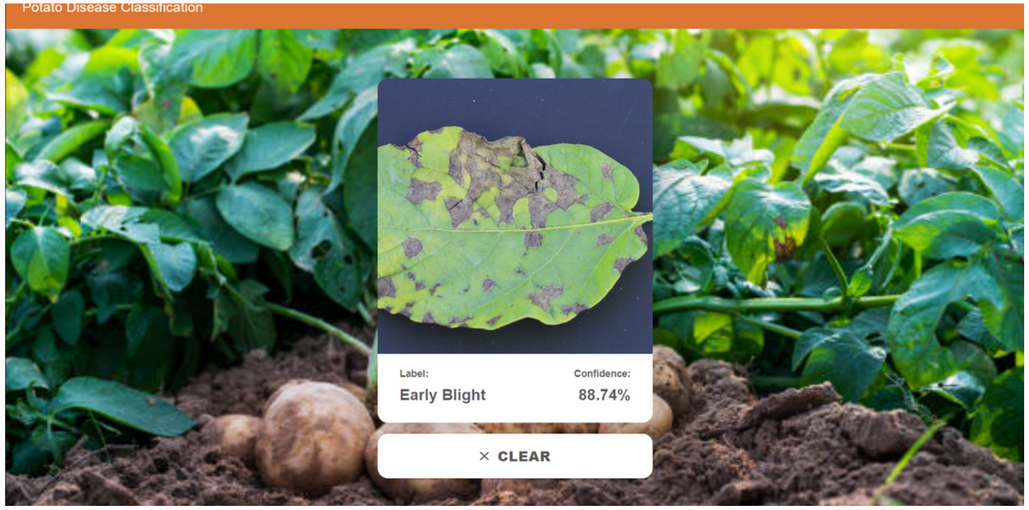

FastAPI

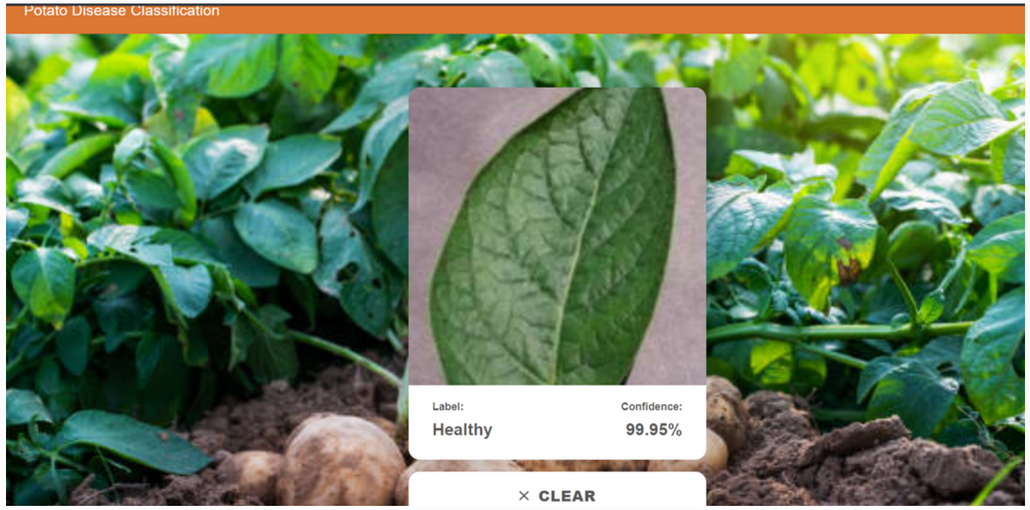
# Communication between frontend and model

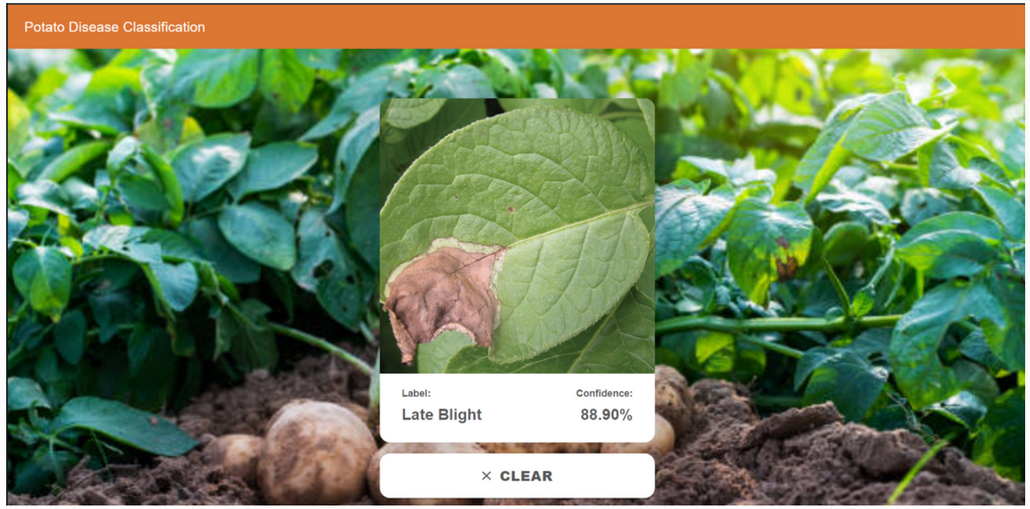


# RESULTS AND DISCUSSION

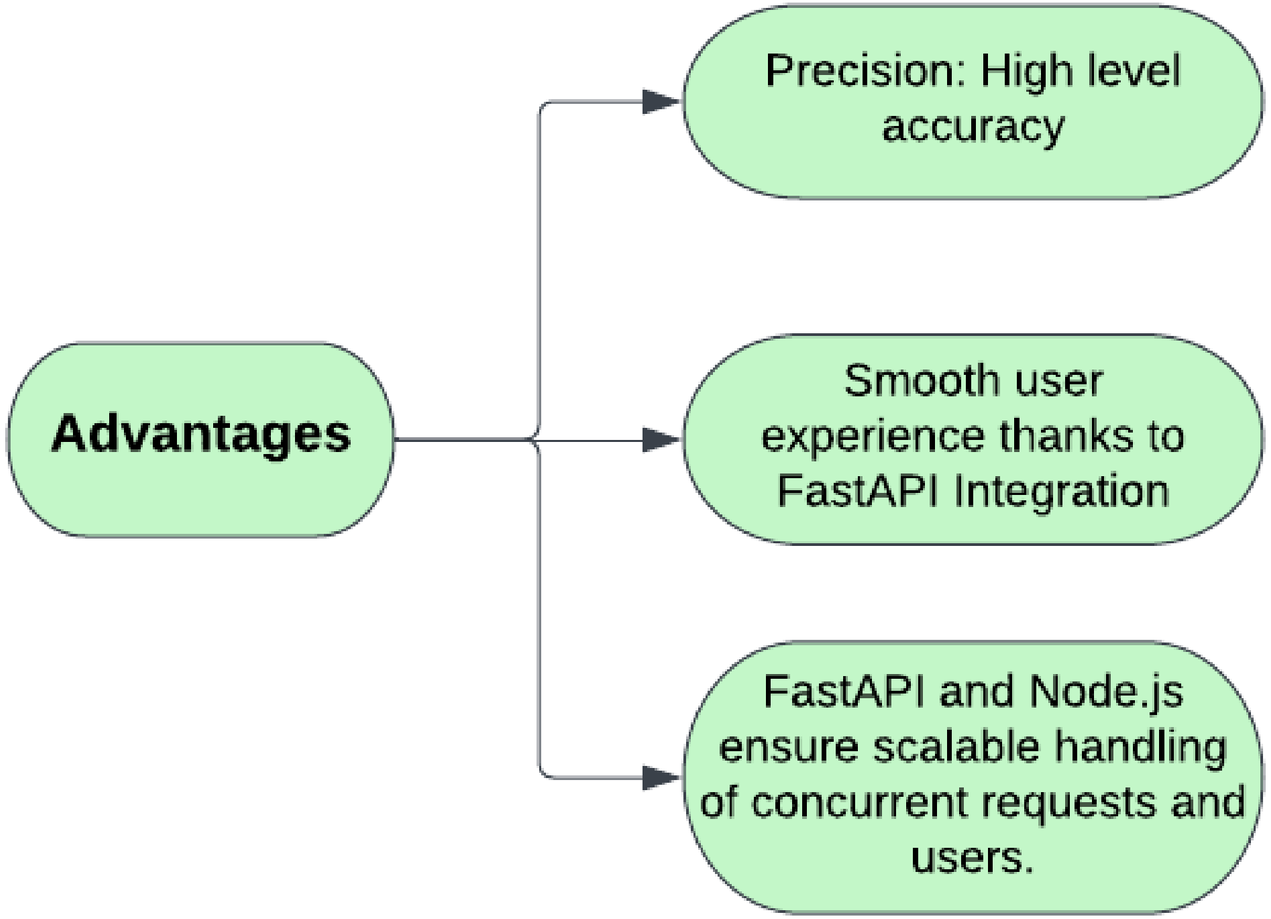
# Results of the web application



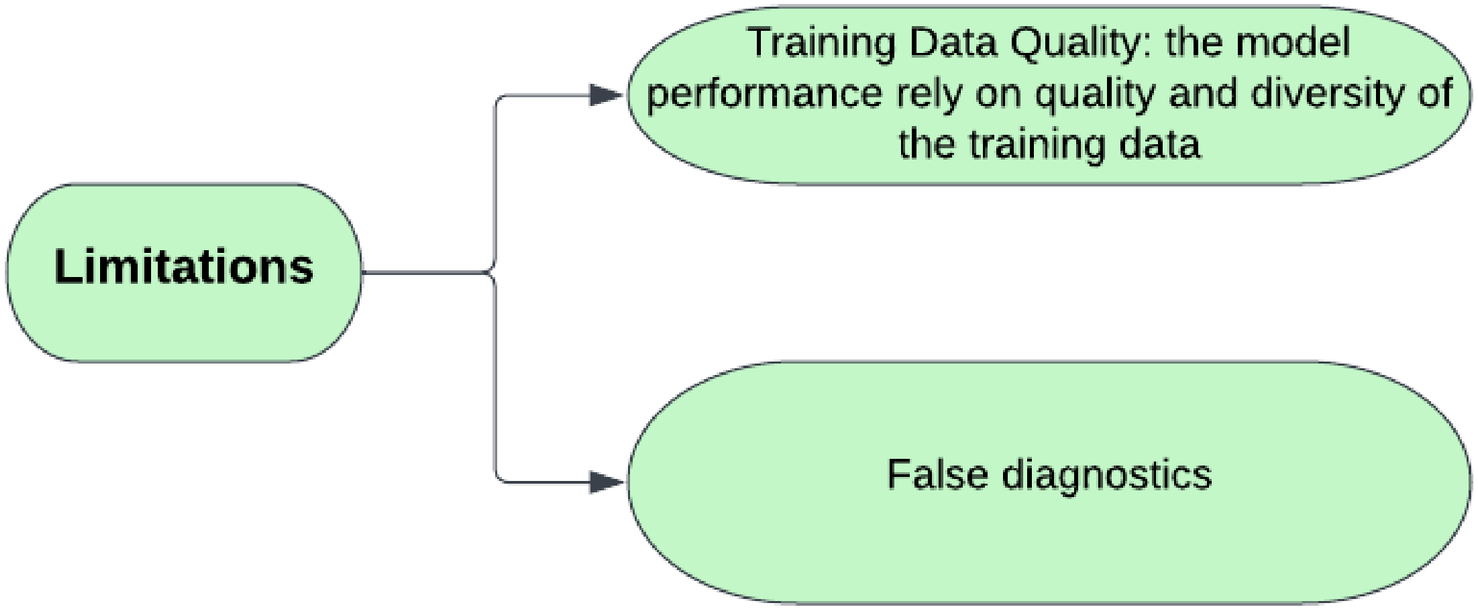



# Advantages of the system.

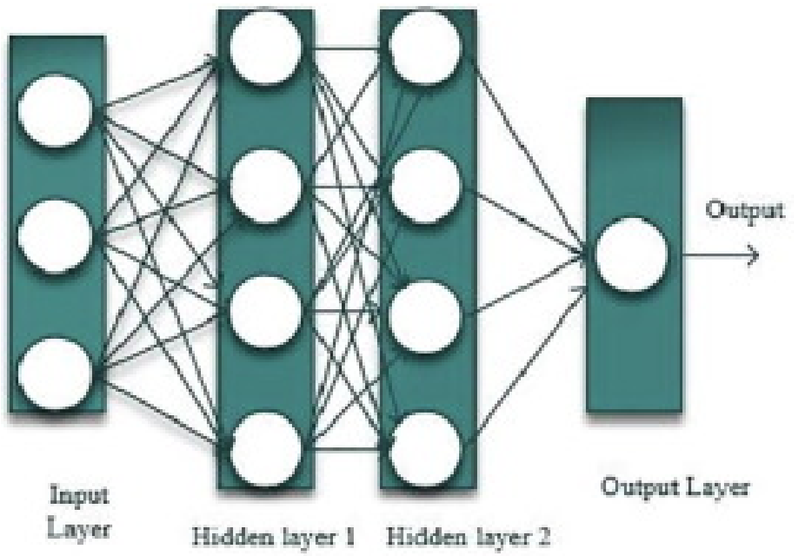


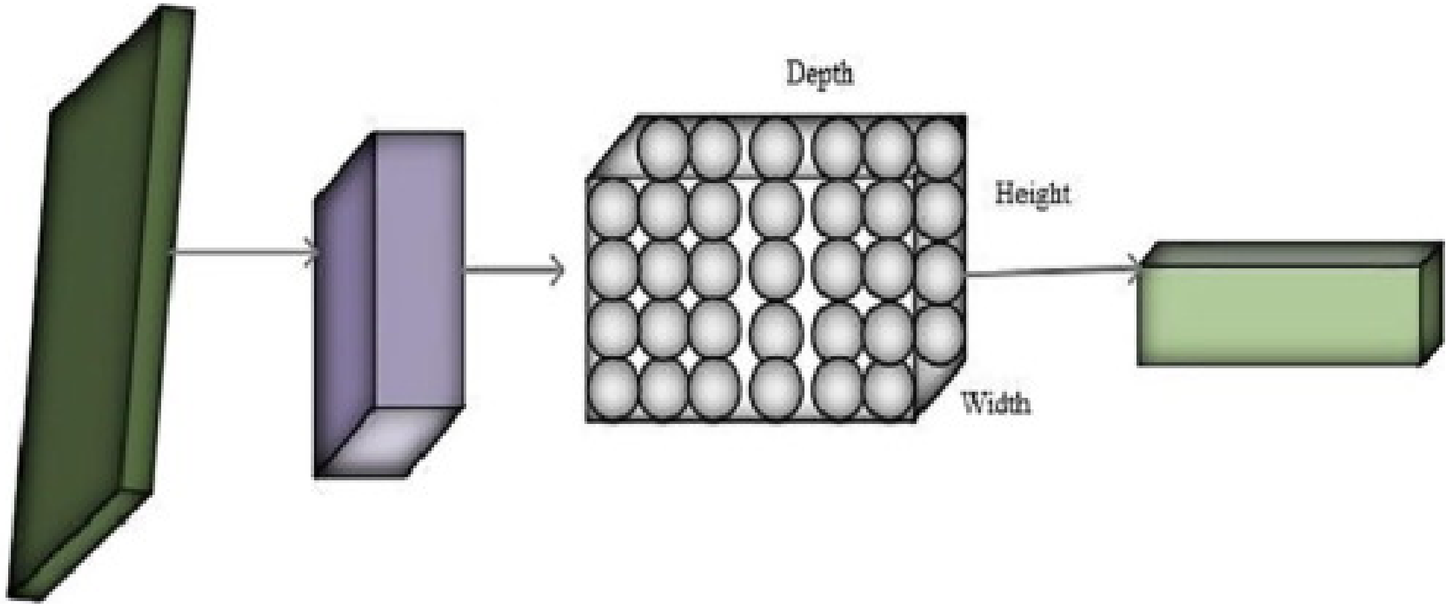
# Limitations of the system.



# FUTURE WORKS

# Optimize model architecture



# Extend the project to other plants and other diseases

Apple scab

Cherry powdery mildew

Corn northern leaf blight

Grape black rot

Grape leaf blight

Orange Haunglongbing (Citrus greening)

Peach bacterial spot

Potato early blight

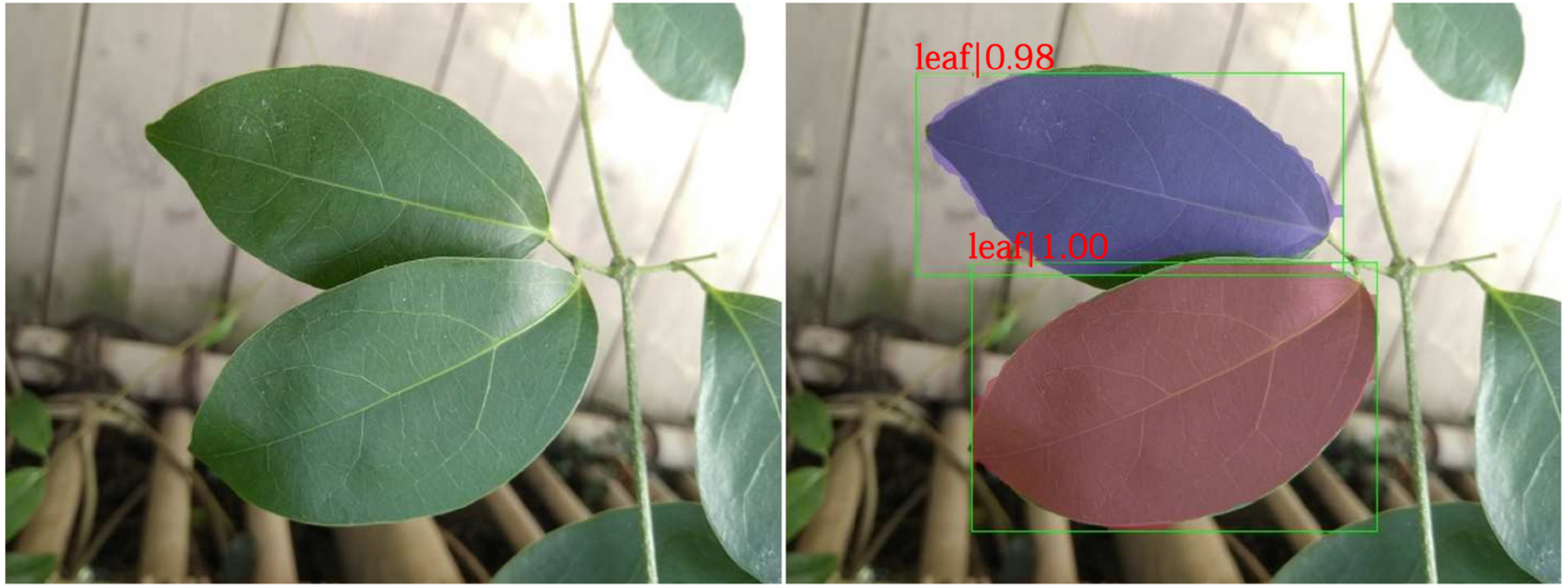
Squash powdery mildew

Strawberry leaf scorch

Tomato early blight

Tomato late blight

# Integrate image segmentation techniques



# Improve the web interface and Develop a mobile app

# THANK YOU