# Ugu Leave Disease Detection Using AI/ML

Njoku Okechukwu Valentine

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# Chapter 1

# Introduction

## 1.1 Background Information

Precision agriculture enables the recent technological advancements in farming sector to observe, measure and analyze the requirements of individual fields and crops. The recent development of computer vision and artificial intelligence (AI) techniques find a way for effective (and early) detection of plant diseases, weed, pest, etc. (Fahd et all, 2022). On the other hand, the detection of plant diseases in Ugu using the recent developments of artificial intelligence and computer vision can improve productivity and lower the menace of crop loss and the accompanying economic effects of crop loss.

Traditional disease detection techniques which normally includes laboratory tests and expert consultation can be slow, costly and limited in scope. According to (Lokesh et al.). ML offers a more efficient and accurate solution, enabling early disease detection and timely intervention.

Artificial intelligence algorithms are trained on large datasets of image or other data forms related to the plant diseases. Artificial intelligence algorithms learn to understand and recognize patterns and features associated with the differing diseases, making it possible for the Artificial Intelligence models to predict the presence and severity of disease in new, unseen data.

There are many types of ML algorithms that can be employed for Ugu disease detection. These include image processing technique, deep learning modelss (like Convolutional Neural Networks - CNNs), and other classifiers. In this, work it is intended to you deep learning and or image processing techniques.

Faster detection: ML algorithms can process images and data rapidly, enabling early disease detection and timely interventions, according to ResearchGate Improved accuracy: ML models can often outperform traditional methods in terms of accuracy, reducing the risk of misdiagnosis and enabling more precise interventions, according to ResearchGate. Increased production: By enabling early and accurate disease detection, ML can help farmers take timely action to prevent crop loses and increase productivity.

Data availability: Training ML models requires large and diverse datasets of plant disease images or data, which may be challenging to obtain. Data quality: The quality of the data used to train ML models can significantly impact their performance, and poor quality data can lead to inaccurate predictions. Generalisation: ML models may struggle to generalise to new or unseen conditions, such as different plant species or environmental factors, according to **Diva Portal**

Early disease detection: ML can be used to identity disease symptoms at their earliest stages, allowing for timely interventions and preventing the spread of diseases. Disease classification: ML models can be trained to classify different types of plant diseases, aiding in accurate diagnosis and targeted treatment. Disease severity assessment: ML can be used to assess the severity of plant diseases, helping farmers determine the approximate treatment strategies. Predicting disease outbreaks: By analysing historical data and environmental factors. ML can be used to predict the likelihood of disease outbreaks, allowing for proactive measures to be taken, according to ResearchGate.

Image-based detection: ML algorithm can analyse images of plant leaves to identify disease symptoms, such as lesions, discolouration and other visual clues.

Ugu is a member of the family of plants / vegetables called Pumpkin. Pumpkin is the name given to a group of plant species in the genus Cucurbita, including Cucurbiat pepo, Cucurbit mixta, Cucurbiat maxima and Cucurbita moschata. It is grown primarily as a vegetable or ornamental plant. Pumpkins have long-running, bristled stems large deeply-lobed leaves often containing white blotches (but not always), and yellow or orange flowers separated into male and female types on the same plant. The fruit is variable in shape and color but is often white, cream or green containing about 70%