

Automatic Detection of Sugarcane Diseases: A Computer Vision-Based Approach

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Abstract : The major problem in crop cultivation is the occurrence of multiple crop diseases. During the growth stage, timely identification of crop diseases is paramount to ensure the high yield of crops, lower production costs, and minimize pesticide usage. In most cases, crop diseases produce observable characteristics and symptoms. The Surveyors usually diagnose crop diseases when they walk through the fields. However, surveyor inspections tend to be biased and error-prone due to the nature of the monotonous task and the subjectivity of individuals. In addition, visual inspection of each leaf or plant is costly, time-consuming, and labour-intensive. Furthermore, the plant pathologists and experts who can often identify the disease within the plant according to their symptoms in early stages are not readily available in remote regions. Therefore, this study specifically addressed early detection of leaf scald, red rot, and eyespot types of diseases within sugarcane plants. The study proposes a computer vision-based approach using a convolutional neural network (CNN) for automatic identification of crop diseases. To facilitate this, firstly, images of sugarcane diseases were taken from google without modifying the scene, background, or controlling the illumination to build the training dataset. Then, the testing dataset was developed based on the real-time collected images from the sugarcane field from India. Then, the image dataset is pre-processed for feature extraction and selection. Finally, the CNN-based Visual Geometry Group (VGG) model was deployed on the training and testing dataset to classify the images into diseased and healthy sugarcane plants and measure the model's performance using various parameters, i.e., accuracy, sensitivity, specificity, and F1-score. The promising result of the proposed model lays the groundwork for the automatic early detection of sugarcane disease. The proposed research directly sustains an increase in crop yield.

Keywords : automatic classification, computer vision, convolutional neural network, image processing, sugarcane disease, visual geometry group

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