

PAPER TITLE:

Deep Feature Extraction for Detection of Tomato Plant Diseases and Pests based on Leaf Images

Date: 30/04/2021

JOURNAL/CONFERENCE: Celal Bayar University Journal of Science.

AUTHOR: Yahya Altuntaş, Adnan Fatih Kocamaz.

PROBLEM MENTIONED/SOLUTION OBTAINED:

The paper addresses the challenge of detecting tomato plant diseases and pests accurately and efficiently to prevent yield and quality losses in agriculture. Traditional methods of visual observation by experts are labor-intensive and prone to errors. The authors propose a solution using deep learning techniques, specifically utilizing pre-trained convolutional neural network (CNN) models as feature extractors and a support vector machine (SVM) classifier. By extracting deep features from leaf images and training the classifier, the system achieves high accuracy in classifying different diseases and pests affecting tomato plants.

ALGORITHM USED:

The study employs pre-trained CNN models (AlexNet, GoogLeNet, and ResNet-50) as feature extractors and an SVM classifier for training and classification tasks.

TOOLS USED/IMPLEMENTED:

The experiments are conducted using the MATLAB 2019b programming environment. The dataset used for training and testing is a subset of the PlantVillage dataset containing images of diseased and healthy tomato leaves.

RESULTS AND DISCUSSION:

The experimental results demonstrate promising outcomes, with the proposed method achieving an overall accuracy rate of 96.99% in detecting tomato plant diseases and pests. Comparison with related studies in the literature indicates the superiority of the proposed approach. The authors discuss the implications of their findings and highlight the potential for further research to enhance classification performance and evaluate models under field conditions.

KNOWLEDGE ACQUIRED:

The paper provides valuable insights into the application of deep learning techniques for agricultural purposes, particularly in the domain of plant disease and pest detection. It underscores the importance of leveraging advanced technologies to address significant challenges in agriculture, ultimately contributing to food security and sustainable crop production.

IMPORTANT REFERENCE:

- Ferentinos, KP. 2018. Deep learning models for plant disease detection and diagnosis. Computers and Electronics in Agriculture; 145: 311-318.
- LeCun, Y, Bengio, Y, Hinton, G. 2015. Deep learning. Nature; 521(7553): 436-444.
- Lu, Y, Yi, S, Zeng, N, Liu, Y, Zhang, Y. 2017. Identification of rice diseases using deep convolutional neural networks. Neurocomputing; 267: 378-384.
- Bishop, CM. Pattern recognition and machine learning; Springer, New York, USA, 2006; pp 738.