

Related Work

[1] Plant Disease Detection Using Deep Learning Techniques

Zainab et al, applied Convolutional Neural Network (CNN) models: ResNet152, VGG19, DenseNet169, and MobileNetv3 to detect plant diseases using a the highly regarded PlantVillage dataset. Also, they extend the dataset to train a deep learning (DL) model in plant disease diagnosis by the use of image augmentation, a crucial method utilizing Keras' Image Data Generator. In this study MobileNetv3 had the best testing accuracy of 99.75%, ResNet152 accuracy of 98.86%, VGG19 accuracy of 99.07% and DenseNet169 accuracy of 99.22%.

Dataset :

PlantVillage: an open access repository of images on plant health to enable the development of mobile disease diagnostics.

<https://arxiv.org/abs/1511.08060>

[2] Deep learning-based segmentation and classification of leaf images for detection of tomato plant disease

Shoaib, Muhammad, et al. proposed a solution to detect tomato plant disease using a deep learning (DL) based on a recently developed convolutional neural network (CNN) that is trained over 18,161 segmented and non-segmented tomato leaf images from Plant Village dataset. And semantic segmentation models: U-Net and Modified U-Net are utilized. In addition, an examination of the presentation of binary arrangement (healthy and diseased leaves), six-level classification (healthy and other ailing leaf groups), and ten-level classification (healthy and other types of ailing leaves) models. They achieved high performance in both segmentation and classification of tomato leaf diseases. Using a modified U-Net model, it reached about 98.66% segmentation accuracy, 98.5% IoU score, and 98.73% percent on the dice.

Dataset :

SpMohanty (2018) PlantVillage-dataset. Available at: <https://github.com/spMohanty/PlantVillage-Dataset> (Accessed 21 January 2021).

[3] Toward Generalization of Deep Learning-Based Plant Disease Identification Under Controlled and Field Conditions

Ahmad, et al. utilize transfer learning using five different pre-trained deep neural networks (DNN): InceptionV3, ResNet50, VGG16, DenseNet169, and Xception using five datasets consisting of foliar disease images in corn: namely PlantVillage, PlantDoc, Digipathos, northern leaf blight (NLB) dataset and CD&S dataset. It was observed using DenseNet169 resulted the best generalization for plant disease identification, capable of achieving accuracies up to 81.60%, InceptionV3 up to 73.27%, ResNet50 up to 70.60 %, VGG16 up to 52.55% and Xception up to 78.80%.

Dataset :

PlantVillage: an open access repository of images on plant health to enable the development of mobile disease diagnostics.

<https://arxiv.org/abs/1511.08060>

PlantDoc: A Dataset for Visual Plant Disease Detection.

<https://github.com/pratikkayal/PlantDoc-Dataset>

Digipathos: A multimedia database for plant pathology.

Northern Leaf Blight (NLB) Dataset

CD&S Dataset

[4] Tomato Leaf Disease Detection using Convolution Neural Network

Agarwal, Mohit, et al. apply a Convolution Neural Network (CNN): VGG16, InceptionV3 and MobileNet for disease detection and classification. Images of Tomato disease have been taken from Plant Village dataset that includes over 50,000 images of 14 crops. Experimentally, they observed testing accuracy ranging from 76% to 100% for the classification. And the average testing accuracy of the model is 91.2% for the 9 disease and 1 healthy class. Where the Custom CNN is the best accuracies up to 91.2%, VGG-16 up to 77.2%, Inception V3 up to 63.4% and MobileNet up to 63.7%.

Dataset :

PlantVillage: an open access repository of images on plant health to enable the development of mobile disease diagnostics.

<https://arxiv.org/abs/1511.08060>

[5] Using deep transfer learning for image-based plant disease identification

Chen, Junde, et al. apply Convolution Neural Network (CNN) models VGGNet, InceptionV3, ResNet50, VGGNet-19 and DesneNet201. They selecte the VGGNet pre-trained on ImageNet for the identification of plant leaf diseases. Instead of starting the training from scratch, they initialize the weights using the pre-trained networks on the large labeled dataset, ImageNet including 500 rice images and 466 maize images. It achieves a validation accuracy of no less than 91.83% on the dataset. The other accurices is : InceptionV3 85% ResNet50 69.67% VGGNet-19 74.83% and DesneNet201 79%

Dataset :

Planet disease detect :Data for identification of plant leaf diseases based on deep transfer learning

<https://data.mendeley.com/datasets/6nv7gt2636/1>

ImageNet: an image database organized according to the WordNet hierarchy, in which each node of the hierarchy is depicted by hundreds and thousands of images.

<https://www.image-net.org>

[6] Automated Identification of Northern Leaf Blight-Infected Maize Plants from Field Imagery Using Deep Learning

DeChant, Chad, et al. applied Several Convolution Neural Network (CNN) to detect Northern Leaf Blight (NLB) symptoms in maize. They trained CNNs to classify small regions of images containing NLB then combined into separate heat maps after that fed into final CNN trained to classify the entire image as containing diseased plants or not. Data were used from two separate plantings, both grown at Musgrave Research Farm in Aurora, New York. Each planting consisted of two replicates, each containing 250 maize hybrids, including five experimental hybrids adapted to New York. The system achieved 96.7% accuracy.

Dataset :

Field images of maize plants collected under natural lighting conditions at Musgrave Research Farm in Aurora, New York

NLB annotated public 2016: available through the Bisque platform of CyVerse
https://bisque.cyverse.org/client_service/

Papers	Year	Methods	Datasets	The best model	Results
[1]	2025	CNN models: ResNet152, VGG19, DenseNet169, and MobileNetv3	Plant Village	MobileNetv3 accuracy of 99.75%	MobileNetv3: 99.75% ResNet152: 98.86% VGG19: 99.07% DenseNet169: 99.22%
[2]	2022	DL, CNN and semantic segmentation models: U-Net and Modified U-Net. Binary arrangement, six-level and ten-level classification	Plant Village	Modified U-Net model	98.66% segmentation accuracy, 98.5% IoU score, and 98.73% on the dice.
[3]	2023	DNN Models: InceptionV3, ResNet50, VGG16, DesneNet169, and Xception	Plant Village, PlantDoc, Digipathos, NLB and CD&S dataset	DesneNet169 accuracy of 81.60%.	InceptionV3:73.27% ResNet50:70.60 % VGG16:52.55% DesneNet169: 81.60 % Xception:78.80%
[4]	2020	CNN, VGG16, InceptionV3 and MobileNe	Plant Village	CNN accuracies up to 91.2%	CNN: 91.2% VGG-16: 77.2% Inception V3: 63.4% MobileNet: 63.7%
[5]	2020	VGGNet, InceptionV3, ResNet50, VGGNet-19 and DesneNet201	Planet disease detect and ImageNet	VGGNet achieves a validation accuracy of no less than 91.83%	VGGNet 91.83% InceptionV3 85% ResNet50 69.67% VGGNet-19 74.83% and DesneNet201 79%
[6]	2017	CNN	Musgrave Research Farm and NLB annotated public 2016 datasets	CNN accuracy reached 96.7%	The system acheaved 96.7% accuracy

Reference :

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