A compact convolutional neural network for plant disease management and fruit classification

June 19 2023

Credit: CC0 Public Domain

A study in the *International Journal of Computational Science and Engineering*, introduces a new deep learning architecture called LightNet,

designed to overcome the challenges of training deep learning models and revolutionize the agricultural sector. The study, focuses on plant disease management and fruit classification and addresses the normally high computational resource demands that have hindered the implementation of deep learning models on limited-resource devices for disease identification in images of leaves and fruit.

Deep learning, a powerful technique in artificial intelligence, has gained popularity across various applications. However, its resource-intensive nature has made it unsuitable for devices with limited computing power and storage capacity. Moreover, there is a dearth of efficient approaches for tackling real-world agricultural problems using deep learning.

Edna C. Too of the Department of Computer Science at Chuka University in Kenya has developed LightNet, a compact convolutional neural network (CNN) that uses two innovative strategies, skip connections and pruning. This increases efficiency considerably by allowing smoother information flow through the network while reducing unnecessary connections and parameters. The approach allows the system to outperform seemingly more powerful tools. For instance, it is half the size, double the efficiency, and three times faster than DenseNet.

The researchers evaluated LightNet using two real-world datasets: PlantsVillage, which focuses on plant disease detection, and Fruits-360, which involves fruit classification and grading. The results of the evaluation demonstrate just how well the system works for plant disease detection and fruit classification tasks. The potential is immense.

By providing an efficient and accurate solution for deep learning in these real-world applications, LightNet offers a way for growers and suppliers to be better equipped to counter major problems across the sector. As it requires a lower-resource device there is the potential for it to be used in

the field, as it were, at lower cost than other more resource-intense systems, ultimately improving crop management and food security.

More information: Edna C. Too, LightNet: pruned sparsed convolution neural network for image classification, *International Journal of Computational Science and Engineering* (2023). DOI: 10.1504/IJCSE.2023.131508

Provided by Inderscience

Citation: A compact convolutional neural network for plant disease management and fruit classification (2023, June 19) retrieved 11 May 2024 from https://techxplore.com/news/2023-06-compact-convolutional-neural-network-disease.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.