

Cassava Leaf Disease Identification and Classification

Cassava is a vital crop for food and nutrition security in Africa, providing essential carbohydrates and thriving in harsh environments. However, cassava crops are susceptible to leaf diseases that can significantly diminish yields and reduce farmers' income. Current CNN models used for detecting these diseases often struggle with poor accuracy and high computational demands.

This project presents an improved CNN model aimed at improving the real-time identification of cassava leaf diseases. Key improvements in the model include:

- **Depth-Wise Separable Convolution:** This technique reduces the number of features and computational load, addressing inefficiencies in standard CNN models and improving processing speed.
- **Gamma Correction:** Applied to correct color inconsistencies in images, this feature helps the model more accurately distinguish between different disease types.
- **Global Average Pooling with Batch Normalization:** These features streamline the variable selection process and enhance computational efficiency, making the model more effective in handling complex image data.

The model was evaluated on a dataset of 6256 cassava leaf images, categorized into five classes: Cassava Bacterial Blight (CBB), Cassava Brown Streak Disease (CBSD), Cassava Green Mottle (CGM), Cassava Mosaic Disease (CMD), and Healthy. The CNN model demonstrated a significant performance improvement, achieving 99.3% accuracy on the balanced dataset. This high accuracy underscores the model's effectiveness in managing imbalanced data and enhancing disease classification, proving its potential for real-time application in cassava disease management.

Submitted By: Gijin T George
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Reference

Umesh Kumar Lilhore 1 , Agbotiname Lucky Imoize 2,3 , Cheng-Chi Lee 4,5,* , Sarita Simaiya 1 , Subhendu Kumar Pani 6 , Nitin Goyal 1 , Arun Kumar 7 and Chun-Ta Li | Enhanced Convolutional Neural Network Model for Cassava Leaf Disease Identification and Classification | Mathematics | MDPI | Vol 1 | Year: 13 February 2022