AFRICAN MASTER'S FOR MACHINE INTELLIGENCE

AMMI AIMS-SENEGAL

COURSE: COMPUTER VISION

REPORT: Cassava leaves classification Kaggle competition

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1 Introduction

The production of cassava in Sub-Saharan Africa has been increasing faster than the production of cereals. Many studies have demonstrated the technical feasibility and the economic advantages of using cassava in partial or total replacement of wheat for bread making but the baking industry in non-wheat producing countries has been reluctant to reduce the use of wheat. Targeting the composite and wheat less flour projects to rural and small scale users may prove to be more successful than trying to persuade large mills and bakeries to change their mode of operation.

2 Problem statement

As the second-largest provider of carbohydrates in Africa, cassava is a key food security crop grown by smallholder farmers because it can withstand harsh conditions. At least 80 % of household farms in Sub-Saharan Africa grow this starchy root, but viral diseases are major sources of poor yields. With the help of data science, it may be possible to identify common diseases so they can be treated.

3 Dataset explanation

- A total of 21,367 labelled images were provided. These images were collected during a survey in Uganda.
- Most images are crowd sourced from farmers and annotated by National Crops Resources Research Institute (NaCRRI) in collaboration with the AI lab at Makerere University, Kampala.
- So, the data made available represents the image format that the farmers would need to diagnose in real life.
- The diseases and their respective class labels are as shown below:

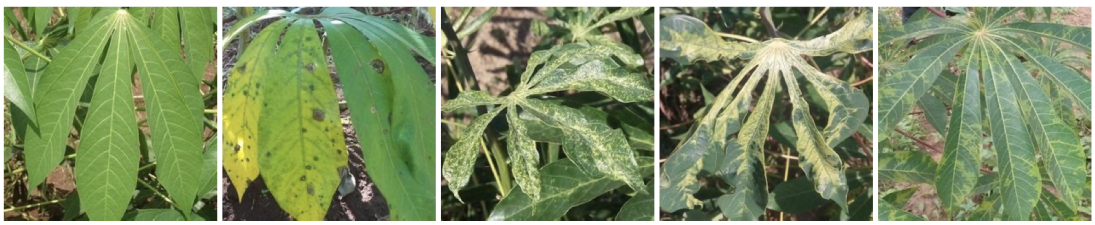
  0 : "Cassava Bacterial Blight (CBB)".

  1 : "Cassava Brown Streak Disease (CBSD)".

  2 : "Cassava Green Mottle (CGM)".

  3 : "Cassava Mosaic Disease (CMD)".

  4 : "Healthy.



(a) Healthy (b) CBB (c) CGM (d) CMD (e) CBSD

Figure 1: cbb class

This is the link for the Cassava data set in kaggle https://www.kaggle.com/c/ammi-2021-convnets/data.

4 Model development and discussions

Starting with the preprocessing stage, many data augmentation transforms have been used like random resized, RandomRotation and other, data augmentation was applied on training phase and testing phase.

During the model development, we used deep learning model (pre-trained model) for image classification task especially Resnet. We attemp to use many pre-trained model (resnet152, densenet121,) . For more reading about Resnet go to: https://arxiv.org/abs/1512.03385. We tried many pre-trained models like Resnext-50 , Resnext-101 and EfficientNet .The best results we got it by using Resnext-101 .

Then , we used many optimzers to optimize the loss function (Cross entropy loss) such as SGD with momentum, ADAM. For our best model SGD was chosen and the hyper parameters tuning was (lr = 0.001 with momentum = 0.9), we also we used schedular step learning rate with step size= 7, with number of epoch= 15.

Our best models were Resnext-101 and EfficientNet with accuracy respectively 0.88410 and 0.88344 on the public leaderboard.

The accuracies are not sufficient, we need to improve. In order to improve, we have three tasks:

- perform some advanced data augmentation in our training data because the image that used didn't have the same characteristics (background color are not the same);
- improve the model's architecture, select the best optimizer maybe Adam with the best learning decay in order to avoid overfitting;
- perform kfold in order to prevent overfitting.