Predicting Rust Disease in Robusta Coffee Plants using Deep Learning

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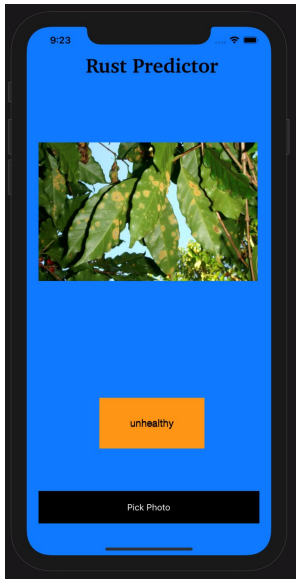
Q1: Engineering Problem and Objectives

- PROBLEM: Farmers and scientists have difficulty predicting the presence of Coffee Leaf Rust (CLR) from the human eye, since the disease depends on the plant having a sufficient concentration of yellow spot symptoms.

- GOAL: Create a mobile iOS application that allows the user to test their own plant for CLR. The app integrates a convolutional neural network based-deep learning (DL) model to make computational predictions.

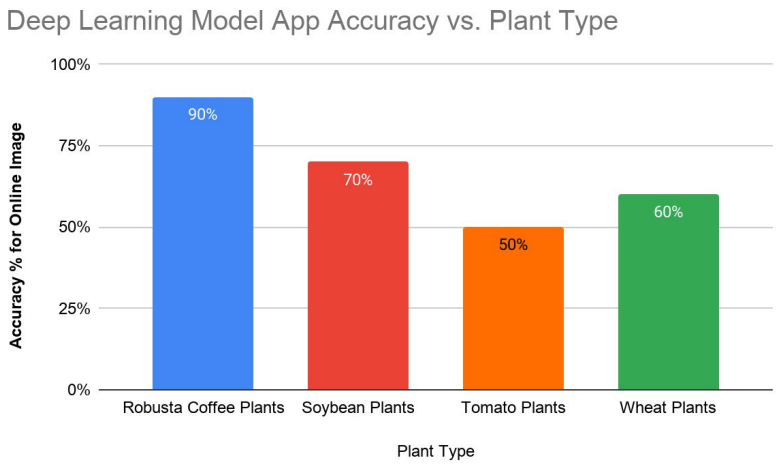
Q2: Project Design

- Upload a dataset of Robusta Coffee Plant Images into a Python program
- Construct the model by adding CNN classifier & output layers.
- Train the model and adjust the parameters to output the highest testing accuracy (optimization).
- Create a new Swift XCode project and use the Storyboard section to design the app home screen
- Implement the Apple ML functions to allow the image classifier to use machine learning.



Q3: Data Analysis & Results

- The app was tested using various plant species and their accuracies were compared.



Q3: Interpretation and Conclusions

- The app worked as expected when <u>all</u> plants were tested for Rust disease.
- Robusta Coffee Plants were the most accurate since the DL model was trained *only* on coffee leaves. The other species still produced sufficient results.
- Further improvements would be to add features to test for other species more accurately using additional DL models, and add the option to test masses of images simultaneously.
- The app could be used by anybody, most importantly scientists or coffee farmers, to efficiently detect Rust disease in Robusta coffee plants