

Capstone 2 Project Proposal

Image Recognition – Fruit Classifier with > 90% accuracy on unseen data.

The objective is to train a CNN (Convolutional Neural Network) to recognize everyday fruits in at least 5 categories. This would be an end to end activity which will involve data curation, data transformation, augmentation, training, validation and testing to achieve at least 90% accuracy on test set (unseen data). They will be trained using 300 color images of each category that are collected from free online resources. For testing, 10 images will be taken for each class. There will be five categories of fruits Red Apples, Strawberries, Green Grapes, Kiwi and Blackberries. The objective is to build a foundational level classifier that can be scaled up to applications in numerous technologies like facial recognition, computer vision, self-driving cars etc. The CNN will need to ensure that it gets over all the below challenges in achieving its target accuracy.

Challenge 1: Color similarity – There will complexity of having at least two sets of fruits with same color. This will up the bar by minimizing any color related differentiation by the CNN. For example in this set, strawberries and apples will be of red color and grapes and kiwis will be of green color. This will ensure that the CNN doesn't discriminate largely based on color of fruits. It could be the case if these 5 fruits were chosen of very different colors.

Challenge 2: Variable Shape – The standard variations in the fruits' shape should be accounted for. For example rounder grapes vs. more oval variation. Differences in shapes of strawberries, apples etc.

Challenge 3: Foreign objects/ partial object recognition – Images that are partial populated with the fruit or have foreign objects blocking it should also be recognizable.

Out of scope:

1. Apart from sliced version of Kiwi that exposes the green color, all other fruits should be whole fruits. Meaning the horizontal/vertical cuts of fruits will not be used to train/test the CNN. For this, we would need a bigger set than that of 300 images and will take a long time for curation.
2. Detection of fruits in their stages of fruit growth is out of scope as it also would need a larger data set to train on. Also, these fruits have different colors and shape when they are raw and that would increase the complexity many fold. For the purposes of this capstone, classification of only ripe fruits is in scope.