



KENNESAW STATE UNIVERSITY

Facial Recognition and Object Detection-based Smart Cashier System

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Smart Cashier System

The AmazonGo is a prime example of the implementation of a smart based cashier store. The store allows the shoppers to come in and pick the items and leave. How it works is based on the camera, sensor, detection, and



Figure 1: AmazonGo.



Figure 2: AmazonGo cameras.

Abstract

In this research study, the topic of smart based cashier systems are being studied to further the depth of knowledge and applications. As of today, there are several implementations of this concept. However, there are a few issues that arise. The purpose of this study is to test the feasibility of the concept within a small environment. The method is to train the computers to detect and recognize. The results concluded that it is possible to have just one camera system used for detection in a small environment.

Research Problem

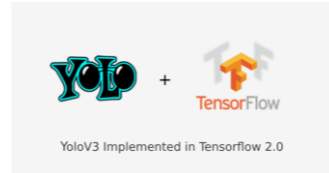
The problem that arises from smart cash system-based stores is the expensive cost of having a lot of cameras and sensors. In small environments, the cost of having this expensive type of system would make the concept of smart stores less practical.

Purpose of Study

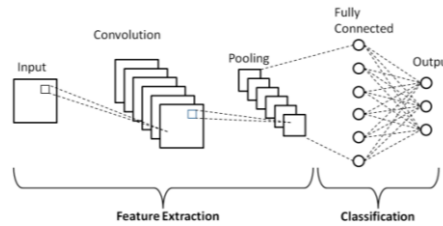
The purpose is to study about the concepts of deep learning, CNN, and computer vision. Topics such as object detection and facial recognition are focused in the study. Also to find a solution to having the cost of cameras reduce by having one camera within a small setting.

Methods

YOLOv3 and TensorFlow are used for the detection and recognition of the computer camera.



Deep learning and CNN are applied in the implementation

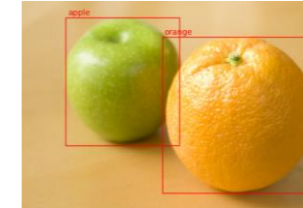


Some key term: neural network, training, extraction, classification.

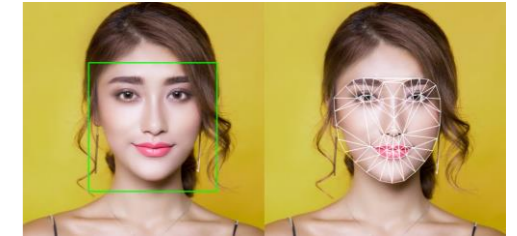
Dataset classes include apple, orange, banana, bagel, and croissant.



Object detection is used for the items.



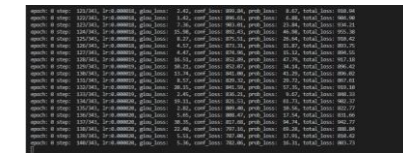
Facial Recognition is used for the shoppers.



1. Gather images from Google API.

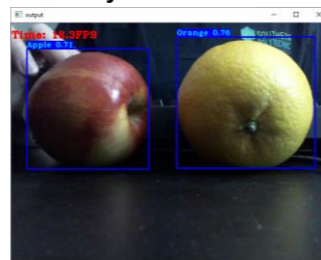


2. Split images into 2 sets. 300 for training and 100 for testing.



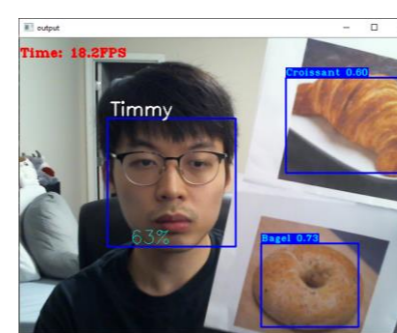
Results

Object Detection



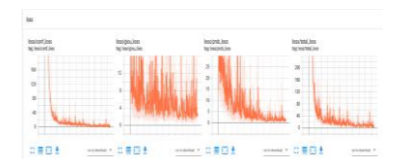
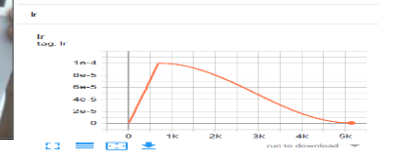
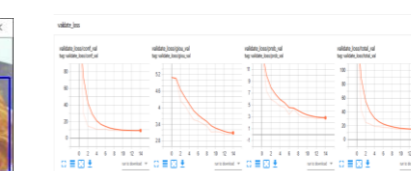
After the training, the objects detected had accuracy values at about 60 percent to 70 percent.

Facial Recognition



After the training, both the detected objects and the recognized face had accuracy values at about 50 percent to 80 percent.

Graphs: Loss, Learning Rate, Validate Loss



Future Directions

This should ideally work with a small environment such as the school store. In the future, the detection and recognition accuracy values should be improved with higher values. The connection of the database to with the shoppers and products should be improved as well.