

The two major issues I had while completing this capstone project was

- 1.) Creating a comprehensive dataset of images to train the object detection model
- 2.) Finding good quality 20-second videos to test the prediction of facial recognition and its ID picture (besides using the video I uploaded of myself)

Object Detection Model Dataset:

There are limits to creating a quality image dataset when choosing to just use open source images. For data collection, I chose to identify these objects (rather than just the lighter) because these objects can all look similar to one another from different distances (e.g. some wallets look like phones, some lighters look like foldable smartphones, etc.). Should a custom object detection model only be trained to learn how these objects look in one form, it may not be a very learned model. For data collection platforms, I used Unsplash, Pexels, and Pixabay to search for free images, and could not find enough quality images that are representative of the following objects' different hardware designs and colors: lighter, phone, keys, and wallet. Although these platforms output thousands of free images put together, most of these images are duplicates of one another across platforms. Therefore, I only managed to collect about 100 samples of different phones, lighters, wallets, and keys from limited angles. 100 samples is not enough to train a model to learn all the different kinds of hardware designs and colors each of these objects may be. This is one of the possible reasons why the precision (76.1%) and recall (59.3%) values aren't very high. Although the model was able to create a bounding box for lighters, phones, wallets, and keys for the provided test images, the prediction confidence threshold for these objects aren't very high. The model neither reduces false positives nor false negatives enough to ensure that it is detecting the correct objects.

In the future, we should tailor our dataset to use images that are taken from a top-down approach. If we are not planning to implement side-view cameras, the model may benefit best from knowing what prohibited items like lighters look like from the specific angle its cameras are planning to be embedded on. Also, having a generous amount of images of what different designs lighters have will also help the model identify them better.

Adequate 20-Second Videos for Test Prediction

Aside from uploading my own video and fake ID, most of the other fake California IDs I generated are of celebrities. The ID images I found for them are good quality, as capturing HD images is a priority for people now. However, there aren't many quality public videos of those celebrities where they are just staring blankly toward the camera. Most of them are talking with their hands a lot near their face, or they are turning their heads frequently to face fans or interviewers. Therefore, these videos don't generate good thumbnails for the Face API to detect whether their face matches that of the image on the ID.

To that end, I left the flight manifest table 'PersonValidation' value for these celebrities to be 'FALSE' since I could not find adequate videos of them. In addition to 'LuggageValidation' being set to false, this is also the reason why I could not yield a successful kiosk validation message.

In the future, it might be helpful to have 4 friends that are willing to upload a picture of themselves for a fake ID, and a 20-second video of themselves staring into the camera for your capstone project. That way, you have data that are of the same source, and same camera quality to feed into the Facial Recognition service.