

Project Proposal: Home Security App

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*** I wasn't able to get in contact with my TPM before submitting this assignment, so these decisions may significantly change based on future conversations with them or comments left on this proposal*

Goal: A home security app which will be able to detect human and other object's (i.e. animal, car) presence through a camera, and then send a notification and an image of what it sees to the user.

Dataset: <https://cocodataset.org/#home>

Dataset

I am going to use the Common Objects in Context (COCO) dataset (<https://cocodataset.org/#home>), which is an object detection, segmentation, and captioning dataset. This dataset will not only allow me to use computer vision to detect human presence with cameras, but hopefully other objects.

Methodology

Approach: First scour through the dataset and look through some projects that have used this before in order to gain some inspiration on how each project handled the dataset.

Preprocessing: I believe the dataset is feasible for what I plan to do, so hopefully I won't have to do a lot of preprocessing. The most useful will be the object detection, so if there's a way to separate that from the rest of the dataset, I will do that in order to make parsing it a bit faster.

Machine Learning Model: Some sort of neural network. I've heard that the convolutional neural network is especially good for analyzing visual data, due to its effectiveness in identifying patterns. There are definitely other models out there that I will be looking into, like any other neural networks that are used for visual object detection. Though there might be unforeseen issues, so until I'm confident in this model, I will keep researching.

Evaluation Metric: From my research, I have found that Average Precision (AP) is the most common for the task of object recognition. I haven't been able to get in contact with my TPM yet, but once I do, maybe they'll have some advice that could sway this and allow me to get more specific, but for now, AP is my plan.

Application

For the webapp of this project, it will probably have a basic input of a "start" button, with a widget showing the camera feed, and either a sidebar of notifications or a system that sends email notifications. User input will be pressing the start button, and maybe a text box to input the receiving email address, and the output will be either a terminal-like box with text updates, or emails sent to an email address. It would be cool to be able to get an external camera to use for the "security camera" but if that falls through, the computer webcam will do for the demonstration.

As this is still in the beginning stages, I'm open to test out a few different methods of deploying a webapp. I've used React.js before but it's not my favourite, so I'll have to tinker with a few to decide. Then I'll either use Node.js, Flask, or another method of connecting the frontend to the backend.