Object Detection System

PROJECT PROPOSAL

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Project Proposal: Object Detection System

For this class, we chose to do an Object Detection System. The reason we chose this project is it is an important step in the long process to detect whether people are six feet away from each other. Due to the current pandemic, this will be a very useful tool to help prevent the spread of the Coronavirus-19 (COVID-19) and ensuring everyone is following the social distancing guidelines.

Proposed Implementation

The specifications that is required for this project is a camera, RaspberryPi 3B, Screen Monitor, Open Computer Vision (OpenCV), and YOLO (You Only Look Once) Real-Time Object Detection system version 3 (YOLOv3). In this project, we will be using the library YOLO: Real-Time Object Detection system by Joseph Redmon. Another system similar to this is using Tensorflow. The reason for this is that they are both computation libraries. The reason we are using YOLO is because currently, it is the fastest object detection library. For this project, we will be manipulating the threads and scheduling algorithms with YOLO. This project does not require FairCom Database therefore, we will not be using it for this project.

Ideation

For our short-term goal, we want to be able to detect a person in real time by the end of this semester. In the long term, we would like to be able to calculate the distance between multiple people in the near future. Our expectation is to be able to detect a person regardless of if they are sitting, standing, or moving. We are constrained to our field of view of the camera angle therefore only people in the camera view will be detected. We are assuming that the object

detection system is able to detect a person wearing a hat, mask and glasses. The object detection

system will be limited to the capabilities of the CPU due to a less powerful processing time. The

strengths for this system are that it is highly portable due to its light weight and small size.

Flowchart

```
                      ┌─────────┐
                      │  Start  │
                      └────┬────┘
                           │
                           ▼
                  ┌──────────────────┐
                  │                  │
                  │ Get Video Stream │
                  │                  │
                  └────────┬─────────┘
                           │
                           ▼
                          ╱╲
          Yes            ╱  ╲            No
        ┌───────────────╱ Person ╲───────────────┐
        │              ╲ Detected?╱               │
        │               ╲        ╱                │
        │                ╲      ╱                 │
        │                 ╲    ╱                  │
        │                  ╲  ╱                   │
        │                   ╲╱                    │
        │                                         │
        │           ┌──────────────────┐          │
        │           │                  │          │
        └──────────▶│ Highlight Person │          │
                    │                  │          │
                    └────────┬─────────┘          │
                             │                    │
                             ▼                    │
                    ┌──────────────────┐          │
                    │                  │          │
                    │ Output to Display│◀─────────┘
                    │                  │
                    └────────┬─────────┘
                             │
                             ▼
                      ┌─────────┐
                      │   End   │
                      └─────────┘
```