Team 7 Project Charter

Problem Statement

Corec goers currently cannot accurately estimate how occupied the gym is prior to arriving at the gym. This lack of knowledge can be frustrating at times because a heavily occupied gym leads to a decrease in workout productivity. Therefore, Team 7 is planning to leverage the power of computer vision to track the number of people in various rooms of the corec and display those numbers in real time through a website/app so that users can see how busy the corec is or will be before they even go or step foot inside. Although there exists a live gym facility usage tracker for the corec already, our project aims to expand on it by forecasting statistics for future hours of operation. Our project also aims to provide more accurate data in quicker fashion by utilizing computer vision (e.g. human detection technology) and camera footage.

Project Objectives

- Track how many people are in the corec in real time using cameras so that customers can assess how busy it is.
    - Count, record, and display occupant amounts separately for each room in the corec (i.e basketball courts, gym room, pool, etc.)
- Present data to users using past-time, current, and predicted future data in the form of a graph (line/bar chart).
    - Update and display data instantaneously
    - Real-time person counting in various rooms/areas of the corec
        - Person counts separated by time
            - Separated by hour
            - Data is displayed in the form of a bar chart
                - Each bar corresponds to a different hour of the day
                - Each bar's value equals the amount of corec users at the start of the corresponding hour
        - Emphasizes which times are the busiest
    - Predictive software forecasting person count at future times
        - Use past data to predict future availability of rooms or machines
        - *E.g. "Number of people in the basketball courts expected to drop to 50 people within the next hour"*
- Track how many people are using a specific exercise equipment (i.e bench for chest, squat rack, or treadmill)

Stakeholders

- Developers:
    - Ethan Lee *(Frontend)*
    - Daniel Shi *(Backend)*

    - Matt Zhang *(Backend)*
    - Shen Wei (Kyle) Leong *(Backend)*
- Project Manager
    - Jakob Hain
- Users
    - Gym-goers who want to know when the corec is or isn't busy so they can schedule their workouts accordingly

Deliverables

- iOS port with the same functionality as the web app
- Python based backend using OpenCv to count the number of people in a certain room or area.
- Physical cameras which record gym users
    - Recorded data (a.k.a. the number of gym users) gets transferred to a server where it will be stored in a database.
    - Clients access the data from the database through the server.

Languages

- JavaScript *(Frontend)*
- Python *(Backend)*

Frameworks

- Front End/GUI
    - React.js
- Computer vision
    - OpenCV
- Web Framework
    - Flask
- Machine learning/Data Prediction
    - Tensorflow
    - NumPy
    - dlib
- Database
    - MySQL

Platforms

- Cameras
    - Corec Security Cameras *(pending approval from corec staff)*
    - USB Cameras *(backup in case corec denies us permission to their cameras)*
        - Potential brands
            - Logitech

        - Andoer
    - To be installed in rooms of our choosing (e.g. lab rooms, dorm rooms) in order to simulate corec rooms