ID-2802 OELP

Monthly Progress Report

Project : <u>Mess People Counter</u> (P047)

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AIM:

The idea of the project is to create an app or website which can show details of how busy/full the mess is. The objective is to also forecast how crowded the mess will be at different times on different days based on the data collected.

HOW TO IMPLEMENT:

We started by analysing various methods to figure out how we could get an estimate for the amount of people (students/ professors/guests) currently dining in the mess. Our initial idea was to use the fingerprint scanner located at the mess entrance to get the approximate idea , but this had several limitations . The count given by this wouldn't count the professors or the guests currently dining in the mess and also we would only get their entry times and not their exit times. So, after some discussion we finalised on the idea of using a Computer Vision Model to count the number of people entering and exiting the mess and then finally using a Regression method to predict the number of people dining in the mess at any moment in the future.

We are planning to use the CCTV camera already installed at the mess door or install our camera (a Raspberry Pi camera module) and then get the live feed from the camera and use a Raspberry Pi to run our Computer Vision model .

HOW THE MODEL WORKS:

We start by analysing a single frame and then drawing a virtual line on the frame and by using OpenCV and YOLO, we track people by drawing rectangular boxes around them , then we take the centroid of the rectangle (so as to have one point per person) and when these points exit or enter the mess (which we infer from that virtual line) we increase or decrease the count of people in the mess that we are storing in a variable. After the operations are done , the particular frame will get deleted keeping the privacy of the people intact . After every 1 minute

we would push this data (the count of people currently dining) to the database where we would store this count along with the time. Also we would store data for special occasion (exams, festivals or a feast), which would be stored as a boolean value , as these factors affect the crowd in the mess at any point of time and would help our final ML model to give much more accurate predictions.

To start forecasting the count of people in the mess , we would need at least 2 weeks of data and then we could train the regression model , which could be either a Random Forest Regression or a Decision Tree Regression model based on which gives us the more accurate forecast .
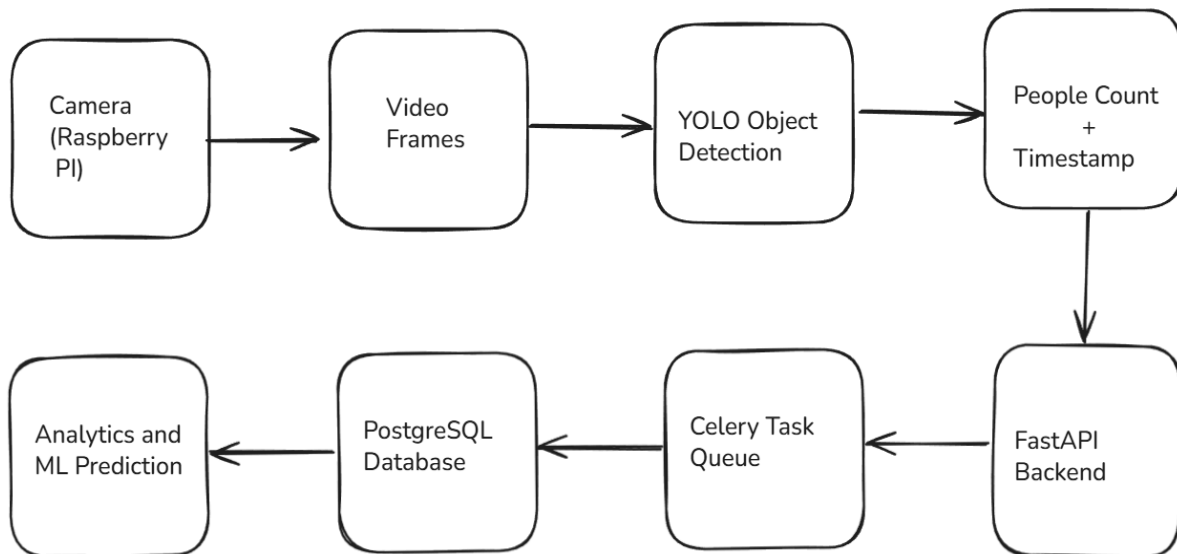
Hardware Required:

Regarding Specifications needed for our project we will be using a Raspberry Pi 5 with at least 4GB RAM and a Raspberry Pi camera module 3.
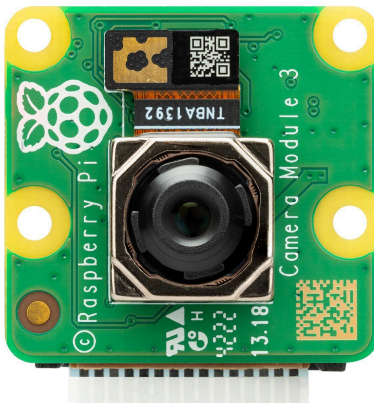
Raspberry Pi 5
It has a high CPU performance which can be used to run our OpenCV model and our line-crossing logic smoothly. It's also energy efficient (consumes around 8-10 W on average under load) and can run for long durations smoothly without overheating and it provides local computing possibility which helps reduce latency and since it has a Linux based environment we can run Python , OpenCV and other database tools comfortably and helps us operate reliably without cloud dependency.

Raspberry Pi camera module 3
We connect the camera module to the raspberry pi via the CSI interface using the ribbon cable.

Feedback: Signature: