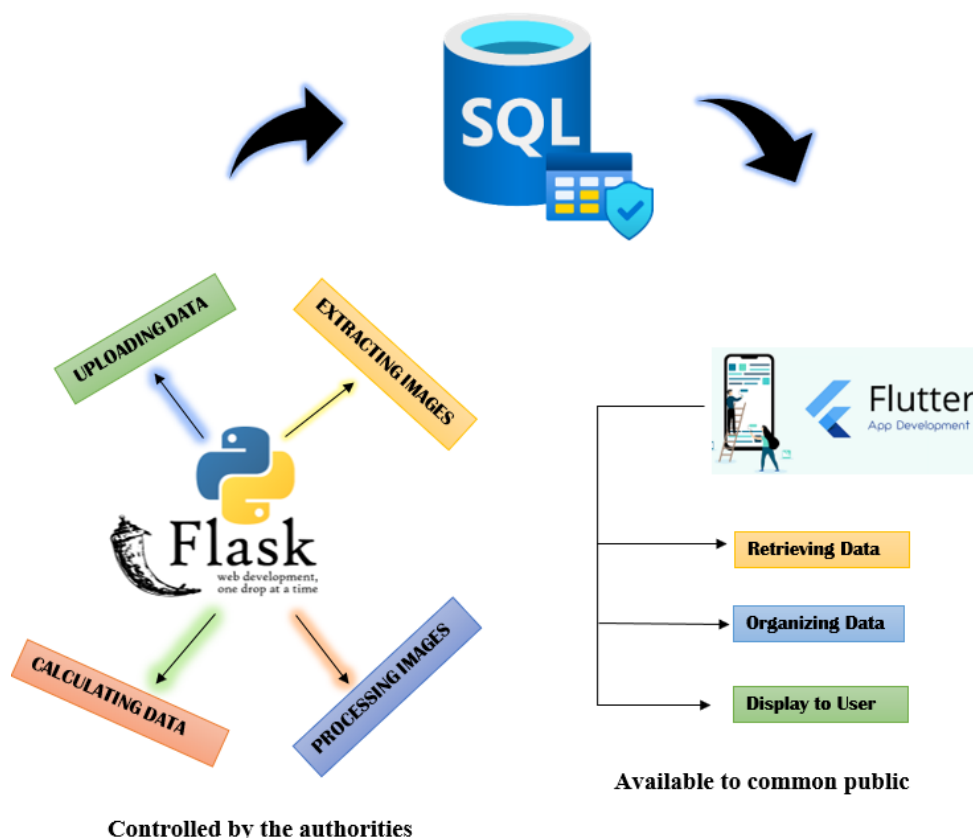
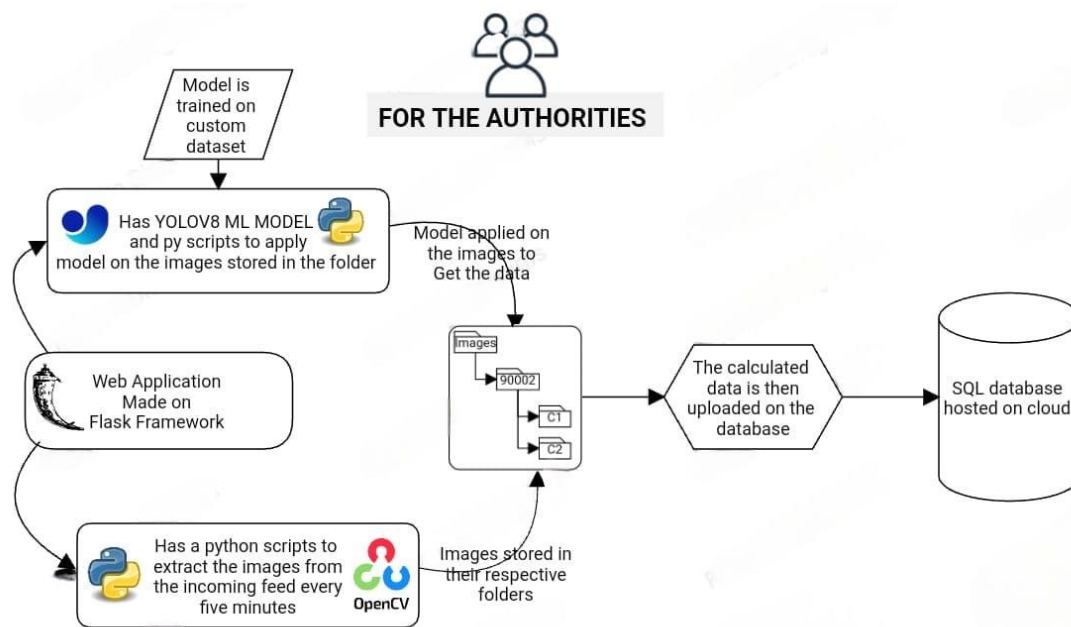


TRAINSPACER

The proposed system aims to solve the problem with the help of installed CCTV cameras inside the local trains. From our research, we came to know that out of the 259 local trains currently running on the central and the western line combined, 85 of them already have the cameras installed inside them and the IRCTC plans to install cameras in all the trains in the coming future. The first task will be extracting the images from CCTV footage and then processing, analyzing, and retrieving data from those images, we've built a web application that will be controlled by the respected authorities that have access to the footage. This occupancy data of each train will also be shown on the web application. The data extracted then is uploaded to a database which is hosted on online servers. The data on the database is stored in a tabular format where the whole occupancy data of the coaches can be extracted just by the Train_id which is a unique ID that is given to all the trains to track them by the IRCTC. To display this information to the public, we've built an Android application, in which users can see the real-time occupancy data of the upcoming trains on their chosen station. The users will be able to browse through the list of stations and select where they are and then where they want to go, then all the upcoming trains will be shown and user can select their desired train and get the occupancy status of each coach. **Hosted on a cloud server**

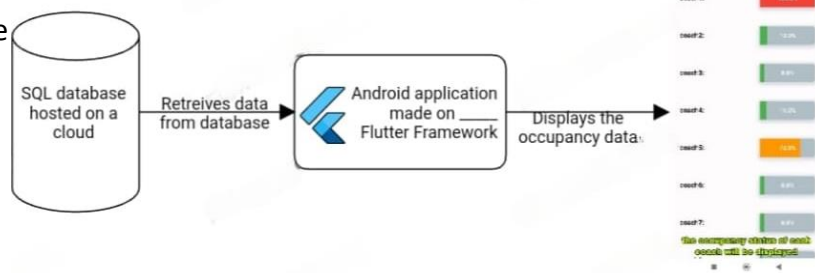




Firstly we have trained a machine learning model named yolov8 which can detect the heads of human beings inside photos this model was trained by us on a custom dataset of 4000 images, the dataset had photos of classrooms with students which helped us to train the model for our specific use-case as we are also processing images from CCTV footages. we have built a web-based application system that is built on the Flask web development framework it can be installed on a device that can access the CCTV footage coming from the cameras installed inside the local trains what this web app does is extract the images from the footages and apply a machine learning algorithm and calculates the number of heads (the number of detections) and uploads the data of the particular to a SQL database which is hosted on a server. In this database, the data is stored in a tabular format where the first element of the row is the train ID which is also a primary key and the other 12 columns are the coaches in which the data will be uploaded by the web app. This site will completely be controlled by the concerned authorities. The folder structure is like this "Trains -> 90002 (all the trains represented by their respective IDs -> c1, c2, c3 (all the coaches) -> image files .png, .jpg etc)." Using the web app the user (concerned authority), with the click of a button will be able to capture photos from all the trains at once and photos will automatically be saved in their respective folders. Then the ML model will be applied to the photos and the occupancy status of each coach will be calculated based on a given threshold capacity of the coach for now we have taken the capacity as 500 people per coach. The percentage occupancy of each coach will be calculated and then this percentage occupancy will be uploaded to the database and the process will be repeated every 5 minutes. No images will

be saved as the

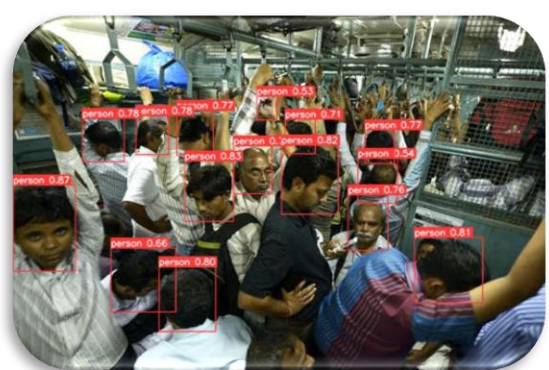
images to save



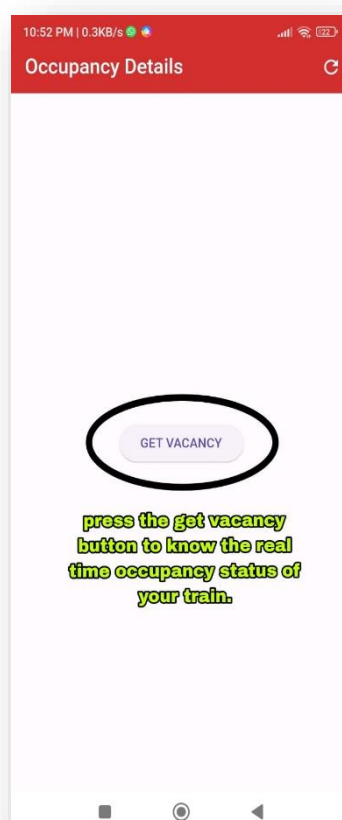
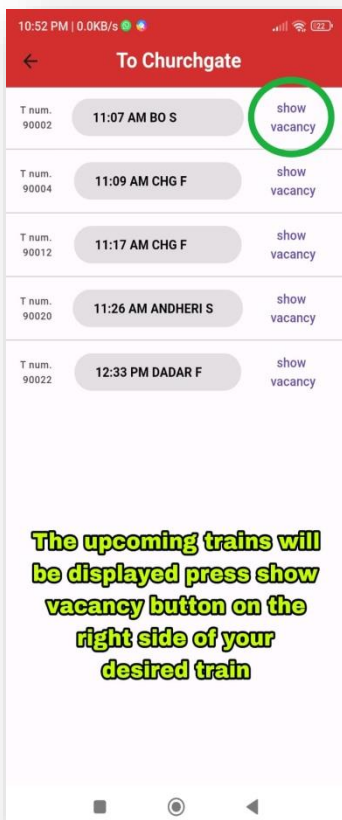
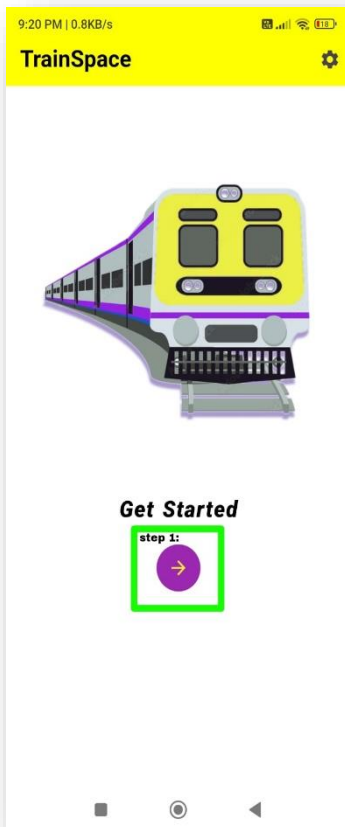
write the saved

Then there is the app “**TrainSpacer**”, the app is built on the Flutter framework and will be available for normal people which will provide real-time information on the occupancy status of all the coaches of the upcoming trains the app will provide the info with the help of color coding. It will show the percentage of occupancy of each coach in a container and that container will be the of the color depending on the percentage of occupancy, if the occupancy is below 25% then the color of the container will be green and if is greater than 25% and less than 50% then the color will be yellow, when the occupancy is greater than 50% less than 75% the color would be orange and if it is greater than 75% the color will be red. The app retrieves the occupancy data from the SQL database hosted on a server the app can connect with the database and retrieve data whenever needed.

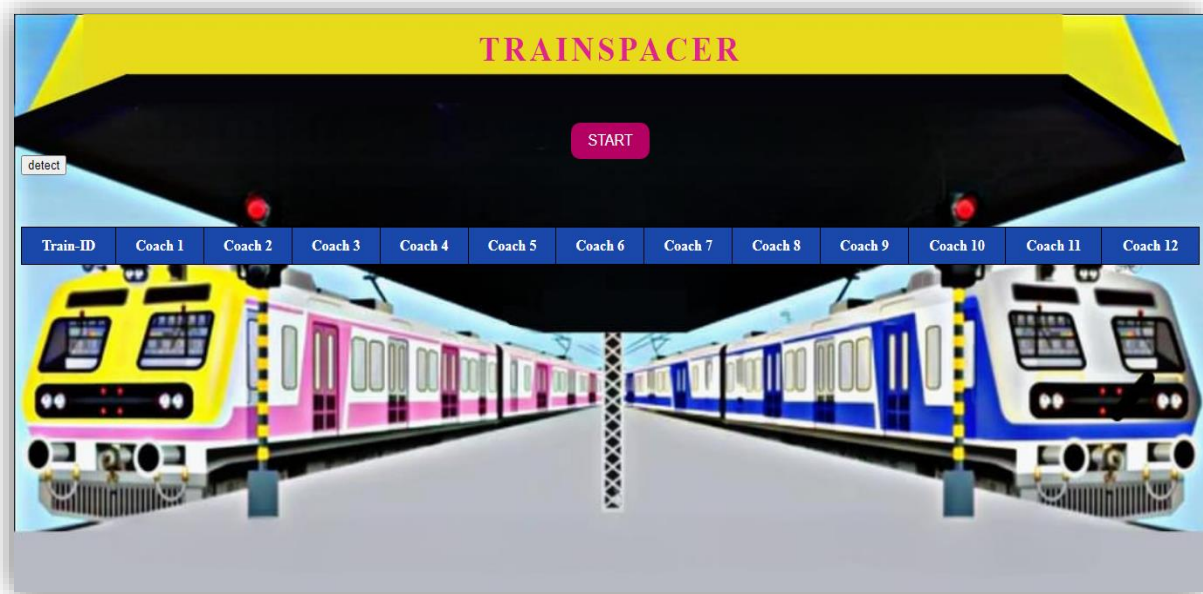
- **Detection Results**



- ACTUAL APPLICATION



- WEBSITE FOR MANAGING DATA



The screenshot displays the TRAINSPACER website interface. At the top, a yellow banner contains the title "TRAINSPACER" in pink. Below the banner is a black rectangular area with a pink "START" button in the center. On the left side of this black area, there is a small white box labeled "detect". Below the black area is a table with 13 columns: "Train-ID", "Coach 1", "Coach 2", "Coach 3", "Coach 4", "Coach 5", "Coach 6", "Coach 7", "Coach 8", "Coach 9", "Coach 10", "Coach 11", and "Coach 12". The table contains the following data:

Train-ID	Coach 1	Coach 2	Coach 3	Coach 4	Coach 5	Coach 6	Coach 7	Coach 8	Coach 9	Coach 10	Coach 11	Coach 12
90002%	0.5%	23.0%	19.5%	0.0%	43.0%	26.5%	43.5%	11.0%	6.0%	7.5%	8.5%	6.5%
90004%	5.0%	9.0%	0.0%	0.0%	0.0%	8.0%	18.0%	5.0%	14.0%	23.0%	5.0%	0.0%
90012%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
90020%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
90022%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%

Below the table is a 3D simulation of two trains, one pink and one blue, on a track. The background is a light blue sky.