PUNE METRO CROWD DISTRIBUTION

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Abstract: People counting" in huddled places has become a vital application of the system. Crowd counting based on object detection has become terribly active analysis in recent years, that encompasses various means via computer vision, image processing, and surveillance. The data on population and human dynamics played an important role for crowd management. This task usually encounters many challenges in crowded environment, such as heavy occlusion, low resolution, imaging viewpoint variability, etc. Crowd counting by means of Image Processing involves classification of the image into patches with overlaps and use a pre- trained CNN model to extract deep features from each overlapping patch. The features extracted from the CNN model trained, shows a strong ability to represent crowd density. In this project we intend to make the passengers aware of the actual rush in each coach before arrival of the train which would give the passengers an option to choose from different coaches with variable crowd density. Hence a pleasant and comfortable journey will be promoted through this project.

Keywords - **CNN, Image Processing.**

I. INTRODUCTION

In last decades, the city witnessed an increase in population and people migrating from various regions of the country for job opportunities. However, the sustainable infrastructure to facilitate simple commute to the citizens was missing. Average time period for citizens using public transport in Pune is over ~100 minutes every day. This makes more citizens use their personal vehicle, which causes traffic chaos and congestion issues. Here in, Pune Metro, can facilitate tackle all these problems, offer comfortable and convenient commute within the city by considerably reducing the travel period by 75%. It will facilitate several youths, students, professionals, etc. travelling to their destination. Metro rail will act as the backbone to the general public transport system of the Smart City Project and strengthen on numerous parameters, since Pune Metro is a great solution for regular travellers and it will attract most of the Punker's due to its adequate fairs. Hence, in future it will lead to a scenario where we have to deal with huge crowd thus crowd management in Pune metro is of prime importance. Our observation in Mumbai locals have concluded that rapid Transit attract daily commuters and they prefer to travel through mid-coaches rather than extreme ones since these coaches arrives in central location of any platform. Most of the platforms are constructed in such a way that the elevators and stairs open up in the central area of platform. This resulted in middle coaches fully packed and extreme ones almost empty. This degrades the potential of the transit since the ideal capacity of 500-800 has fallen down to 400-500.To deal with such a situation which may arise in Pune metro through our problem-solving skills we have come up with an idea through our project. In our project we will first identify the rush in each coach as the people arrive in the coaches and update it in our server. Hence, the data which is obtained in the server will be displayed to the user through our application. This data will be update after the metro depart from each station and before it arrives to the next station.

As a result of this before boarding the train, traveller would be aware of the rush in each coach. There are facilities provided in platform in terms of led display boards that are provided to inform the passengers about different coaches which will arrive at different locations in the same platform. Using information about rush provided through our application the travellers could stand at the positions for the coach for which less rush is displayed. To calculate the rush inside each coach we will use camera in each coach to capture the image of crowd after the departure of metro from every station. This image will be then further given as input to image processing algorithm (CNN) to get the count of passengers present in each coach.

1.2 MOTIVATION

- As we the Students of Bharti Vidyapeeth College of Engineering for Women Katraj travels along path from other-side of city we came across different situation which are related to crowd and rush.

- This clicked our Mind to develop a project that will help to control the crowd in forthcoming transportation projects of Maharashtra Government.

- As a College going student, we know that how much one need to struggle for getting a proper place in government transport during peak hours.

- So, to overcome this type of situation our project will be keenly helpful for all the Punekars. Our project will also try to help the authorities of Pune Metro for overcome such type of issues.

1.3 OBJECTIVE

- To calculate the rush inside coaches, we will use camera in each coach to capture the image of crowd after the departure of metro from every station.

- To do certain prediction over the calculated data obtained from our software about the rush on peak hours per day.

- To promote travelling through Public Transport by providing a comfortable journey to the travellers.

II. LITERATURE SURVEY

2.1 CROWD MANAGEMENT IN TRAIN AND METRO STATIONS.

VICTOR A. MENSINK PUBLICATION YEAR: 2017

2.1.1 SURVEY:

- The main aim of the thesis is to develop a method to consistently select and assess effective crowd management techniques to increase the throughput and safety in metro station train and trains

2.1.2 ADVANTAGES

- To evaluate the effects of different measures, models can be used as a substitute to test the measures in real-life. For accurately modelling each measure, different requirements are required from the model.
- This is obtained by building the knowledge which is obtained from the foregoing questions.
- The developed frame begins with an applicability checking, the main objective of the users when they are applying the measures, understanding the contextual data from different station and load cases in to select measure(s) which could be effective.
- Along with the advantages by applying the measure(s) and negative effects, the decision creator can make an advanced decision on whether to apply the measure(s) or not.

2.1.3 DISADVANTAGES

- An accurate review on applied and studied measures is done to build a list of 29 crowd management measures along with their field of application and possible other benefits or disadvantages, and an estimate of the costs.
- The limitations to applications or negative effects of measures were also found, like a small group of travellers that experiences negative side-effects, a decreased surface area, difficulty to apply measures or the measures which first require communication with the travellers.

2.2 SWITCHING CONVOLUTIONAL NEURAL NETWORK FOR CROWD COUNTING.

DEEPAK BABU SAM, SHIV SURYA, R. VENKATESH BABU, BANGALORE, INDIA 560012. PUBLICATION YEAR: 2017, DOI: 10.1109/CVPR.2017.429

2.2.1 SURVEY:

- The given crowd is mapped to its density by the proposed completely unique crowd estimation model.
- Crowd analysis has been combined by a lot of factors like blockage in people due to excessive crowding, high similarity between appearance of people with background elements, and large fluctuations of camera view-points.
- In depth experiments for major of crowd counting dataset has been performed and it evident better performance to current state of-the-art method.

2.2.2 ADVANTAGES

- It has been observed that the switch based on density of crowd, relays the clicked image patch to a particular CNN column.
- Each independent CNN repressor is developed to let it have different receptive fields and to relay the crowd scene patch to the best CNN repressor, a switch classifier is trained.
- A switch convolutional neural network obtains variation of crowd density within an image to increase the accuracy and the localization of predicted crowd count.

2.2.3 DISADVANTAGES

- This weighted averaging technique does not require to account the intra-scene density variation and it's global in nature.
- Each independent CNN repressors have been chosen that has field-of-view and different receptive fields as in multi-column convolution neural network to boost up the ability to cast large scale variations.

2.3 A CNN-RNN Neural Network Join Long Short-Term Memory for Crowd Counting and Density Estimation.

Jingnan Fu, Hongbo Yang, Ping Liu, Yuzhen Hu Beijing, China, Publication year: 2018

2.3.1 Survey:

- Crowd density estimation is major challenge in the field of computer science.

- To overcome the challenge, design of special framework is required called (CRCCNN), which contains CNN and composed with RNN. For each image as input, network firstly identifies its features with the help of CNN and then the feature maps will be coded and given as input to the LSTM unit.

- The experiments are conducted on completely different datasets and are compare with other existing methods, which helps in achieving the outstanding results and also demonstrates the effective performance of CNN.

2.3.2 Advantages

- LSTM unit in CRCCNN. Due to the ability of LSTM to model the long short-term relationships between sequence elements, in recent the combination of CNN and LSTM has been applied successfully in producing image and video description.

- The real-time supervision of the crowd counting and approximation of crowd density has been an important application of computer technology within the field of public security

2.3.3 Disadvantages

- It is very difficult for CNN to accurately estimate the density of high-density level and crowd count because of the neglection of contextual information.

- The paper verifies that the crowd counting and density estimation needs to consider the feature extraction of crowd along with the contextual relevance of crowd density.

2.4 Crowd Counting in Low-Resolution Crowded Scenes Using Region-Based Deep Convolutional Neural Networks.

Muhammad Saqib, Sultan Daud Khan, Nabin Sharma, Michael Blumenstein Sydney Australia, Publishing Year: 2019, DOI: 10.1109/ACCESS.2019.2904712

2.4.1 Survey:

- Major of the previous approaches uses regression on density maps for the crowd count from a single image.

- For overcoming the limitations of pedestrian detectors, a motion-guided is proposed later (MGF) that makes use of temporal and spacial information between successive frames of the video to retrieve missed detections.

- The performance of the approach is evaluated on three publicly available datasets.

2.3.2 Advantages

- The occurrence of crowd is majority found in social, political and religious gatherings which favours gathering of huge number of people in a constrained environment.

- Hence, analysis of crowd is one of most important and challenging tasks in image and video surveillance due to composite nature of pedestrians.

2.4.3 Disadvantages

- The models which are mentioned above have succeeded in achieving a sustainable improvement in pedestrian detection in general and object detection in particular when applied to static images.

2.5 Bus-Crowdedness Estimation by Shallow Convolutional Neural Network.

Zongyue Wang, Guorong Cai, Cuiling Zheng, Chengjie Fang, Xiamen, China, Publishing Year: 2018

2.5.1 Survey:

- The paper tries to represents Multi-cameras based Convolutional Neural Networks (MCNN) and shallow Single camera based mostly Convolutional Neural Networks (SCNN) to make an estimate of the crowdedness in a bus.

- Random cropped and random white balance are some of the ways to generate samples such that the model is robust enough.
- Due to the light weighted models, it can be easily run on embedded system carried on busses

2.5.2 ADVANTAGES

- The paper proposes a novel passenger crowdedness estimating system to avoid the build-up errors
- The loads on every bus plays an important role in management and controlling of mass transport systems.

2.5.3 DISADVANTAGES

- The detection techniques find the people's faces, bodies, heads with the help of pre-processed image which has correlation with several circular patterns.
- But this very expensive along with power consumer which is not suitable for different scenarios

III. PROBLEM STATEMENT

- To provide a real time crowd estimate travelling through each coach of Pune Metro before the actual arrival of the metro to the station via an android application also provided with web application via machine learning.

3.1 FEASIBILITY STUDY

Technical Feasibility:

This project is mainly developed for travellers of Pune Metro seeking their comfortable journey and also for the Pune Metro organization team for achieving aim of providing better journey for the passengers. Through this we are trying to get best accuracy possible to determine actual and predicted rush. Taking this into consideration what could be better having a web and an android Platform.

Economical cost:

The project aims at delivering the service at minimum cost. Since it is an application it will be made available free to metro passengers.

Legal feasibility:

There will be no violation of rules of software background. There is no involvement of any type of contracts in our project.
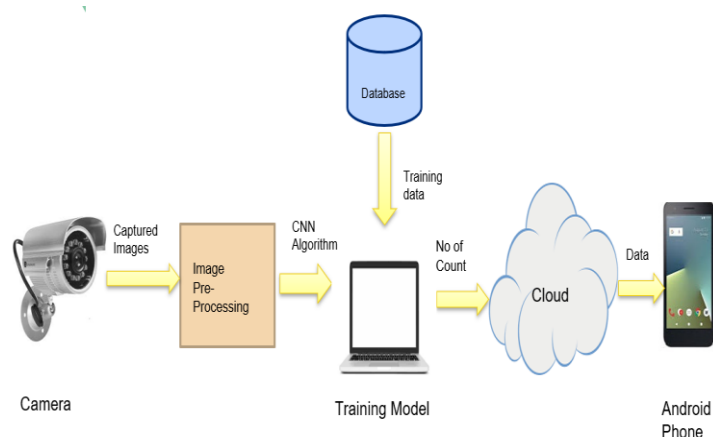
IV. PROPOSED SYSTEM APPROACH

Fig1: Architecture Diagram(Hardware Based)

Above diagram shows the prediction the persons and count the people in train coach. The block diagram shows to take the input data, image and videos processing of historical data. The crowed database by using CNN algorithms and count the person in the metro train bogie. And the diagram shows all the data stored in cloud ThingSpeak and send the alert message Mobile Application

V. CONCLUSION

This report is undertaken to explain the need of a comfortable and convenient public transport in Pune, it describes the overall idea as when a scheduled departure/Arrival of a train takes place the Passengers waiting on the platforms are unaware of the rush in the train, this will try to help out those passengers who are travelling by Metro trains. Further this will also show the Actual as well as Prediction of Rush the train carries in a particular.

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