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Real-Time People Counting for Surveillance Videos

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ABSTRACT

Real-time people counting from video records are main building blocks for many applications in smart cities. Real-time human detection and tracking is a vast, challenging and important field of research. It has wide range of applications in human recognition, human computer interaction (HCI), video surveillance etc. This method is able to count people in real time and is robust to changes of illumination and background. People counting has a wide range of applications in the context of pervasive systems. There exist several vision-based algorithms for people counting. People counting is a spatio-temporal function of human sensing, which gives the count of people in a particular area. Counting people is a useful task, which helps in understanding the flow of people in various places. The knowledge of density of people over an area would be helpful in handling emergency situations, efficient allocation of resources in the smart buildings etc. The constant movement of people, different age groups and body types makes people counting a challenging process. In addition, the presence of obstacles in indoor spaces etc., and varying lighting conditions make the process of accurately estimating the number of people in an area at given time very difficult. To overcome the above issues, we propose a novel real-time people counting approach by TensorFlow.

INTRODUCTION

During past few years, detecting humans in a video scene of a surveillance system is attracting more attention due to its huge range of applications in abnormal event detection, person counting in a dense crowd, person identification, gender classification, fall detection for elder people. The scenes obtained from a surveillance video are having low resolution.

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Most of the clips captured by a stable camera are with slightest change of background. Entities in outdoor surveillance are often detected. Most existing digital video surveillance systems depends on human observers for detecting particular activities in a real-time video scene. However, there are drawbacks in the human capability to monitor simultaneous events in surveillance displays.

Hence, human motion analysis has become a most active and attractive research topics in the area of computer vision and pattern recognition. Smart system detects and captures information of moving targets for accurate object classification. The categorized object is being tracked for high-level analysis. In this project, we focus on detecting humans and do not consider identification or recognition of their complex tasks. Human detection is a difficult task from a machine vision perspective as it is influenced by a wide range of possible appearance due to changing in clothing, lighting and background, but previous knowledge on these drawbacks can improve the detection performance.

There may be many challenges because the control system should receive the detection results very quickly say in milliseconds and the process should be repeated multiple times in 5 seconds so the car adjusts its acceleration and lane system. If too many parameters are present, then the system becomes complex and time taken to classification increases. The proposed system is able to detect the positions of a person accordingly to real time. This project examines and reports standards for detecting and enumerating humans through real-time images, videos and camera. This is useful in image processing and performing computer vision tasks. These schemes have been implemented in Python programming language, and using various tech-stacks like OpenCv, Tensorflow, etc. The main scope of this project is to detect the count of people in order to see whether the region is crowed or not through an API. We can integrate this API with the CCTVs to detect whether a region is crowded at hospitals, airports, offices., etc. Aim of the application is to detect the people present in a place and give the count to host or user.

EXISTING SYSTEM & PROPOSED SYSTEM

In the past few years, people counting owned significant consideration and appreciated as one of the most promising applications in the field of image analysis. Human detection can consider a substantial part of human recognition operations. According to its strength to focus computational resources on the section of an image holding a person. The method of person detection in pictures is complicated because of variability present across humans such as pose, expression, position and orientation, skin color, the presence of glasses or facial hair, differences in camera gain, lighting conditions, and image resolution.

There were only limited libraries to develop an API which is user friendly and takes less time to create an API. And to monitor whether the region is crowded or not continuously in some areas like shopping malls, theatres, large gatherings etc., So both human effort and time are needed.

With the level of advancements in the technology we can see that may libraries have been developed. So, with those libraries we can create many applications and API's which are user friendly. In this we'll be developing an API so that it will detect and track the human count. The algorithm is trained to capture people in real-time video streams and images and recognize whether the region is crowded with a better accuracy rate. In this the admin or the host has to run the application so that the client can monitor using an API. Client can either give images or videos as input for the API. Videos can be both static and dynamic. After performing the initial analysis, the system classifies every region as "region is crowded" or as "region is not crowded" and sends an instant alert, so you can take further action — dispatch a public audio announcement, send a custom message to a digital screen. Proactively manage and correct visitors to maintain social distance while remaining compliant with privacy regulations.

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Fig 1: output window

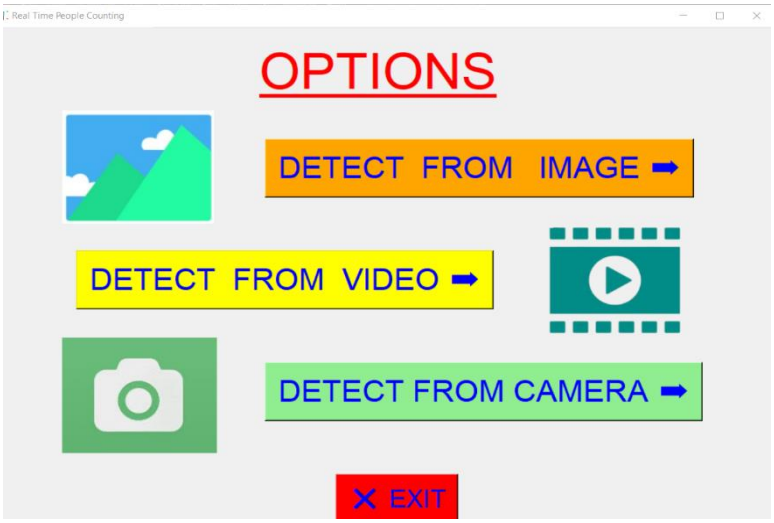

Figure 2: Displays the Options

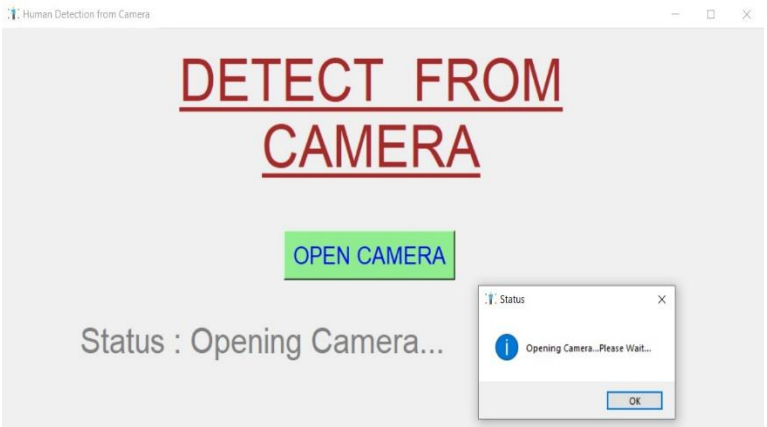

Figure 3: opens web camera for Detection

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Figure 4: Image is Detected

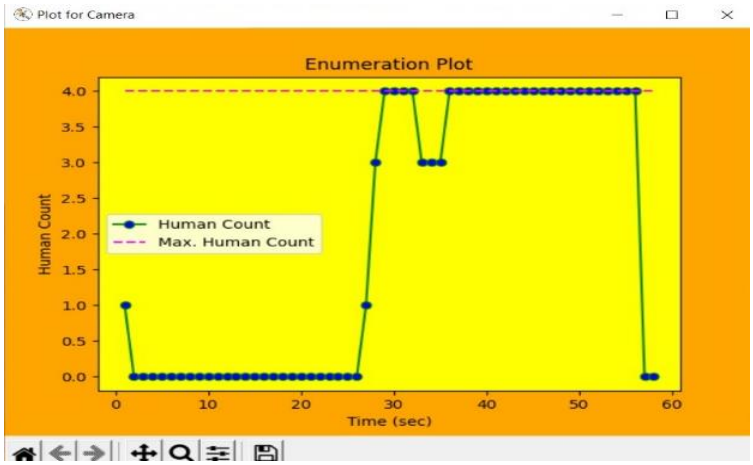

Figure 5: Enumeration Plot

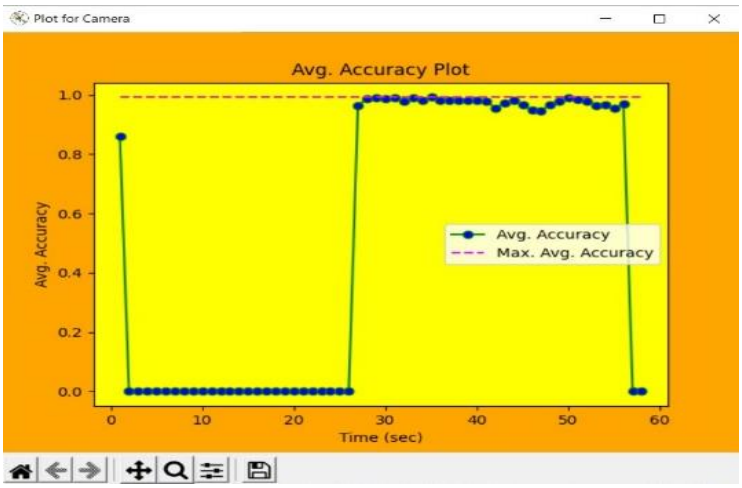

Figure 6: Average Accuracy Plot

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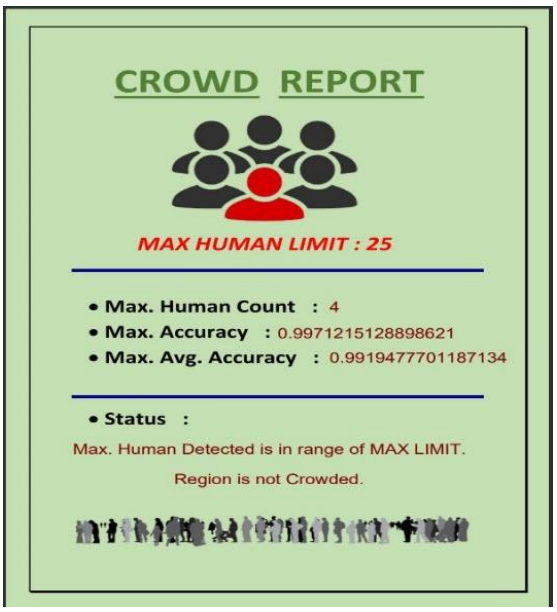

Figure 7: Crowd Report

IN CASE OF VIDEO

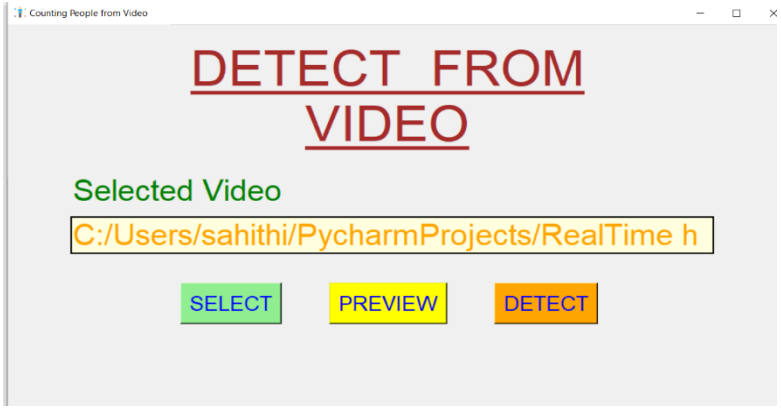

Figure 8: Video path for Detection

Figure 9: Detection from Video

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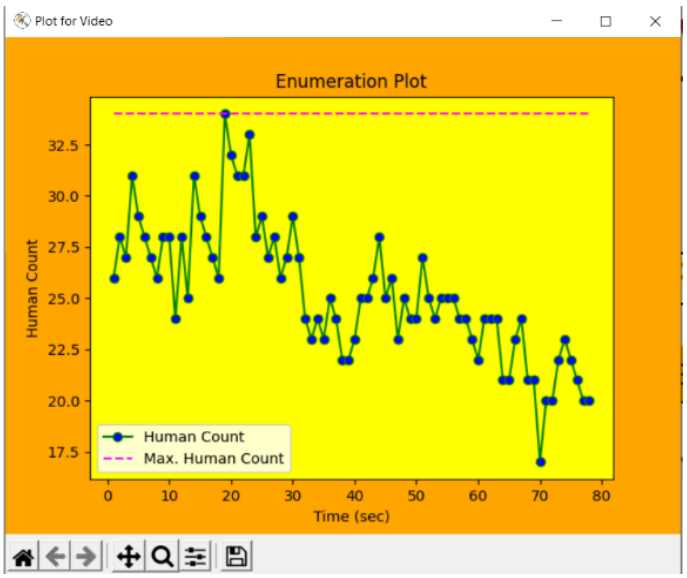

Figure 10: Enumeration plot for Video

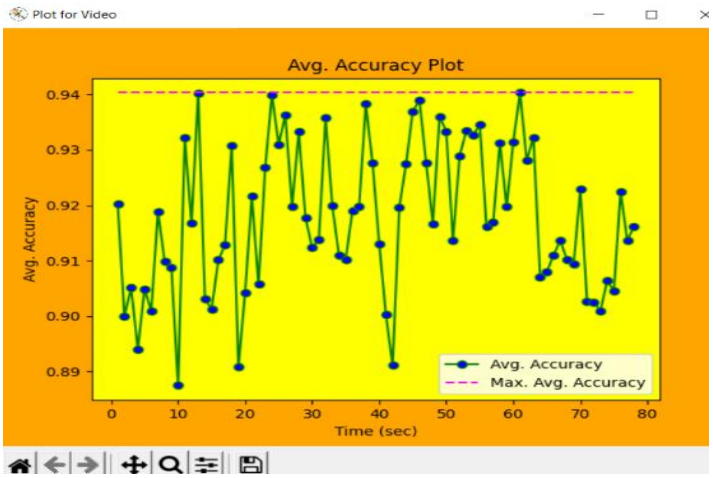

Figure 11: Average Accuracy plot for Video

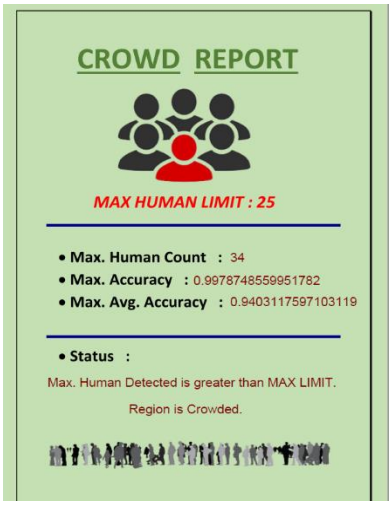

Figure 12: Crowd Report

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CONCLUSION

Human counting using R-CNN TensorFlow is the best approach as it is easy and has the better accuracy. It has the faster response time compared to other models. The proposed system solves the problems faced in existing system. It creates a people counter to generate an efficient people count in which it uses video or an image as input. Proposed System is simple and provides accurate output with best accuracy. By running this application, we can say that it has successfully detected people count which can be used to monitor the humans in the large gatherings like shopping malls, theatres or any organizations, etc. Maintaining the social distance may be obligatory in the near future, considering the Covid- 19 crisis. The API which we developed is user-friendly anyone can be able to run the API. Just the user needs to provide input in the form of either images or videos. After giving input he needs to click the start button it does the processing work then upon successful processing the user can download and display the results. Many government agencies will require customers to maintain social distance correctly in order to use their services. The deployed model will contribute immensely to the public health care system. In future it can be extended to detect if a person is maintaining social distance or not. The model can be further improved. In this critical time the only way possible to control the spread of virus is to make sure that the people are maintaining social distance as the disease is contagious and maintaining proper hygiene, in which this application can play a vital role.

FUTURE ENHANCEMENT

If this application is integrated with the employees database in organizations then if the employees are not maintaining social distance properly then we will be able to send a warning message to that employee using his/her id .In the similar way we can also ensure that all the students are maintaining social distance properly in the campus if not then a reminder is sent and incase the same student violates this protocol the fine is to be charged, which we can notify that student using student's contact details in college database.

We can also implement the concept of social distancing that would make it a complete system which can bring a dramatic impact on the spread of virus.

This can be used in various malls and other areas, to analyse the maximum people count, and then providing some restrictions on number of people to have at a time at that place.

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