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Design and Development of Deep Learning Based Model for Video Analysis

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Abstract: ***In order to analyze video streams and extract particular features or patterns, such as object recognition, motion detection, facial recognition, or behavior analysis, video analysis employs computer vision and machine learning techniques. Analyzing video footage to spot suspicious activity or items and locate people or vehicles is part of the process. This approach comprises keeping an eye on and controlling traffic at crossings, on roads, and in highways. It entails reviewing video footage to find traffic jams and overcrowding and to offer prompt alerts or suggestions for crowd management.***
Keywords: Open CV, Real time, Video analysis, facial recognition, object recognition, feature Extraction

I. INTRODUCTION

In order to conduct their investigations, law enforcement officials frequently need to spend a significant amount of time manually reviewing CCTV material. In order to make their job easier, a video analysis system is required that can automatically scan through CCTV footage for known facilitators like criminals and potential suspects. This system aims to improve object tracking and detection accuracy both in real-time and using historical data. We are counting and locating recognized facilitators in addition to conducting real-time human detection. Real-time human detection uses either a live capture, static video, or snapshot for identification. We produce a report and analysis for it after detection.

II. LITERATURE SURVEY

Paper	Author & Year	Gap	Accuracy
Edge AI Face Recognition for Public Transport Fare Payment	Rusoke, Blaise Marvin; Musinguzi, Denis; Miyingo, Simon Peter; Katumba, Andrew (2022)	Our system's pipeline makes use of a pre-trained anti spoof model based off research by Costa et al. [7]. During our deployment tests, this model efficiency deteriorated with vari-ations in lighting, and with low image quality Our system's pipeline makes use of a pre-trained anti spoofmodel based off research by Costa et al. [7]. During ourdeployment tests, this model efficiency deteriorated with vari-ations in lighting, and with low image quality	94%
Face Recognition Method for Online Exams	Sukmandhani, Arief & Sutedja, Indrajani. (2019).	further application development is expected by using updated algorithms for face recognition with a higher degree of accuracy. Trials for this method are only carried out with the same level of lighting, not yet done at different lighting levels and distances further application development is expected by using updated algorithms for face recognition with a higher degree of accuracy. Trials for this method are only carried out with the same level of lighting, not yet done at different lighting levels and distances	96.3%
Our system's pipeline makes use of a pre-trained anti spoof model based off research by Costa et al. [7]. During our deployment tests, this model efficiency deteriorated with vari- ations in lighting, and with low image quality Smart Surveillance System Using Face and Optical Character Recognition for Secure Environment	HarikaPalivela, Lakshmi & P M, Ashok Kumar & Krishna, V.V.. (2022).	If multiple cameras are used, additionally, the area or location at which the suspected individual was identified can also be included so as to better facilitate the authorities to apprehend that particular suspect. If a suspect is identified for a continuous protracted period of time, back-to-back emails will be sent to the authorities, which will lead to a spamming problem If multiple cameras are used, additionally, the area or location at which the suspected individual was identified can also be included so as to better facilitate the authorities to apprehend that particular suspect. If a suspect is identified for a continuous protracted period of time, back-to-back emails will be sent to the authorities, which will lead to a spamming problem	Our system's pipeline makes use of a pre-trained anti spoof model based off research by Costa et al. [7]. During our deployment tests, this model efficiency deteriorated with vari- ations in lighting, and with low image quality 98%

Table 1: Literature Survey

III. METHODOLOGY

A. *Proposed Work*

This is a rudimentary flowchart for a computer vision-based people detection system:

1) *Image or video Feed Capture:* The system begins by taking a picture or video from a camera or sensor.
2) *Preprocessing:* To improve the quality of the collected image or video and get rid of noise or artefacts, the data is first processed.
3) *Object Detection:* In order to identify faces or human bodies in the image or video, the system uses an object detection technique like Haar cascades and Histogram Oriented Gradients.
4) *Feature Extraction:* The algorithm collects information including shape, size, color, and location after identifying human bodies or faces.

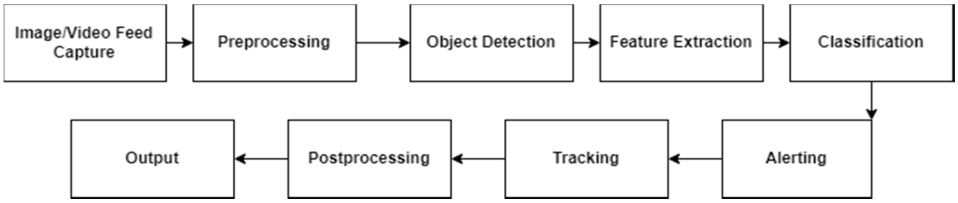

Fig.1. Flow diagram

5) *Classification:* The system classifies the collected features as human or non-human using a machine learning method, such as support vector machines (SVM) or neural networks.
6) *Alerting:* If a human is found, the system notifies a monitoring station, security staff, or other pertinent parties by sending an alarm or notification.
7) *Tracking:* Using methods like optical flow or Kalman filters, the system may also follow the motion of any persons it has identified in an image or video over time.
8) *Post processing:* The system then applies postprocessing to the result, such as removing false positives or enhancing the precision of the categorization, and creates a final report.

When utilizing computer vision to recognize humans, preprocessing is crucial. These are a few typical preprocessing methods for human detection: Image normalization: is the process of enhancing an image's quality and making it better suited for human detecting algorithms by altering its brightness and contrast. Picture resizing: is the process of adjusting an image's dimensions while keeping its aspect ratio. When the image resolution needs to be changed to meet the specifications of the human detection algorithm because it is either too high or too low, this technique can be helpful. Noise reduction is essential for human detection systems because it gets rid of noise or other artefacts from an image or video input. The quality of the input data is increased by using methods like smoothing, median filtering, and Gaussian filtering to minimize noise.

Image enhancement By enhancing the contrast and edges in an image, one can make it simpler for human recognition algorithms to recognize the aspects of interest. Such approaches include contrast stretching, histogram equalization, and sharpness.

IV. RESULT

We have developed a system that can help identify known facilitators, and can identify human as well as keep a count of it. We have developed a interface where user can input image, video or he/she can make use of camera. After taking the input it's processes it, and extract features from it after which it detects the human.

Fig.2. Frontend of application

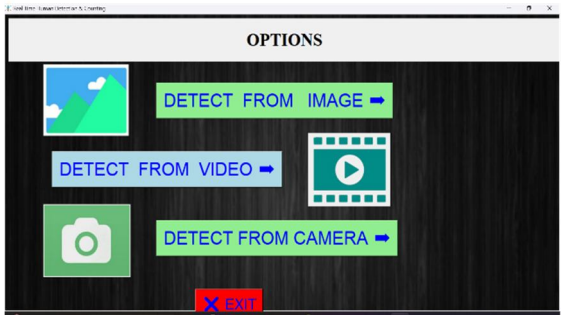

Fig.3. Frontend of human detection

Other then detecting humans, we have also developed a interface in which user can input image, and any video, after which our model will process through the video input and find that particular person in the video and will show the output in the form of image, with bounding boxes created on the person face.

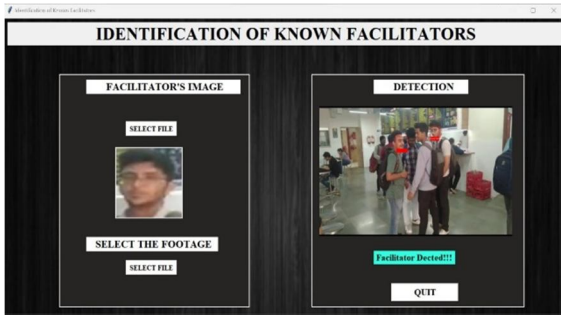

Fig.4. Frontend interface of known facilitators

We have used haar cascade and histogram orientated gradient for human detection purpose, where as for face identification we have used OpenCV etc.

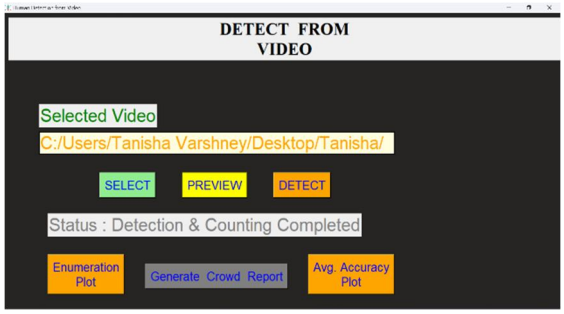

Fig.5. Frontend interface of detection page

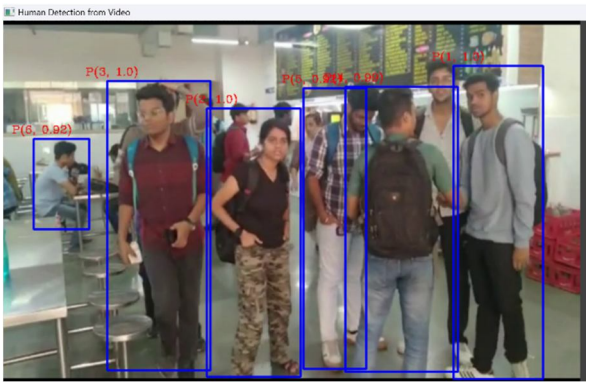

Fig.6. Bounding Box

Fig.7.Human detection output

We are also generating crowd report which shows, maximum human count, average accuracy as well as maximum average accuracy in the end it's show' s if the area is crowded or not as output.
This crowd report can be helpful for detecting crowded areas , and places.

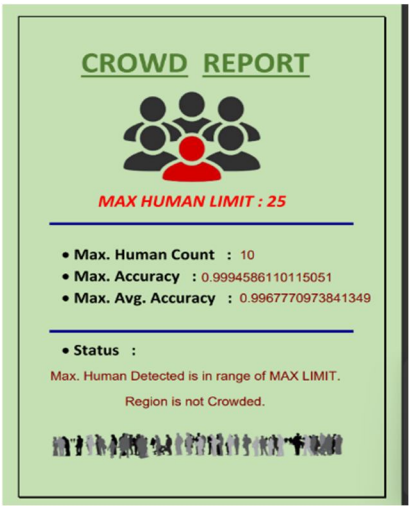

Fig.8.Crowd Report Output

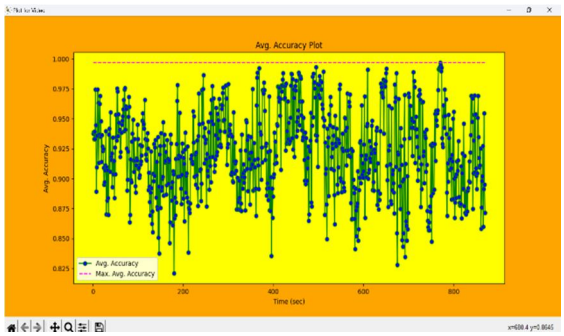

Fig.9. Accuracy Plot

V. CONCLUSION

The proposed system is vital in today's world. This system can be used for various purposes such as at public areas like streets, parks, transportation hub to get rid of crime as well as to assist in emergency response. People can use for their personal use to monitor any activity, prevent theft and vandalism, and ensure safety. Also this proposed system can help identify known facilitators in case of criminal identification, where police professional can input image and check in the surveillance video and identify the criminal.

VI. FUTURE SCOPE

For future work, we can work more in image preprocessing as well improving our accuracy further. As well as we can work on to make a background running application could be made which keeps working without interfering and notifies when detects something abnormal. Accidents happening in public places could be detected. The model can further be trained in such a way that unusual events such as eve-teasing or involving any kind of violence could be detected. Can be used in the defense sector for security purposes.

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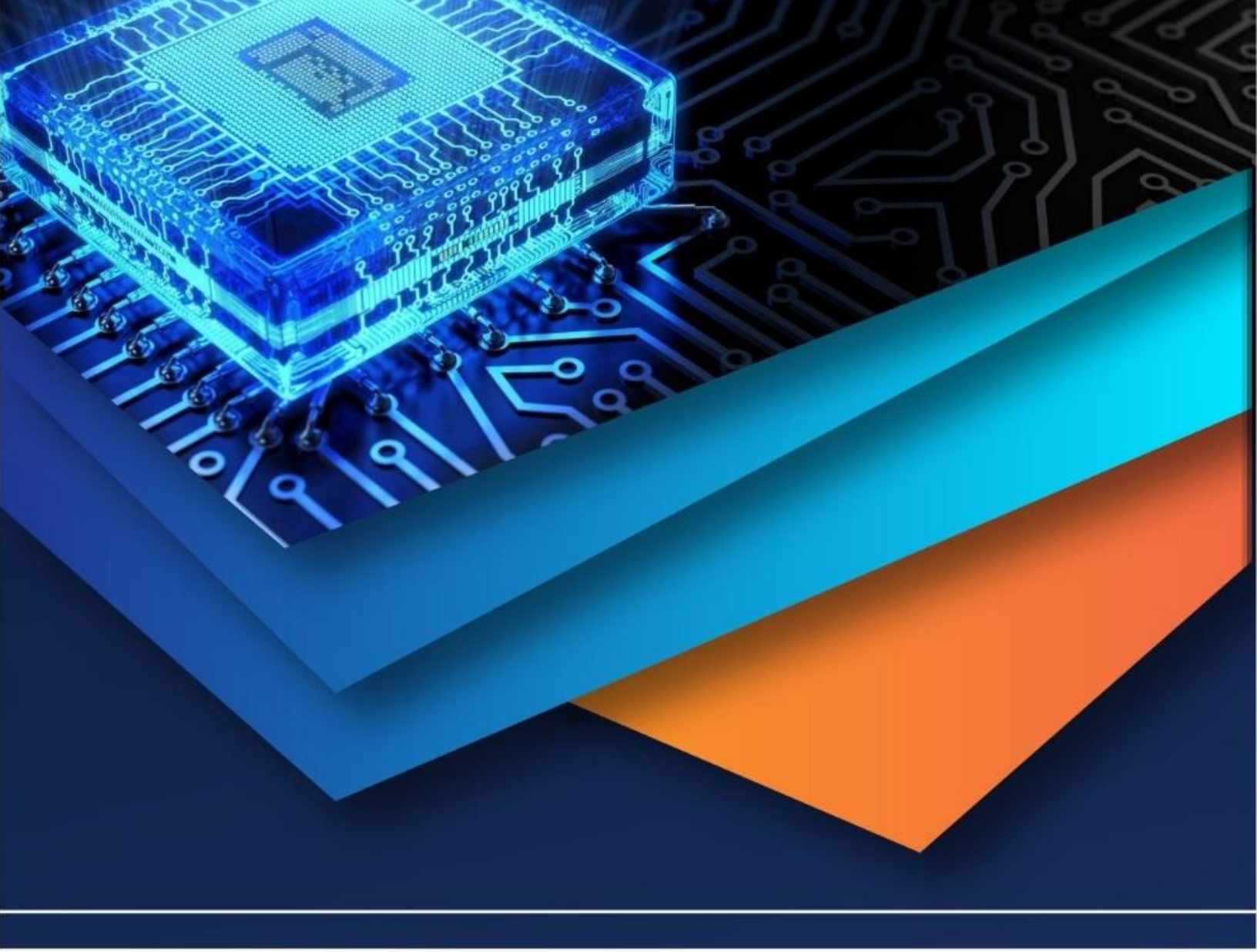

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