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Crowd Scanning in Real Time

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***Abstract*: In this paper we initiate a distinctive image processing application which is totally automated, requires no human action, is cost efficient and as better as human performance if not better than it. We set up a camera wherever the crowd is to be scanned. We then use the camera feed, pass it through various neural networks that detects the emotion (behaviour), gender, attentiveness of the person as well as counts the number of distinct people to have come in front of the camera by uniquely encoding their faces. All this in real time.**

***Keywords*: Real time, Neural networks, Camera, Face**

1. Introduction

It's 2018 and if there is one thing that is going to keep increasing rapidly in the world, it is population. The increasing population leads to produce loads of data. Reports say that people are generating more data than ever before. To be clear: relevant data reported correctly is undeniable and therefore getting huge data quickly is what any organization needs nowadays, to offer better solutions or to build better strategies. One important aspect where finding such real-time data is Crowd Scanning. No wonder nowadays, it is the most high-oriented research and searched topic in computer vision. Traditionally, three processing steps involve in crowd scanning, and these include pre-processing, detection of object and event/ behavior estimation. However today many applications do not process in real time. Our primary objective was to create a unique image processing application. We implemented it by making it completely automated, which won't need any human intervention, will be cost effective. The rest of this paper is organized as follows. In section II, we describe the related works that have concerned with people counting the crowd. In section III, the framework of our system and the process of system design and implementation. In section IV, we discuss the experimental results. In the last section, we summarize the approach and present some clues for the future research work

2. Literature review

In this section, we will look at several similar systems that are been researched and implemented by other researchers for further understanding on their methods and techniques, refer to the reverence page at the end of this report to search or text or even websites published. One of the main application of image processing is in identification of individuals in a compound uncontrolled scenario. The main difficulties are barrier, angular pose, different light illumination and partial inclusion. Image processing has become faster and versatile with the development of multicores and faster GPU. The traditional face detection and recognition has come a long way with greater accuracy in different lightings. Application involves unmasking of culprit/Person of interest from a crowd, presence detection in home automation, audience detection and in robotics. This survey notes the similarity and reviews some of the main papers presenting different methods of multiple human presence detection in an uncontrolled framework.

The purpose of the present work is to perform manual observation of crowds and pedestrians in such large data is cumbersome and often impractical which makes automated computer vision methods extremely favourable for this purpose. The main difficulties are occlusion, angular pose, different light illumination and partial inclusion that can cause the system to neglect a face even being in front of the camera [1].

A novel face identification method based on multi-features using a neural networks committee (NNC) machine is proposed in this paper. The committee consists of several independent neural networks trained by different image blocks of the original images in various other feature domains. The final differentiation results represent a joined response of the individual networks. Then, we use the proposed neural networks system to perform human face data recognition. The experimental results show that the classification accuracy of our preferred NNC is much high in number than that of single characteristic domain. When performing differentiation using a neural networks committee considering voting integrating strategy, it is not efficient if the committee contains less members. So, in our experiments, the original images are firstly divided into many blocks to increase the number of the committee members. Each image block can produce four committee members' samples, respectively, in four different feature domains. The precision is well as collated to other systems. The accuracy obtained while guiding neural network for the task completion was 95% but the time needed to train the neural network was high [2].

There is an increasing need to address multiple social issues by using image estimation technologies in surveillance cameras, thereby helping in the realization of a safer and more secure society. In this paper we will propose a crowd behavior scanning technology that utilizes NEC's image identification

technology, and a new crowd estimation system is based on this technology as an example of its implementation,

- *Managing crowds instead of individuals:* The image recognition technology used in basic surveillance cameras is based on recognizing each person discretely and following them. Our new technology differs from the conventional in that it doesn't detect and follow people individually, it handles a group as a single entity instead of a gathering of individuals.
- *Analysis of crowd changes:* For conventional methods, crowded environments made it difficult for the surveillance camera to see a likely crisis developing. By comparing, the effects caused by a deformity are expected to reach by such as unlikely congestion, crowding around something, and motionless groups.

Based on these characteristics and trends, it will become possible to make forecasts of congestion during specific times of the day, a specific day of the week, or by season. Comparing the actual camera image against a simulated image is time consuming and no real time output is provided [3].

3. The proposed methodology

The proposed system summarizes the given input which can be video or image format through a high resolution camera. Can cover many faces which depends on the clarity as edge detections deteriorate with the increase in distance from the camera .Given that the recommended configuration is followed, it will give almost instant results i.e., in real time(delay of ~100ms) .The most advanced version of the system can be used to analyze unique people in the group of people and also recognize the age of a person. Data is collected from the camera, further it is feeded into the system for processing, basically the camera data is in the form of human face. This data is then sent in neural networks from where the multiple features of the human face are extracted using various image processing libraries and convolutional neural networks, multiple face recognition, attentiveness estimation, emotion recognition and gender recognition are all the features which are extracted from the processed data. Finally, the data is collected and displayed on the web in real time using Angular JS as a front end.

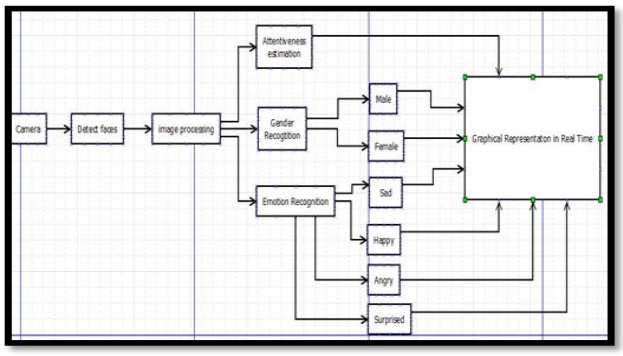

Fig. 1. Flowchart of proposed methodology

4. Result and analysis

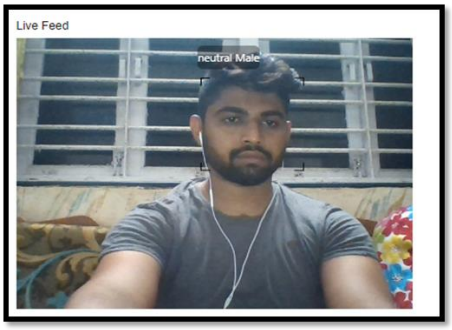

Fig. 2. Live face detection and sentiments analysis

The fig. 2 shows the live feed taken from the high resolution camera, in the backend multiple python scripts are getting executed with the help of which it detects the faces in the frame and shows sentiments of the faces in the frame.

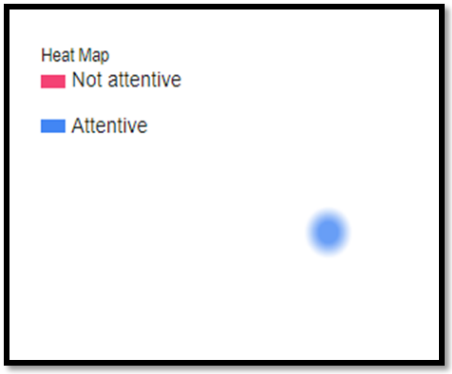

Fig. 3. Attentiveness Estimation based on live detected face

The Fig. 3, estimates the attentiveness of the person facing the camera based on eyes detection. If the person is looking at the camera the blue mark will be displayed showing that the person is attentive and if not then not attentive.

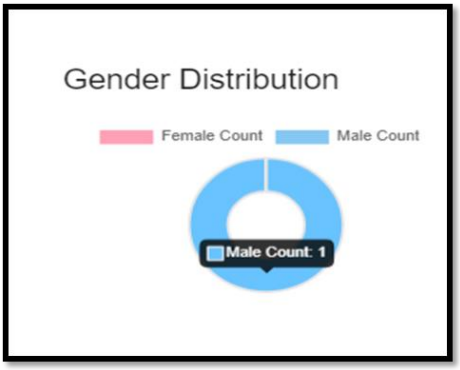

Fig. 4. Gender recognition

The Fig. 4, recognizes the gender of the person facing the camera and shows it in real time on the web application as a pie chart for both the genders along with the number of count.

Fig. 5. People count graph

The Fig. 5, shows the people count graph, it shows the number of people scanned in the time period of time which is represented in minutes.

5. Conclusion

This paper designs a framework for Crowd scanning and its limitless applications. It's an important tool for any area where crowd analysis is required and evacuations can be planned via the modeling and study of crowd interaction and reaction due to its really accurate prediction of the emotional feedback of the congestion. It is strongly believed that the system will provide real-time data and at most accurate estimation and recognition data to help the concerned authority to take necessary steps and actions with respect to the provided results.

6. Future scope

New methods can be proposed to provide more reliable and accurate data to the users. For measuring various others factors like uniquely identifying similar people coming in front of the camera and even age detection based on his or her facial attributes using neural networks.

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