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Real-Time Face Detection and Tracking

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Abstract: ***Face detection, face tracking, and Object identification is the first process in applications such as face detection-based attendance marking system, video surveillance, and tracking of human faces in case of emergency. The main objective of our project is to detect and track the moving human faces with a permanently placed fixed camera. We propose a general moving face detection and tracking system.Our project mainly focuses on the moving human face detection in a situation, let us say, the people moving together are meeting with each other and are detected as the people as long as they stay in the situation. This can be done with the help of an Image Difference Algorithm with the python programming language support, and also that the time period for each and every frame can be calculated.***

Keywords: Face detection, Face tracking, Human face identification.

I. INTRODUCTION

The detection of moving human face is done by identifying the movement of humans and the static or fixed background in the video, which is captured from a CCTV or webcam. Video sequences can be categorized into two types, such as moving humans with moving backgrounds and moving humans with a fixed background. In order to identify the foreground image, a methodology named **Background subtraction** is used. Human face detection is done by comparing each new frame with a developed old frame of the image background in the video, which is taken from a CCTV camera or Web Camera. The face identification process involves separation human faces from a video here the process divided into two classes, one containing faces, In this phase faces are extracted from a video by using Haar cascade features The video from the webcam or CCTV is converted into Greyscale format, then the faces are extracted with the help of dark and lite pixels and another phase containing background image. It is difficult because human faces have common things like skin color age, gender, facial expression.

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The problem is furthermore complicated by the difference in light, picture quality.
A face detector is able to identify or find the presence of any human faces under any set of lighting conditions, picture quality upon any type of background. The face identification task can be broken down into two-phase.
The first phase is a classification process that takes the human faces as an input, from a video and the output will be in a binary format, This phase indicating whether there are any faces captured in the picture. The next phase is the face tracking process; usually, this phase track the human faces frame by frame. The video is split into frames, and this phase extracts the human faces from the frame and matches extracted faces with faces that are stored in the database. The identified human faces are indicated by the bounding box. Video capturing of human faces usually requires for security purpose and authentication purpose

II. METHODOLOGY

The aim of the project is to track over the human faces in every frame of the video by locating its position. For this detection and tracking, we used the Moving face detection method, the Reference frame selection method, and frame difference method. Different object/face tracking algorithms are being used for the moving objects identification, and these algorithms can be used in different technologies and applications like video surveillance, face detection based attendance marking system, tracking of human faces in case of emergency, and biometrics. Below is the architecture diagram fig.2.1 that shows the object or faces identification and tracking. Foreground and Background are two basic techniques used for the extraction of image or set of images. We can use a background subtraction algorithm and foreground detection algorithm to track the Human faces.

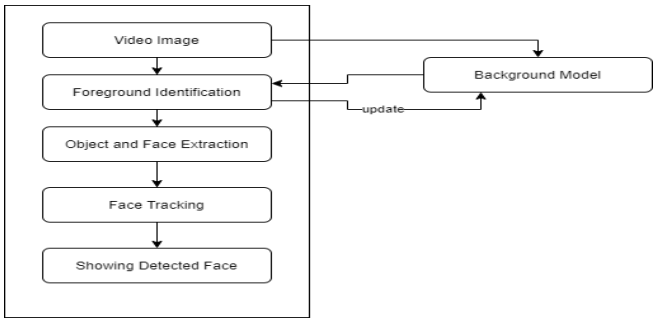

Fig 2.1 Architecture diagram

III.EXISTING SYSTEM

There exist plenty of projects under research that are already available, which uses certain face detection algorithms to give control access to the user. Face recognition systems' senses of work are exactly the same as the biometric recognition systems. The face recognition system is based on the concept that each human being is different and unique. If we make a clear point of this concept, the face has parts that are unique to each human-like fingerprints. But people do not know about this unique face.

Each person has their own facial features or expression that are to be matched, and this is what the procedure the face recognition and tracking processes take place. As a result of face matching, our facial features or expression are compared with the faces on the database, and the person who is having the matching facial features or expression is allowed to log in.

IV. PROPOSED SYSTEM

The system can be explained such that it can be split into several different modules. The video sequences are read in a frame-wise manner in the first phase of the project. That first frame is made processed as the reference frame at the starting of the system. The below figure 4.1 shows the flow of the proposed system.

In order to extract the foreground image, the current frame's intensity and pixel values are subtracted from the reference frame. To remove the noise from the video, the basic operations are performed. The proposed method aims to obtain the moving human face from an input video sequence and then tracking the Human faces.

4.1 FLOW DIAGRAM

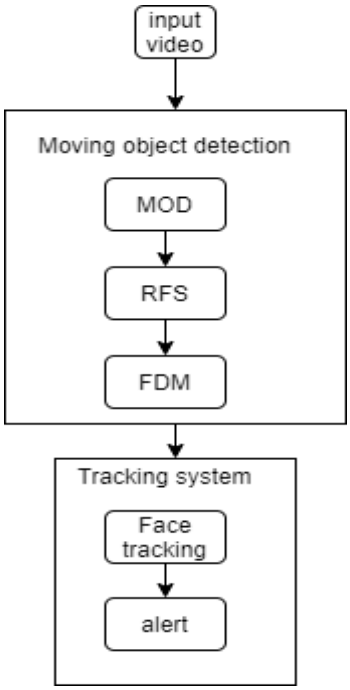

Fig 4.1 Flow diagram

4.2 MOVING FACE DETECTION METHOD

One of the most important parts of our project is this Moving Face Detection method, where the video which is captured from CCTV camera or a web-camera is converted into a single or individual frames, which is made compared with the previously mentioned frame. Then, the frame containing the facial object shows the changes in the movement of the objects in the previous frame.

In order to work with the areas like Automatic Video Analysis, Video Surveillance, **Background Subtraction** is one of the efficient techniques for which it is used to detect the moving object or faces in the scene.

4.3 REFERENCE FRAME SELECTION METHOD

The **Background Subtraction method** can be used to split the face or moving object, which is detected in the camera. Before updating the next sequence, there requires a starting reference frame or background frame from its background section. In order to avoid the coincidences of the image or the chances of missing any information from the video sequences, it is necessary to select the reference frames, and the first frame is to be selected as the reference frame.

4.4 FRAME DIFFERENCE METHOD

For the detection of moving faces or objects in a video sequence, the Frame Difference methodology Algorithm is being used, which can be done by using the next frame difference in a video sequence. One of the most common and simplest methods to explain the difference between the frames in a video sequence is the Frame Difference methodology.

The basic principle of this algorithm is working by identifying the change that happened in using the adjacent frames in video sequences through frame differences, and then the threshold value of the image difference and the moving object is determined. In the moving face detection technique, the grey value of corresponding pixels is being compared from the two frames images in the image sequence directly.

V. RESULT ANALYSIS

Our project aim is to identify and track the human faces in the video surveillance camera. The sample input image to the system and the system finds the below image in the input video by detecting frame by frame. The input video is processed frame by frame to find the presence of the above input picture in the video. If the face detected in the video, then the rectangular box with the search or found/not found tag is placed in the video.

Fig 5.1 Resultant video

VI. CONCLUSION

In a model world, the computer can automatically identify human face and information for authentication purposes, video surveillance and security, and access control, etc.
The next-generation face recognition and tracking systems are going to have high accuracy, and high efficiency in detection and tracking of human faces, and these applications are used in fields like IOT, artificial intelligence. Where Face detection and system are more like helpful assistants.

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