Real Time Tracking & Face Detection System

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Abstract— This paper presents the research work made in the field of Real Time face detection. In order to address all current face detection researches, it include approaches that uses Blobs Acquisition and Segmentation as well as those uses Kalman Filter for tracking and Viola-Jones algorithm for detection of faces. It use different current research works where algorithms for face recognition typically extract facial features and compare them with the database to find the best match.

Key words: Video Surveillance Cameras, Face Database, Face Detection

I. INTRODUCTION

Face recognition is combination of pattern recognition and image analysis which is still research topic. Many papers are written and many real-world systems are being developed and distributed. As a non-invasive biometric method, face recognition is attractive for national security purposes as well as for smaller scale surveillance systems. However, face recognition system is efficient, robust and reliable.

The first thing need to create a face recognition system is a database of facial image of people that want to recognize also known as face gallery. Then perform a processing step known as feature extraction to store discriminative information about each face in compact feature vector. Following this we have to fit a model of the appearance of faces in the gallery so that we can determine between faces of different people in database the output of this stage is the classifier or a model that is used to recognize input images.

When we have input query image a face detection algorithm is used to find where the face is allocated in that image. We then crop, resize and normalize the face to match the size and pose of the image used in the training face gallery. Then it performed the same feature extraction step that we did with the face gallery and run that through classifier or a model. The output is the label or an indicator to signify which person from the database the query image belongs to.

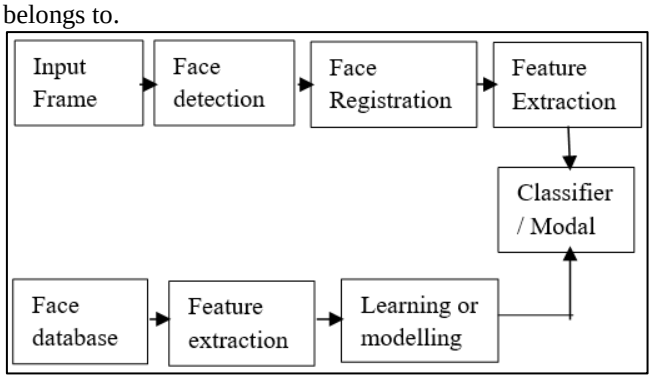

Fig. 1: Face Recognition Workflow

II. VIDEO CAMERA SURVEILLANCE:

Real time people estimation can be very useful information for several applications like security or people management such as pedestrian traffic management or tourists flow estimation. The use of video camera to track and count people increase considerably in past few years due to the advancement of image processing algorithms and computers' technology. Several attempts have been made to track people but all those different ways can be classify in three categories of different complexity:

- Methods using region tracking features. To improve this method some adding a classification scheme of pixel based on color or textures.
- Methods using 2D appearance of humans (using different models of humans)
- Methods using multiple cameras to make full 3D modeling.

The third category is more accurate than the two others because it rebuilt precisely the scene (so it deals in a better way the occlusion problems) but it is also the most difficult with complex algorithms. Sometimes, this system required a complex camera set-up (calibration) and cannot operate in real-time because the 3D models are too slow. This is why most of the system used the other two categories.

III. FACE DETECTION

Face detection is the technology used for identification and matching of different faces. Face detection can be defined as a type of object class detection. In object class detection, its main work is to locate the position and size of the object in the image for particular class. Mainly face detection focuses on upfront images. The algorithm which is going to be used in the paper only detects frontal human faces. Here from the images stored in database matched with the image of the person pixel by pixel. In face detection algorithm a system is designed by giving input face images and some non-face images and then trained the classifier so that it identifies the faces. And once the training is done we would be able to detect any faces from any image.

IV. TRACKING

For tracking of the people in the video sequences [2], the input to the image is live or recorded video data acquired by a stationary camera. The output consist of trajectories which gives the Spatial-temporal coordinates of individual. Individuals points are tracked across frames and points in each frame are clustered into individual objects based on their position and velocity. The motion field in each frame is obtained by matching intensity features in successive frames. The motion field is smoothed both temporally and spatially and then split into regions having the same quantized direction of motion. The posture of the person in each frame

is estimated by matching gray scale edge the image with model edges. Figure shows main steps in people tracking system.

An application for counting people through camera[3] basically work on performing the count distinction between input and output of people moving through the supervised area. The counter requires two steps: detection and tracking. The detection is based on finding people's heads through pre-processed image correlation with several circular patterns. Tracking is made through the application of a Kalman filter to determine the trajectory of the candidates. Finally, the system updates the counters based on the direction of the trajectories.

Here people counting[3] is performed by extracting an appearance vector based on a color region of interest (ROI) and a probabilistic model, using the stereoscopic disparity map to resolve possible uncertainties. Two ROIs are defined at the top and bottom of the image. Next, the column histogram of the optical flow is computed in those areas. The number of people crossing the area is obtained from the histogram values considering a minimum threshold. The count is obtained from the information of blobs crossing the ROIs.

V. VIOLA JONES ALGORITHM

The Viola – Jones algorithm is intended for real – time detection of faces from an image. Its real – time performance is obtained by using Haar type features, computed rapidly by using integral images, feature selection using the AdaBoost algorithm (Adaptive Boost) and face detection with attentional cascade. Viola Jones algorithm is having two types of system type object i.e. Vision Cascade Object Detector and Train Cascade Object Detector. For training the different images, Train Cascade Object Detector object detector is being used. The Viola-Jones face detector [5] can run in real time because it is based on the following main ideas:

a) Rapid computation of Haar-like features using the integral image;
b) Classifier learning with AdaBoost to select the best feature;
c) The attentional cascade structure which rejects the majority of the sub-windows in early layers of the detector, making the detection process extremely efficient

VI. DESIGN & IMPLEMENTATION

In order to acquire image using MATLAB, a video input object which represents the connection between MATLAB and the image acquisition device (in this case camera), must be created first. Video analysis normally requires certain video processing algorithm to prepare the image for further analysis. For this work, the video is analysed as it is viewed. To analyse color frames, it is necessary to first segment it. Edge detection is one of the most commonly used image segmentation methods in object detection. Since edges contain some of the most useful information in an image can be used to extract boundaries of each different object in an image.

Many edge detection algorithm have been developed which include Sobel, Prewitt, Roberts, Laplacian of a Gaussian, zero crossing and canny edge detectors, was used because of the fact that it is less susceptible to noises in comparison to other edge detection methods. The algorithm can be summarized as follows;

a) First the image was smoothed using a Gaussian filter with a specified standard deviation in order to reduce noises
b) Standard first-order edge detection was performed to find the edge locations and edge directions. An edge point will be the point whose strength is locally maximum in the direction of the gradient.
c) After this, non-maximum suppression will be applied. Non –maximum suppression is used to trace along the edge in the edge direction and suppress any pixel values (set to 0) that are not considered to be an edge.
d) Finally, Hysteresis thresholding was performed using two threshold values, T1 and T2 with T1<T2. Any result pixel with a value greater than T2 is categorized as a strong edge pixel, whist result pixel with value between the two thresholds.

Frames are extracted from the video these frames are the save in separate directory. Images are taken from the directory for extraction of ROIs.

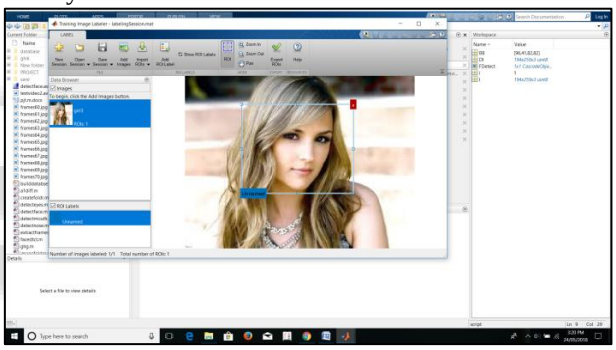

Fig. 3: ROI Labourer

After labelling session detection of face takes is done. An Annotation is added for the displaying purposes.

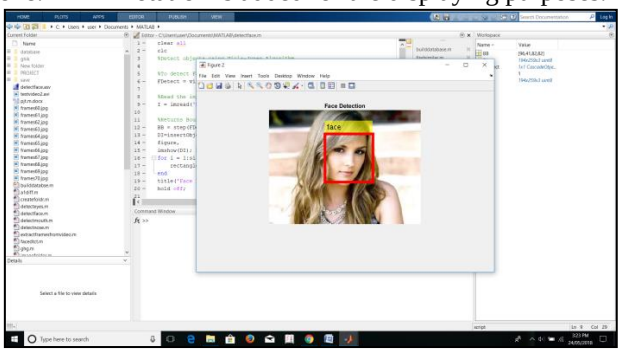

Fig. 4: Detected Image

VII. APPLICATION & FUTURE SCOPE

Among the different biometric techniques, face recognition may not be most reliable and efficient. However one key advantage is that it does not require the cooperation of the test subject to work. Properly designed system installed in airport, multiplexes and other public places can identify individual among the crowd, without passerby even being aware of the system. Automated face recognition can be applied 'live' to

search for a watch-list of 'interesting' people, or after the fact using surveillance footage of a crime to search through a database of suspects. Other biometric like fingerprints, iris scan and speech recognition cannot perform this kind of identification.

VIII. CONCLUSION

In this paper, we have given an introductory survey for the face recognition technology. Face recognition is a both challenging and important recognition technique. Among all the biometric techniques, face recognition approach possesses one great advantage, which is its user-friendliness (or non-intrusiveness). Different video camera surveillance and face recognition techniques have been studied to make system efficient and work on real time with more efficient result.

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