Face Detection and Tracking Using Combination of SDM Viola Jones and Skin Color Based Segmentation

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Abstract:*Real-time face detection and tracking is a demanding problem in many application circumstances such as faces and gesture recognition in image processing and robotics etc. The ongoing work implements a robust method which can locate various faces at the same time under the varying environment of illumination and complex background in online (real time) by using face detection and tracking in conjunction with depth data. To achieve robustness, the Kanade-Lucas-Tomasi point tracker is used and dedicated to work on facial features by inserting knowledge about the configuration and visual features of the face. The resulting tracker is designed to get better from the loss of points due to tracking drift or temporary occlusion. Performance calculation experiments will be carried out on a set of video sequences of several facial expressions. It will be shown that using the original Kanade-Lucas-Tomasi trackers, some of the points are lost, whereas new method has been proposed to overcome the drawback. A performance assessment experiment is carried out on a set of video se*quences of several facial expressions.

***Keywords:-* Face tracking, tracker, feature points, Image Processing etc.**

I. INTRODUCTION

To realize time period face tracking, this combined motion history image with Mean-Shift to unravel the development of missing and false trailing within the case of existing obstructions. Algorithmic rule method includes quick face detection of initial state and target trailing of continuous state and target lost state. Firstly, we want to extract the predict region of face through interval frame distinction technique, color detection, the proportion of 5 sense organs and alternative data and observe it by Adaboost technique. Then track the sequence image combined with MHI, per the obtained face regional location, size, direction data etc. This technique has been verified by a well-behaved experimental, and therefore the results show that the algorithmic rule can't solely agency one target and multiple targets, however even have a high accuracy, robustness. Face detection is a crucial requirement in several fields. Detection may be performed by collaboration of people. It can be the case in Human-Machine interactions. It may also be done without the topic being conscious of it. It might be the case in high-security buildings. An event of human central applications explains why face detection has become a broad studied and researched topic. It has inaccurate to mention the matter which has been solved for perspective cameras. However, several ways developed to reach maturity and performance levels that enabled them to makeover from educational labs to daily lives. Nowadays, folks use of face discovering algorithms while not realizing it took years of a machine equipped with camera will currently detect person's face in time period, that's to mention quick because image is streamed by capturing device. Viola and Jones weren't pioneers within field.

Numerous researchers already dedicated themselves to present topic. However, Viola and Jones' scheme has driven by trade-off between detection concerns and hardware concerns. As result, the technique that achieved unexampled classification performance, whereas victimization has extremely economical process step. These approaches continue to inspire various researchers within search an ideal face detector. All the same, always highlight every one way were developed for the perspective cameras. However, many disadvantage of the perspective cameras their field of read. Thus, people got to enter FOV to act with the machine. It can be not ideal for various things. One may cite videoconference things wherever the FOV is thus tiny that only 1 person may be seen within the image.

The opposite folks round the table can't be seen. Most of time, this disadvantage is overcome by adding some additional cameras, an answer that causes subsequent issues. Within the case of building direction, if one desires to observe a sq. space, one should use several cameras. It is used to increased the FOV of image device will circumvent all this additional bother. In this, such sensors exist already. They're referred to Omni directional vision sensors. As the name indicates, they'll look altogether directions. Omni directional vision device theory and applications area unit well established. Most of applications of this technology may be found within the field of AI. OVS area unit primarily won't to solve navigation and motion estimation issues. The utility of position vision sensors has conjointly been incontestable within the 3 dimensional reconstructions of scenes. The mathematical tools used area unit supported laptop vision pure mathematics theory. Within the mentioned applications, position pictures area unit regarded and processed as provided by the device. This can be possible once the idea involves matching points, pixels within the case of laptop vision, or tiny regions restricted to the 8-neighborhood of the thought-about element.

Several low-level options like Scale Invariant Feature remodel key points or Harris corner detector are with success changed to require into consideration position image geometrical specificity. These recent results have incontestable that position pictures may be directly processed. Object detection will imply point-of-interest matching. Still, the methodology most well-liked by the image process community is predicated on region-based descriptors. The matter analysis to form them becomes advanced on position vision sensors. As a matter of reality, the device resolution may be non-linear on many dimensions. One cannot utilize detectors trained for perspective pictures. In fact, neither the descriptors nor the ensuing classifier will handle this non-linearity. a typical strategy is to synthesize a pseudo-perspective image via a technique referred to as anti-anamorphous. The wrapped position image may be absolutely unwrapped and projected onto a cylinder or a sphere. One may also domestically project the region of interest to be processed on a plane. The ultimate step is to use a detector trained on perspective pictures onto the ensuing footage.

II. RELATED WORK

Dewan, M. Ali Akber et al. [1] proposed an adaptive biometric system. This proposed system is used to solve the problem of single sample face recognition (SSFR) having modular framework. This architecture have one detector per target and for every detector, face model is being produced within the face images. Sequential Karhunen-Loeve technique is used to update the face model using representative face captures that are choosing for operating data by utilizing reliable tracking trajectories. This method is used to produce the intra-class variation of face appearance and improve representativeness of the face models. The efficiency of presented technique is detailed in security surveillance and user authentication using Chokepoint and FIA datasets in SSFR setting.

Karmakar, Dhiman et al. [2] in this paper, facial feature extraction scheme has been proposed. By utilizing the segmentation method, control points are extracted and color images are cropped automatically. In this segmentation method, initially images are cropped automatically and then these cropped images are being applied for detecting the main connected components. The feature points are found by utilizing the geometrical measurement of location and the size of component with no previous information if probabilistic distance between the feature points or using any feature point extraction formula. By containing main feature points, T shaped face image is generated. Finally rate of recognition of unprocessed face images using PCA is reported.

Agrawal, Samiksha et al. [3] in this paper, face detection approach has been proposed. This technique is depending on the Viola and Jones algorithm and principal component analysis. The simulation results demonstrated that the presented approach is efficient and performs better as compared to already existing approach.

Sudha, N., and D. Bharat Chandrahas et al. [4] presented a parallel architecture for face recognition which is suitable for implementing in multicore environment. The proposed system includes the modules for video frame acquisition, PCA, binarization, skin detection on the image frame. Consecutive frame lines are processed in pipeline on multicores. The proposed system attains a frame rate at 8 frames per second for 480x272 image size and the experimental result is area- effective.

Kheirkhah, Esmaeil et al. [5] presented a hybrid technique depending on the adaboost face detection and skin color information. The feature points of hybrid technique are background elimination and down-sizing. The feature point is computed by using segmentation method and utilizing adaptive skin colour classification. In this segmentation method, initially images are cropped automatically and then these cropped images are being applied for detecting the main connected components. Though, Viola-Jones Adaboost-based face detector is being applied in this paper as the final face detector. To verify the precision of presented hybrid technique, then an experiment is performed on some standard datasets and then proposed system is compared with Viola-Jones face detection system. The experiments indicate that the presented technique might effectively enhance the face detection system in terms of precision (98.88%) and detection time (259.59 ms).

Vong, Chi Man et al. [6] proposed sparse Bayesian extreme learning machine (SBELM) for real-time face detection. The proposed method is capable to reduce the size of model without compromise on the fast execution time and precision. Numerous standards for the face datasets are developed for the estimation of SBELM among other traditional approaches. The analysis of results indicates that SBELM attains best ever execution time with high precision over the standard face datasets.

Hatem, Hiyam et al. [7] presented a well-organized and fast face detection method in face images and videos. Initially color filtering method is being adopted in order to recognize the face quickly; it skips that area which is not matching with candidate faces. in this paper, haar like features is being used having adaboost algorithm which build a stronger classifier consists of weak classifiers and including facial sections to enhance the recognition precision. In this paper, motion model estimation has been adopted. The result indicates that the computational cost of proposed method is lower and provides better performance in factors which affects appearance of faces like change in expression, goggles, spectacles, long hairs, beard etc.

Shakir, Haidar R [8] presented a method for detection of faces. This proposed method is depending on the learning algorithm to scan the images so as to detect the human face. In such system, issues like pose variation, scale variation, etc. occurs. Initially first stage in proposed method includes the improvement of image. It will be significant stage specifically if the image has been acquired under unconstrained illumination condition. In the next stage, segmentation of the skin in HSV space is done and hole filling algorithm is utilized to refine the skin segmentation results. The input image edges and skin tone are fused in oder to ensure that all non-face regions are removed from candidate faces,

Zhao, Qian, Shuzhi Sam Ge et al. [9] presented a method to learn a type of saliency features, which merely makes response in face regions. Based on the saliency features, a joint pipeline is designed to detect and recognize faces as a part of human–robot

interaction (HRI) system of SRU robot. By restricting false responses, the performance of face verification can be improved, especially when the training and testing are implemented on different dataset. In experiments, the effects of saliency term on face verification and benchmark discriminative ability of saliency features on LFW are analyzed. And the effectiveness of this method in face detection is verified by the experimental results on FDDB.

Negi, Rahul Singh et al. [10] presented a new method in order to implement face recognition using PCA. Although, there will lots of work is done on PCA, the major disadvantages that was happened with the distance issue. In this paper, problem is being solved by utilizing Hausddroff distance algorithm.

Aghaei, Maedeh, Mariella Dimiccoli et al. [11] presented multi-face tracking method which produces a group of tracklets and takes benefit of tracklets redundancy to deal with unreliable ones. Same tracklets are the combined into bag of trackeles that is aimed to correspond to a particular person. This method is a widespread dataset of egocentric photo-streams and compared with other methods, indicating its efficiency and robustness.

III. PROPOSED METHODOLOGY

There are many recent methodologies from an extensive research on this topic. Most of these works focus on the extraction and analysis of visual features

The method described here is concerned with several issues that are considered to be important for robust recognition of facial features. These issues are rigid and non- rigid motion, variation of lighting conditions, head orientation, head tilting, and real- time tracking. The established point tracking scheme aims to tackle all those issues. The technique is designed to be robust and to recover points lost during tracking. The main constraint is for then nostrils to be visible. The tracker works on grey level image sequences of any length. The general tracking process is shown in Figure 1

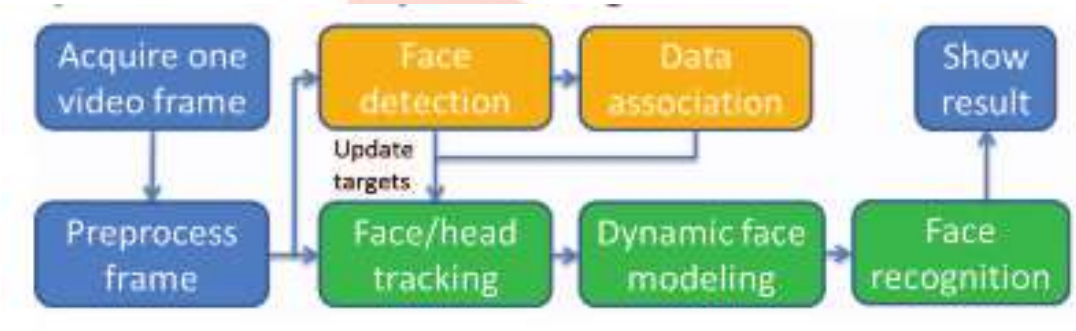


Figure 1. Flow chart

Motion tracking based on points is often important in many applications requiring time- varying image analysis. Applications may be object tracking, motion understanding, navigation, automatic speech reading, and facial feature tracking. This paper presents a new robust technique based on the Kanade-Lucas-To masi tracker. The technique focuses on the automatic recovery of points lost between frames. It is specialized for robust tracking of human facial features. This new method is intended for use in robust recognition official information such as the identity or facial expression of a person. Such recognition applications are important components of future machine interfaces, for example. Instead of trying to improve tracking performance through the automatic selection of better features, as proposed in, here we exploit the knowledge that the tracker is working on a human face. Several constraints are applied during the initial selection and tracking of feature points.

Several general-purpose point tracker have been proposed. Lucas and Kanade have worked on the tracking problem and proposed a method for registering two images for stereo matching based on a translation model between images. From the initial work of Lucas and Kanade, Tomasi and Kanade developed a feature tracker based on the sum of squared intensity differences (SSD) matching measure , using a translation model. Then, Shiand Tomasi proposed an a fine transformation model .Over small inter-frame motion, the translation model has higher reliability and accuracy than the affine model. However, the affine method is preferable and more adequate over a longer time span. Tomasi *etal.* proposed a robust tracker based on the work of Shiand Tomasi by introducing an automatic scheme for rejecting features.

Algorithm

1. Acquire image from the video
2. Apply skin color based segmentation
3. Obtain face and hand as blobs
4. Apply SDM Viola Jones with skin color segmentation based on velocity of the blobs

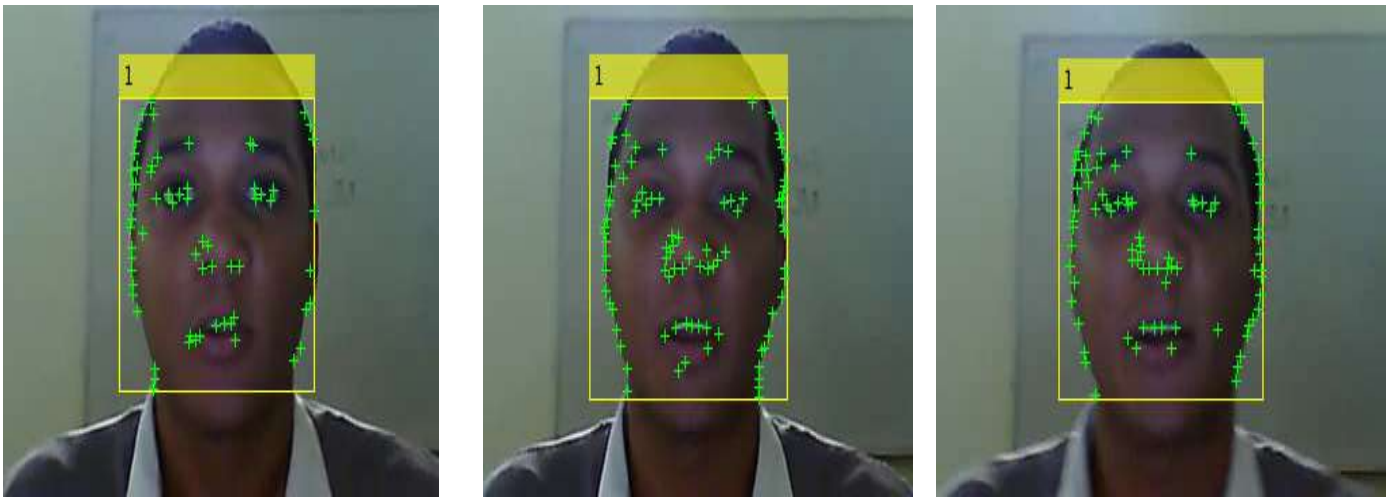
5. Obtain the facial region
6. Apply eigen feature extractor
7. Use the feature for the tracking algorithm
8. Apply KLT tracking algorithm and track the face
9. Repeat steps 1-8 for each frame in the video

IV. RESULTS

The results presented are there for the proposed skin color based segmentation along with SDM Viola Jones with skin color segmentation. The solution has implemented to create an application which works on both recorded and live videos. When software application is running, a user can interfere at any time to tag a detected face in frame. A vector feature of tagged face can be computed and saved in gallery. Due to the parallel computing in various levels and distinct modules of system, critical work has been conducted in implementation to avoid the conflicts among individual threads. In this, MATLAB's inbuilt functions are used in multiple portions of implementation. The software application with 320x240 frame size has been tested on the videos. These experiments made on various mainstream laptops, desktop and PCs, each contains up to two multi-core processors. Consistent performance has been attained from PCs. Face detection process works once every 20 frames. The calculation official feature for face recognition takes 44ms per frame. For tracking purpose, minimum eigen values are considered as feature points. Dynamic face modeling can be called once every seven frames. In dynamic collection, each subject has almost five clusters and each one contain maximum 20 samples. In the dynamic face modeling, subject has been identified much faster when someone reappears in video of standard benchmark videos, it is not practical to compare the detection accuracy with prior arts.

(A) (B) (C)

Fig. 2



(A) (B) (C)

Fig. 3

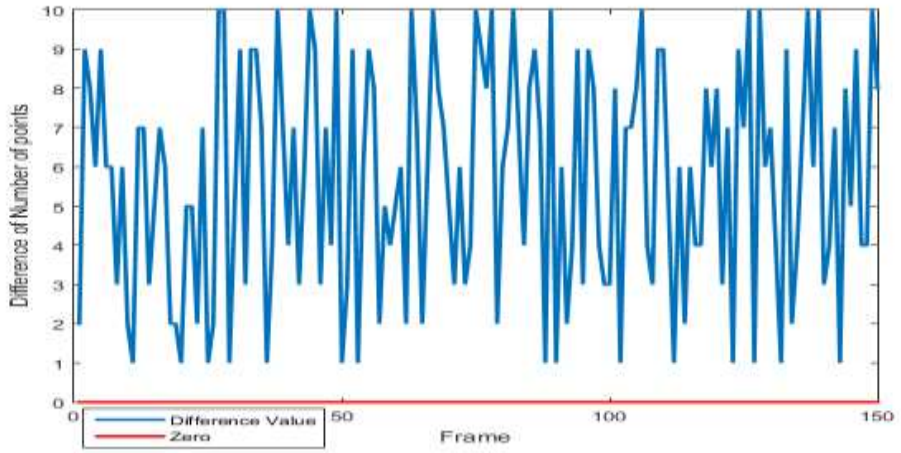


Fig. 6.4 Comparison graph for both method

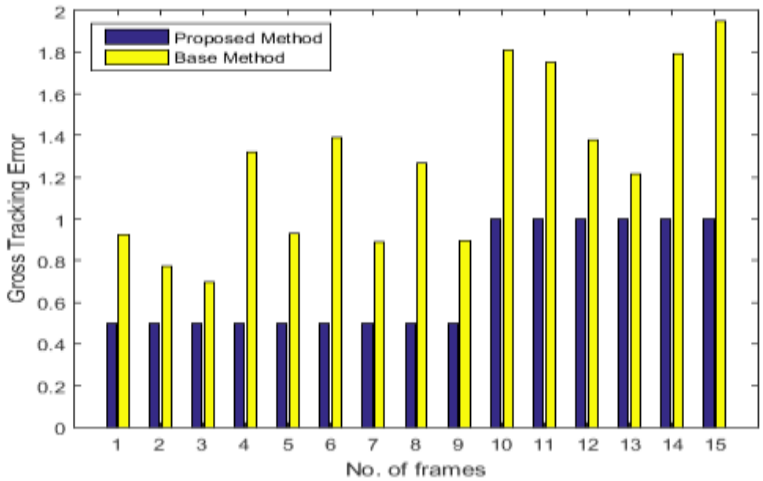


Fig. 6.5 Comparison graph for both method

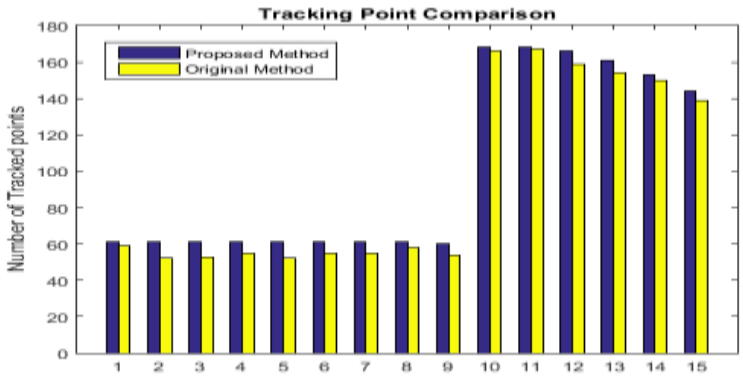


Fig. 6.6 Comparison graph for both method

V. CONCLUSION

In this work, a facial identification and tracking system for security purpose use is presented. A novel method, of face detection using SDM Viola Jones with skin color segmentation is proposed and innovations were made to image examination modules for effectiveness and robustness. The results are published in this paper and are generated using MATLAB which allows immediate identification and strong detection of face in high-resolution videos. Future research is expected to be carried out in a different of aspects to improve this work. More efforts can be made to enhance up the tracking method so that the system run faster, and specifically, the system's cost may reduce. Also, the system can be made robust against occlusion.

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