Detection and Tracking of Faces in Videos: A Review of Related Work

[1]Seema Saini, [2] Parminder Sandal
[1]Student, [2]Assistant Professor
[1, 2]Dept. of Electronics & Comm., S S I E T, Punjab, India

Abstract **- Face detection and tracking in real-time is a inspiring problem in many application situations such as faces and gesture recognition in computer vision and robotics. The continuing work implements a robust method which is expected to localize multiple faces at same time under the changing environment of light brightness and complex background in real time by utilizing face detection and tracking in combination with depth information. To achieve robustness, the Kanade-Lucas-Tomasi point tracker is used and dedicated to work on facial features by embedding knowledge about the configuration and visual characteristics of the face. The resulting tracker is designed to recover from the loss of points caused by tracking drift or temporary occlusion. Performance assessment experiments is carried out on a set of video sequences of several facial expressions. The methods reviewed will are the state-of-the-art algorithms for this purpose.**

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

I. INTRODUCTION

As the most significant external characteristics of human, face plays a vital role in communication. With human computer interaction technology turning into a newest topic within field, face detection and tracking has become a serious concern analysis direction in computer vision that has broad application prospects within field of human computer interaction, video game so on. The complexness of the face results in a definite degree of issue for quick the detection and trailing. There are various ways for the face detection, for example: mathematics technique, templet matching technique, the strategy of support vector machine, the strategy of active contour model, the strategy of variability template, etc. however the a lot of thought approach for face detection is Ad boost-based, however, the speed of that doesn't meet the time period in high-resolution video sequence detection. Search candidates face by mistreatment the strategy of color and contour detection, then make sure pattern matching recognition through the algorithmic rule of principal element analysis, the trailing accuracy rate of that is sort of high, however the track result is poor within the event of occlusion. In another thesis, an algorithmic rule, that is combined multiple target hunter with face observe technique, with that is ready to trace the multiple faces at a similar time. This technique has higher time period performance; however the algorithmic rule is a lot of advanced. It takes the Mean-Shift technology to trace moving target that has the quick and economical characteristic. However its trailing window is mounted. Once the target moves at the side of the direction of the camera, it had lost.

In digital image processing face detection and tracking have a wide range of applications in various areas like crowed surveillance, artificial intelligence, neural networks, human computer interaction, image monitoring systems etc. There are different algorithms that have been used for face detection and tracking. Face detection and tracking is a fundamental component in computer vision applications such as surveillance, biometrics and intelligent robots. Considerable work has been done and several algorithms have been proposed. Most of these algorithms are based on features such as Haar, skin pixels, histograms and shape. In addition, the real-time processing requirement calls for high-performance implementation for face detection. Embedded implementation of face detection is quite challenging. Some recent works on VLSI implementation of face detection are available. Of late, multicore processor has been given greater attention due to its ability to realize a parallel system with ease achieving faster time-to-market when compared to FPGAs. 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, folk's 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.

A face detector is initially employed to estimate the position of individuals. Those positions estimates are used by the face detector to classify the search space of possible face locations and minimize the false detections. A face classifier is employed to assign identities to the trajectories. Apart from recognizing the people in the scene, the face information is exploited by the tracker to minimize identity switch. Once the detection locates the face, the next step in the example identifies feature points that can be reliably tracked.

II. LITERATURE SURVEY

Kang, Sung-Kwan, Kyung-Yong Chung et al. [1] this paper proposes a head gesture recognition system consisting of face detection, eye location, and HMMs. In this paper, real-time head region detection based on the differences in image frames using an active camera. The main component of the system is the application of vertical projection of edge contours to identify head location and nested K-means algorithm for error minimization during differencing and threshold. Overall, the system shows low computational cost and a high detection rate, which is suitable for a real-time system.

T. Mallikarjuna[2] proposed face recognition using Eigen values. Face recognition security systems become important for various applications such as automatic access control and video capturing. In most of the cases face recognition using Eigen space systems require proper views of a person from front. But if the person to be recognized does not face the camera correctly then these system will not work .In this paper, we find the face capturing and storing the database

Ilya V., Philip Lee et al. [3] have proposed Noncontact millimeter-wave real-time detection and tracking of heart rate on an ambulatory subject. The integration of a millimeter-wave sensor, two cameras, and a pan/tilt base has been successfully demonstrated. A subject was detected and tracked by the system, while his/her chest displacement data were collected remotely with a millimeter wave sensor. From this data, locations of the heartbeats could be extracted. Future work in this area will include extraction of the respiratory rate from data when the subject is breathing normally.

Kumar, Prashanth, and M. Shashidhara et. Al [5] proposed a approach for real time face tracking and detection. Skin color segmentation and knowledge based approach is used in proposed design. For skin color segmentation RGB, HSV and YCbCr color models are used. These color models helps to eliminate non skin, like pixel from an image. Then these skin region are checked to know whether region is human face or not.

Zhu, Xiangxin, and Deva Ramanan et.al [4] present a unified model for face detection; pose estimation, and landmark estimation in real-world, cluttered images. These models are easy to optimize and also very effective in capturing global elastic deformation.

Xiong, Xuehan, and Fernando De la Torre[6].in this paper Supervised descent method and its applications to face alignment has been presented. The computer vision problems like camera calibration, structure from motion, image alignment are solved with help of nonlinear optimization method. It is noted that 2nd order descent methods are the most vigorous, fast and consistent approaches for nonlinear optimization.

Wu et al. [7] worked on counting the number of people based on face detected and tracked. The method is affected by false detection and loss detection caused by motion blur. The people counting system proposed in this paper mainly contains five function modules, including an area-setting module, a face detection module, a skin detection model, an area-tracking module and a people counting module. Through the test of the system in the laboratory, experimental results show that this system has good real-time performance and high accuracy. However, there are still some problems, such as false detection and loss detection caused by motion blur, tracking chaos when more than one person are detected, etc. These are the focus of the next research.

Portmann, Jan, et al. [8] developed detection and tracking of faces in low or no light using thermal images Histogram of oriented Gradients (HOG) and Body Part based Detector (BPD) technique. Though the technique is unique the method requires high cost thermal camera, hence less economical. Moreover, we propose a new particle filter based framework for tracking people in aerial thermal images. Finally, we evaluate the performance of this pipeline on our dataset, incorporating a selection of relevant, state-of-the-art methods and present a comprehensive discussion of the merits spawning from our study. In situations where the contrast between people and background is low, true detections can be disregarded by the background subtraction. Consequently a combination with additional sensing modalities (e.g. visible-light cameras) would be necessary to disambiguate in these cases.

III. CONCLUSION

In this paper, a facial identification and tracking system for security purpose use has been reviewed. Various methods, of face detection using skin color and other segmentation methods are surveyed and innovations were made to image examination modules for effectiveness and robustness. 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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