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A SURVEY ON HUMAN IDENTIFICATION USING WEARABLE DEVICE

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ABSTRACT : *Human being is a social animal, we meet a variety of people every day, but it is not possible for us to remember these people in only one interaction it may also create an embarrassment if we again meet the person and do not recognize him/her. Humans are quite excellent identifying known faces; we are not skilled when we deal with a lot of unknown faces. Face recognition and detection field are widely studied and a variety of work has been carried in this field. We here studied a number of algorithms and methods which available for face detection and recognition. These methods work quiet effectively with the static or fixed input system but needs improvement while using them in real time. We have also studied the way in which the algorithms work and their efficiency in various scenarios.*

KEY WORDS *: Wearable Device, Real-time face detection*

1. Introduction

Face recognition has long been researched and maturely developed. However, the issue becomes intractable when these algorithms are implemented on a embedded system and platform which has low computational power comparably. With the need to make human life more easy and hustle free it was need to develop an efficient and fast detection and tracking algorithm. Many real-time face tracking systems have been developed in the past, but many cannot perform well with limited computational power on mobile or embedded devices.

Real-time multiple face detection and tracking has been a growing research in recent years. Face detection, recognition, tracking, gesture recognition,3D modeling are some examples of related applications. The first step of almost all face processing methods is face detection. Also, the faces if disguised cannot be adequately detected and recognized with the available systems. Face recognition is a relevant subject in pattern recognition, neural networks, computer graphics, image processing, psychology. For face detection, we have to take multiple factors into consideration, like are the face and expression recognition separated system? Is color an important factor in face recognition? Does symmetric play a major role in face recognition? Hence, an algorithm or methods addressing the above issues needs to be developed.

2. Previous Methods

Various techniques and methods are implemented and proposed over the years and are explained.Kim-Han presented an efficient real-time face detection hardware architecture [1] using a reconfigurable device which is based on AdaBoost learning algorithm which uses Haar-like features. For multimedia applications like face tracking, object recognition, privacy masking, video surveillance and many more, face detection is the first step. Viola-jones technique is widely used and is mature in Open computer vision library, but embedded systems are not much powerful and hence implementing OpenCV face detection on embedded systems is not easy. In this technique, the FPGA-based hardware architecture is used for real-time face detection which minimizes the complexity of architecture which results in achieving feasible hardware with accelerated processing speed.

Haar-like features can be calculated by calculating the sum of pixels in white rectangle minus those in the black rectangle. Hardware architecture in given technique consists of SPB, IPB, and FPB. Where SPB gets input image. IPB calculates Integral image and FPB calculates the cascaded classifier and output. Detection rate during experiments was 96% of OpenCV results.

In another method proposed three steps are needed; face detection, eye detection, tracking. The face is one of the important parts of human being and represents most important information about the person. There are two facial feature detection methods; local and global. In the local method, each component of the face is detected separately and in local those are detected combinely. Using Projections of the face in vertical and horizontal eyes are detected. Different eye detection methods are available like Integral Projection Method, Pixel count method. Tracking can be described as Kalman Filtering and Mean-Shift Tracking. Eye detection methods performance is dependent on the performance of face detection method[2].

In approach with augmented reality augmented reality is real world object and computer generated object which is also called as media of future, where computer generated object is three-dimensional graphics rendering. Here AR technology is used to simulate eyeglasses frame models. Video camera and the marker are employed in AR. Face tracking on video is done by augmented reality, Haar-like feature, Active shape model, the pose from Ortography and scaling with Iteration[3].

Head Pose Estimation to obtain strong classifier in Adaboost is time-consuming. Here a new fast multi-view and efficient face detection method based on Adaboost. From Haar-like features, a strong classifier effective to detect rotated face is constructed. Proposed multi-view face detection consists of robustness of Haar-like features, feature transformation, overall cascade structure[4].

Here a real-time face recognition system is proposed using CUDA platform. Along with Viola-Jones algorithm improved novel parallel methods of image integral, scan window processing and amplification of classifiers were implemented. For face recognition, algorithm reference taken was Viola-Jones algorithm. Face recognition based on cuda consists of Parallel detection, parallel recognition, database[5].

In Emotion Recognition System Using Open Web Platform [6] a model for recognizing emotions through movement of facial muscles which is inspired by FACS and FACSAID which is called as WebSER. Images are first captured and emotions are classified with computer vision system. Here also, Viola-Jones algorithm is used. The proposed model has an accuracy of 76%.Image processing techniques for recognizing emotions are face detection, facial action coding systems, and feature tracking approach. A web-based system for emotion recognition consists of implementation, reading points. The proposed model was able to sort basic emotions.

Proposed paper evaluates two methods, Haar features and local binary pattern feature based on detection of hit rate and speed. Methodologies used are Haar-like features and local binary patterns.LBP has overall faster detection speed and also detects more faces[7].

Real-time image processing algorithms such as LPF, HPF are implemented on designed system. The system also uses code optimization and hence improves execution time for Viola-Jones algorithm. Hardware details of designed systems are a digital camera, beagle board, and LCD. Software description is windows or Linux os, visual studio or OpenCV and minicom [8].

For disguised face detection and recognition an effective method is proposed, which is consists of two stages; first to determine whether the object is a person and the second is to determine whether a face is disguised. The proposed method consists of The first dynamic then static foreground object detection strategy, The updated learning-based codebook model for moving target detection, The LBP+HOG feature-based head-shoulder detection, and the Haar feature based disguised AdaBoost classifier. This proposed method reduces the impact of complex background. This method performs very well under complex background detecting disguised faces[9].

Later on, an Architecture implementable on FPGA for accelerating Haar-based face detection through dedicated processing is proposed here. Architecture is scalable; load balancing is done to reduce idle time. Haar-based face detection algorithm consists of Haar features and a cascade of classifiers, integral image, lighting correction. Proposed architecture consists of the frame buffer, frame scalar and address generator, an integral image generator, squared integral image generator, lighting corrections, classifier data, face detection engine[10].

Face image retrieval technique from video frames is introduced here which aims to detect human attributes automatically.The video will be provided as input which will be extracted into frames and then Viola-Jones face detector is applied. After extraction face detection, facial landmark detection, face alignment and attribute detection is done. This method provides better face image retrieval result[11].

A real-time face detection system which uses the framework of Adaboost and the Haar-like feature is proposed in real time face detection using active illumination.Feature selection consists of Haar-like features, and fast computation of Haar-like features by integral image[12].

A multiple face detector based on pupil detection is presented here which uses active illumination which exploits the retroreflective property of eyes for detection. Range detection of this method is suitable for interactive desktop applications. Here an inexpensive system was combined with single face tracking using recursive estimators[13].

Several optimization techniques for LBP based integrated face detection and tracking are proposed here. Proposed optimizations consist of Integrated face detection and recognition, face detection on embedded GPGPUs and face recognition on embedded GPGPUs. Face detection on embedded GPGPUs consists of Parallelization, skipping with multi-phase scanning, aggregated kernel launching, reducing memory loads, packing and OpenCV vector and reducing data transfer overhead. Face recognition on embedded GPGPUs consists of histogram and chi-square distance[14].

The system was constructed to detect multiple people's faces in real-time. A hybrid GA was employed which is based on selective attention. Recognition method using model-based matching consists of HSV system[15]. Hybrid GA based on selective attention consists of human selective attention, global area searching, local area searching,

genetic algorithm, dynamic reduction of GA group. The proposed system used the unprocessed raw image as input and HSV color system.

3. Proposed Architecture

The proposed architecture as below is divided into multiple layers for the ease of simplicity. The face detection model tracks the presence of any facial components in the video stream it tracks and transforms the image or frames accordingly and takes decision what decision to be taken on the input stream. The next module is the extraction module which extracts the face from the given stream and performs the masking functionality. The retrieval module performs transformation and retrieves and stores depending upon the input. The whole application will be running on Linux os distribution which is working on the raspberry pi hardware. The hardware set up will be based on virtual reality concept, i.e., the device being developed will give virtual reality experience with the VHMD virtual reality head mounted display.

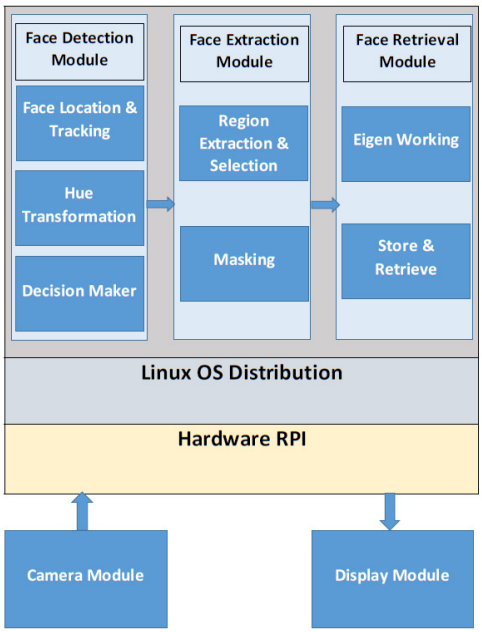

Fig. Architecture of Proposed System

3. Conclusion

Thus, here we have studied multiple algorithms and methods that are used along with their methods and other aspects. We have studied various transformation methods used so as to improve the working and increase the performance of these algorithms However working on a real-time stream of images, i.e., a video is difficult but using transformations and rendering this can be achieved. The proposed architecture presents a new implementation so as to improve performance by using a modular approach.

3. References

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