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A Novel Multi View Video Based Face Recognition Methodology

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ABSTRACT:

The recognition of the persons from videos has numerous applications in Video Surveillances and Computer Vision. Face detection in still images is applied in many of the devices and in many of the applications. Face detection in videos is a recent technique which ensures the identification of person in the video. In a video normally the pose of the persons and the illumination variations were normally present. The main challenge of detecting face images in videos is the pose and the illumination variations and sudden changes in the movement of the object. The videos taken from cameras are taken. The surveillance videos were normally not so clear and there may be some illumination variations and blurness at some places due to rapid movement of the objects. The proposed system analyzes and recognizes the exact face image from the video while the existing systems deals with the recognition of the face images from still images.

The proposed system is capable of identifying the face images in the video in a better manner even though there are pose variations illumination variations and blurs occurring due to rapid motions of the subjects in the video. The videos were converted into frames.Preprocessing is applied to the video frames using median filter to remove the unwanted noises from the frames. The face of the person is detected and the face is masked. The face region is masked so that we identify the face images of the particular person more clearly. The gradient value of the image and the histogram values were calculated. These will be helpful in the identification of the face positions continuously. Based on the detected face the position of the person is determined in each frame and the person is tracked continuously. Hog features are extracted and then RBF kernel function is applied along with spherical harmonics function. The Hog features are more reliable and they are useful in the identification of the face image of the particular person. The Hog features calculate the histogram of the gradient points in the images.

The main advantage of Hog is that it provides feature values required for the matching process and also the hog feature extraction technique counts occurrences of gradient orientation in localized portions of an image. Face images is retrieved from the dataset which is trained based on the distance calculated using Bhattacharya coefficient. The Bhattacharya distance calculated will be more helpful in identifying the face image from the Dataset. The results shows that the recognition rate of the proposed system is increased compared to other existing systems. The system is more reliable for the identification of the face images from the videos.

INTRODUCTION:

The identification of persons in the video has numerous applications in video surveillance system. It is easy to identify persons in frontal view cameras by identifying the face. The identification of the persons in other views was difficult. The identification of the persons in different views can be much helpful in identifying the suspicious persons in a video. The process requires some tedious works including a multiple camera network an effective tracking system to track and identify the persons in an effective manner. A facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source.

One of the ways to do this is by comparing selected facial features from the image and a facial database. It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Face recognition has been one of the most active research topics in computer vision and pattern recognition for more than two decades. Some facial recognition algorithms identify facial features by extracting landmarks, or features, from an image of the subject's face. For example, an algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw.

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These features are then used to search for other images with matching features. Other algorithms normalize a gallery of face images and then compress the face data, only saving the data in the image that is useful for face recognition. A probe image is then compared with the face data. One of the earliest successful systems is based on template matching techniques applied to a set of salient facial features, providing a sort of compressed face representation Facial recognition can be done from far away so with no contact with the subject so they are unaware they are being scanned.Facial recognition is most beneficial to use for facial authentication than for identification purposes, as it is too easy for someone to alter their face, features with a disguise or mask, etc. Environment is also a consideration as well as subject motion and focus on the camera.Facial recognition, when used in combination with another biometric method, can improve verification and identification results dramatically.

EXISTING SYSTEM :

The face detection process is employed in still images. 3D model reconstruction, local feature matching, regularized regressions were employed to identify the face images. The feature based approaches uses SVM classifier to verify the poses. In video based face recognition SVM based approaches are used to select the frontal poses from the video frames and recognition is done. 3D face models based matching process is used to match the face images. In feature based approaches LBP and PCA were more commonly used for face matching. Gaussian Mixture Model, Hidden Markov Models were

proposed to find the face regions in the video. The feature matching techniques extracts the feature values from the images using several algorithms that were proposed. Then based on the extracted feature values the face images were recognized from the videos. Two pair of face were got from the user and the similarities between them were measured and the face is recognized.

Disadvantages :

The recognition of the faces in different poses and illumination variations is not an easy process and it always reduces the recognition rate of the process. 3D reconstruction process and recognizing using the 3D face models needs complex mechanisms and they are very costly.

PROPOSED SYSTEM:

The video is converted into frames. Preprocessing is applied to the video frames using median filter. Then face region in the frame is detected and the face region is masked. Based on the position of the face in the frame the face region is detected in the whole video. Spherical harmonics is applied to the input image. HOG features are extracted and then RBF kernel function is applied. The face images of some subjects were trained. The distance between the train feature and the test image features were calculated. The image that is having the minimum distance is retrieved from the database.

Advantages :

The detection and recognition of the face images are more effective. The recognition rate is high. The detection and masking of the face is more helpful in identifying the suspects in the video.

TECHNIQUE:
PREPROCESSING:

The video is first converted into frames. The noises in the frames reduce the quality of the frames. Each frame is considered as images. Inorder to improve the quality of the images we normally employ some filtering operations. Median filter is used for filtering. The median filter considers each pixel in the image in turn and looks at its nearby neighbors to decide whether or not it is representative of its surroundings. The identified noisy pixel is replaced by the median of neighboring pixel values. The median is calculated by first sorting all the pixel values from the surrounding neighborhood into numerical order and then replacing the pixel being considered with the middle pixel value. In preprocessing unnecessary noises in the video were eliminated. An unnecessary noise refers to the unwanted pixels in the frames. The aim of gradient operators is to indicate such locations in the image. Gradient operators suppress low frequencies in the frequency domain (i.e. they act as high-pass filters). Noise is often high frequency in nature; unfortunately, if a gradient operator is applied to an image the noise level increases simultaneously. Filters are used in the preprocessing techniques. imfilter() function is used to remove noises from multidimensional array. The input can be logical or a nonsparse numeric array of any class and dimension.

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The resulting array has the same size and class as the input. The computation is performed using double precision floating point numbers. Images taken with both digital cameras and conventional film cameras will pick up noise from a variety of sources. This is in contrast to the mean filter's uniformly weighted average. Because of this, a Gaussian provides gentler smoothing and preserves edges better than a similarly sized mean filter.

FACE DETECTION :

The face image are detected in the frame. The face region is detected using the vision cascade operator which identifies the face region in the image. It gives the x and y position of the face images. The position of the detected face image is taken and a rectangle is drawn at the particular location.

FACE MASKING :

The face region is then masked based on the detected face region. The region which is detected as face is taken and the particular region is marked separately. The areas other than the region which is detected as a face were blackened and face alone is masked. This will be helpful in the correct recognition of the face images. Each stage of the classifier labels the region defined by the current location of the sliding window as either positive or negative. Positive indicates an object was found and negative indicates no object. If the label is negative, the classification of this region is complete, and the detector slides the window to the next location. If the label is positive, the classifier passes the region to the next stage. The detector reports an object found at the current window location when the final stage classifies the region as positive. The stages are designed to reject negative samples as fast as possible. The assumption is that the vast majority of windows do not contain the object of interest. Conversely, true positives are rare, and worth taking the time to verify. A true positive occurs when a positive sample is correctly classified. A false positive occurs when a negative sample is mistakenly classified as positive. A false negative occurs when a positive sample is mistakenly classified as negative. To work well, each stage in the cascade must have a low false negative rate. If a stage incorrectly labels an object as negative, the classification stops, and there is no way to correct the mistake. However, each stage may have a high false positive rate. Even if it incorrectly labels a nonobject as positive, the mistake can be corrected by subsequent stages.

The overall false positive rate of the cascade classifier is fs, where f is the false positive rate per stage in the range (0 1), and s is the number of stages. Similarly, the overall true positive rate is ts, where t is the true positive rate per stage in the range (0 1]. Thus, you can see that adding more stages reduces the overall false-positive rate, but it also reduces the overall true positive rate. The cascade object detector uses the Viola-Jones detection algorithm and a trained classification model for detection.

Application:

Face recognition is more reliable in most of the cases. Face recognition systems can be useful in computer vision system. The recognition of the face images from the videos can be used in the authentication process since the process is more reliable. The process can be employed in the surveillance system since the process can easily identify the suspects even in different views.

TRACKING:

The position of the face regions at each frame is updated each time and the person is tracked all over the video. The position of the face region at each time is identified by analyzing the movement of the person in the consecutive frame. The position is updated each time so that the system is trained to identify the movement of the person in the frame. Each time the position of the rectangle is moved according to the movements identified in the frame.

RECOGNITION :

Spherical harmonic pattern is applied to the face images. Then the HOG features are extracted from the image. The extracted features then passed to RBF kernel which projects the feature values based on different views of the subjects. The distance is calculated between the test feature and the train feature. For this Bhattacharya distance is calculated. The image corresponding to the feature having minimum distance is retrieved from the database.

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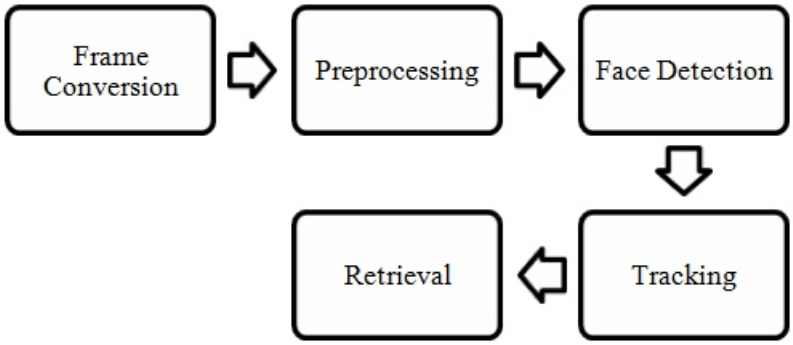
SYSTEM ARCHITECTURE:



GUI open window

Face Detection, Gradient Map, Histogram Calculation And Tracking

select mask region

Gradient image

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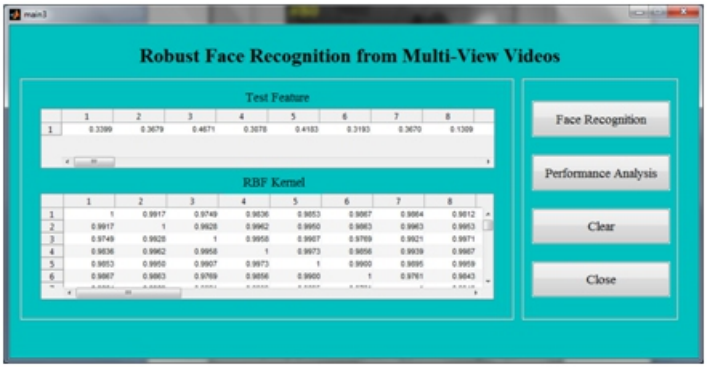
Retrived Image



Robust Face Recognition from Multi-View Videos

CONCLUSION AND FUTURE ENHANCEMENT:

The face image of the subject is detected exactly. The detection of the face and the retrieval is very useful in many of the processes. There is no need to identify the pose and other such process. The person is identified correctly even though there are pose variations and illumination variations. The performance of the proposed system is high compared to the techniques that are used to identify the face images in multi view videos. The process can be further developed by recognizing the actions of the persons in the video. The features used can be further changed which recognizes the persons in a better way. For feature extraction additional features such as SIFT features SURF features can be used. The process can be developed to identify the reaction and persons or actions performed by the person. Inorder to recognize the action or reaction of the person some classifiers can be used. The classifiers such as Probabilistic Neural Network classifier, multi class adaboost classifiers can be used for this purpose. If the classifiers were trained they can exactly recognizes the action or reaction of the person. Multiclass classifiers have to be used for this purpose.

The multiclass classifiers can recognize different actions and reactions of the persons. The supervised classifiers need training of the datasets that we are using to recognize the action. The unsupervised classifiers clusters the features to find the category to which the input feature belongs. The accuracy, sensitivity, specificity of the classifiers can be measured and the confusion matrix and ROC curve can be obtained that represents the performance of the classifiers that we are using. The calculated performance can be compared with some other methods.

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