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HUMAN IDENTIFICATION USING FERET AND FRGC

Kavitha.B.Kumar[1] *K.Sivakami*[2] Vaisakhi V S[3]

[1] *Asst. Professor , Department of ECE, Nehru Institute of Engineering and Technology, Coimbatore.*

[2] *Asst. Professor, Department of ECE, Nehru Institute of Engineering and Technology, Coimbatore.*

[3] *Asst. Professor, Department of ECE, Nehru Institute of Engineering and Technology, Coimbatore.*

[1]*kavithabkumar7@gmail.com* [2] *ksivakaamii@gmail.com* [3]*vaishunethaji@gmail.com*

Abstract:

The project uses a method which is scalable to the gallery size and modifies one-against-all approach to use a tree – based structure. At each internal node of the tree, a binary classifier based on PLS (partial least squares) regression is used to guide the search of the matching subject in the gallery. The use of this structure provides reduction in the number of comparisons when a probe sample is matched against the gallery.

*Index terms: P*artial Least Squares *(PLS), (*FERET*), (*FRGC*)*

1. INTRODUCTION

The main issue is how to match two face images of the same person under different conditions. One is taken in a controlled studio setting while the other is captured in uncontrolled illumination condition such as hallways, atria, or outdoors. To overcome the uncontrolled environmental problems, we introduce a systematic approach that combines multiple classifiers with complementary features instead of improving the accuracy of a single classifier .Illumination insensitive preprocessing and a score fusion technique are in corporate into the proposed face recognition system. The current study on face recognition is the local feature-based method. The local feature-based methods analyze a plural of local features, such as Gabor wavelet features extracted from the high-resolution image, but most of these approaches impose a heavy computational burden on the target, in particular has low computational power. The project is designed to overcome these challenges. Focusing on the benefits provided by combining an increasing number of featured descriptors' weighted by partial least squares(PLS) to emphasize those that best discriminate among different subjects ,our project focuses on the robustness under uncontrolled acquired images and scalability in large galleries

In [1], A. S.Tolba A.H.El-Baz, and A.A.El-Harby, the task of face recognition has been actively researched in recent years. This survey provides an up-to-date review of major human face recognition research. An overview of face recognition and its applications is presented first .Then, a literature review of the most recent face recognition techniques is presented .Description and limitations of face databases which are used to test the performance of the face recognition algorithms are given. A brief summary of the face recognition vendor test (FRVT) 2002, a large scale evaluation of automatic face recognition technology, and its conclusions are also given.

This method integrates the cascade of rejecters approach with the Histograms of Oriented Gradients (HoG) features to achieve a fast and accurate human detection system. The features used in our system are HoGs of variable size blocks that capture salient features of humans automatically. Using Ada Boost for feature selection, we identify the appropriate set of blocks, from a large set of possible blocks. In our system, we use the integral image representation and a rejection cascade which significantly speed up the computation. Fora320×280 images, the system can process 5 to 30 frames per second depending on the density in which we scan the image, while maintaining an accuracy level similar to existing methods.

Human detection is a logical next step after the development of successful face detection algorithms. However, humans have been proven to be a much more difficult object to detect because of the wide variability in appearance due to clothing, articulation and illumination conditions that are common in outdoor scenes .Dalaland Triggs presented a human detection algorithm with excellent detection results .The method uses a dense grid of Histograms of Oriented Gradients (HoG), computed over blocks of size 16×16 pixels to represent a detection window. This representation is proved to be powerful enough to classify humans using a linear SVM. Unfortunately, their method can only process 320× 240 images at 1FPS using a very sparse scanning methodology that evaluates roughly 800 detection windows per image.

Hence this method is used to speed up their method, while increasing the number of detection windows for evaluation from 800 to 12,800. The improvement is achieved by combining the cascade of rejecter approach that is extensively used for face detection with the HoG features.

2. EXISTING SYSTEM

Face recognition research has achieved ignificant progress over the past decade. There are some recent and comprehensive surveys on face recognition written by Tolbaetal and Zhaoetal. Most previous works are based on statistical learning or local matching methods. Methods in the former category use the whole face region to perform recognition and include techniques such as subspace discriminant analysis, support vector machine (SVM), and AdaBoost. These methods suffer from the generalizability problem due tot he unpredictable distribution of real-world testing face images, which might be dramatically different from the training samples.

Local binary patterns (LBP) and Gabor filters are descriptors most ideally used in face recognition. LBP is invariant to monotonic photometric change and can be efficiently extracted. Gabor features are characterized by spatial frequency, spatial locality, and orientation selectivity for coping with image variability such as illumination variations. There are several combinations or variations based on these LBP and Gabor descriptors .In addition, by varying a sampling radius and combining the LBP images, a multi resolution representation based on LBP called multi scale LBP(MSLBP) can be obtained. This representation has been suggested for texture classification, and the results reported for this applications how better accuracy than that of the single-scale LBP method.

2.1. Algorithm One-Against-All Approach

Learning:

Extract features for all
subjects **for i=1toNdo**

1. Set samples of the ith subject as positive Exemplars
2. Set remaining samples as counter examples
3. Build the **i**th PLS regression model
4. Save regression coefficients βi.

Matching of probe samples
For each probe sample **do**
ν←extract
features from r
for i=1
do←end

Set rank-1 match of r to be subject arg()
End

2.2 .Illumination Normalization

Illumination normalization, the r type of image normalization that we are concerned with, is discussed next. They define an extension to the edge map technique, the line edge map, where face contours are extracted and combined in segments, which are then organized as lines. The resulting feature vectors are compared using a modified Hausdorff distance; prefiltering is then applied before nagging proper authentication. Fisher face shave been shown superior in performance to GAO's methodology as they exhibit a better ability to maximize the between-persons variability while minimizing the within-person differences.

According to this and similar results, Argue that the performance of a recognition system can benefit from combining several suitable linear techniques. Another approach uses a ratio- image between the face image and a reference face image .An iterative algorithm updates the reference image, which is reconstructed from the restored image by means of PCA. A different group of techniques relies on near-infrared illumination to obtain face images of good quality regardless of the visible illumination in the environment.

These techniques, however, require special hardware. Alternatively, many existing2-D methods pursue explicit robustness to illumination changes through some normalization technique, rather hand devising distortion invariant recognition techniques. A comparison among many illumination normalization algorithms concludes that Self-Quotient Image (SQI) and Local Binary Patterns (LBPs) represent the best solution, in terms of simplicity, speed, and authentication accuracy, when used with Eigen-space-based nearest- neighbour classifiers. We therefore chose SQI. Generative methods providea3-Dalternative to the aforementioned approaches, which try to perform both kinds of normalization within the same algorithm.

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proposed, robust face recognition is still

difficult. The recent FERET test has revealed that there are at least two major challenges:

1.The illumination variation problem

2. The pose variation problem

Either one or both problems can cause serious performance degradation in most of existing systems. Unfortunately, these problems happen in many real world applications, such as surveillance video. The general face recognition problem can be formulated as follows: Given single image or sequence of images, recognize the person in mage using a database. Solving the problem consists of following steps:1)face detection ,2) face normalization, 3)inquire database.

2.3.1The Illumination Problem

Images of the same face appear differently due to the change in lighting. If the change induced by illumination is larger than the difference between individuals, systems would not be able to recognize the input image. To handle the illumination problem, researchers have proposed various methods. It has been suggested that one can reduce variation by discarding the most important eigen face. And it is verified in that discarding the first few Eigen faces seems to work reasonably well. However, it causes the system performance degradation for input images taken under frontal illumination.

In this method different image representations and distance measures are evaluated. One important conclusion that this paper draws is that none of these method is sufficient by itself to overcome the illumination variations. More recently, a new image comparison method was proposed by Jacobsetal. [20]. However this measure is not strictly illumination-invariant because the measure changes for a pair of images of the same object when the illumination changes.

2.3.2 The Pose Problem

The system performance drops significantly when pose variations are present in input images. Basically, the existing solution can be divided into three types:

1.Multiple images per person are required in Both training stage and recognition stage

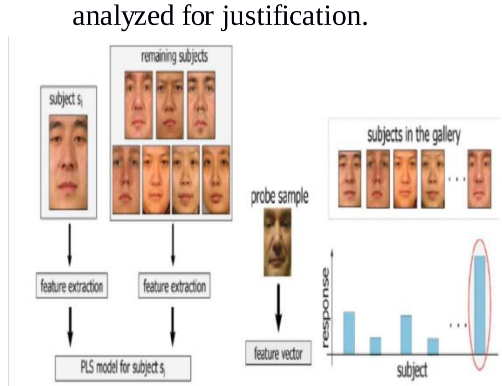
2.Multiple images per person are used in Training stage but only one database image Per person is available in recognition stage,

3. Single image based methods.

3. PROPOSED SYSTEM

Our proposal begins by decomposing the images into non-overlapping blocks.

- Each block is subjected to feature extraction namely,
- Shape Features–HOG
- Texture Features–LBP
- Color Features–Averaging the intensities in each block
- Visual Features–Gabor Features
- These features are subjected to dimension reduction using PLS regression.
- Finally, these features are labeled and learnt by Tree based structure called as Classification–Regression Tree.
- Using this the verification is carried out for a probe sample.
- Identification accuracy is calculated and analyzed for justification.



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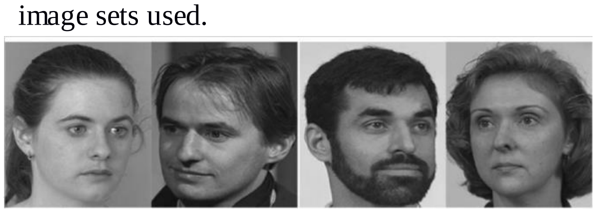
located through the approach presented namely, the extended Active Shape Model (STASM) algorithm. The latter is used to locate features in frontal views of upright faces.

It first submits the image to a global face detector Images that lack faces are discarded. ROI are individually fed to STASM algorithm, which searches for relevant landmarks by minimizing a global distance between candidate image points and their homologues using a general model (shape model), which is pre computed (“learned”) over a wide set of training images. The algorithm locates 68 interest points.

STASM may be not a solution fits all. However, it is among the few ones that are accessible as open source and can 1`be handled without too much effort .This is a critical point, since solving such problems is out of the scope for this paper. The quality indices proposed and implemented, such as the one based on symmetry, which work even with an inaccurate point location, aim at handling such situations by asking for a new capture/selection of a different sample (“identity management”) or for user validation in the specific case of tagging.

To the extent that STASM helps its use seems justified .In addition, we tested two further implementations of ASM, namely, ASM Library and Open ASM. The obtained results were infavour of using STASM. We also trained it on sample images from the image sets used.

3.

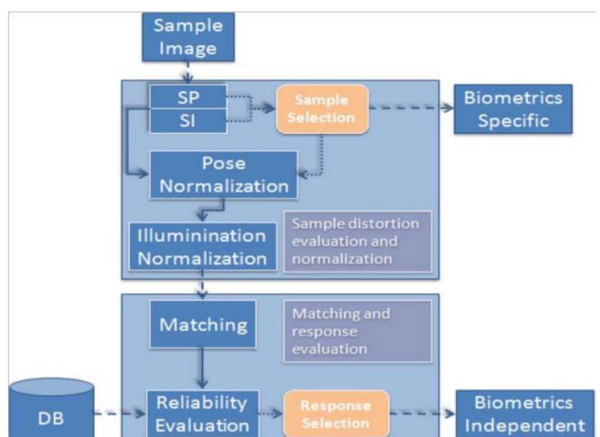


Pose normalization is often employed to improve classification accuracy. As an example, which is among the most efficient algorithms available for such purposes ,computes a 3-Dface model starting from one or more 2-D images and modifying a 3-D generic model (morphable model).A similar idea is applied in Polar Rose.

The resulting final image undergoes illumination normalization. This is performed using the SQI algorithm. The value of each image pixel is divided by the mean of the values in its neighborhood, represented by a square mask of size k×k (in our case k=8).The final result of the over all normalization process.

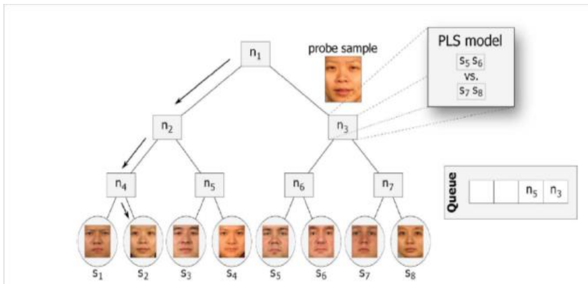
3.2FaceArchitecture

FACE to further derive important additional information regarding the image quality achieved during the acquisition of the biometric sample. Two quality indices are defined for this purpose, which are inversely related to the “effort” that would be needed to correct the original biometric image.



3.2.1ProblemIdentification

Need to handle the problem of insufficient training data. Need to achieve high performance when only a single sample per subject is available. Need to reduce the number of comparisons made for verification.



the details of each use case.

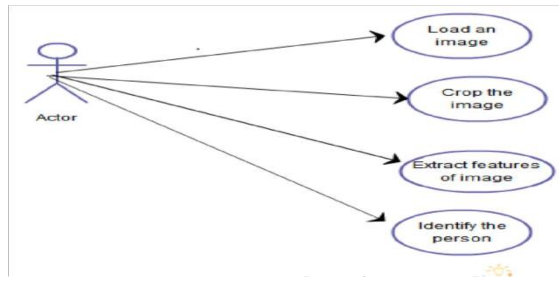
4.1Creating Case Diagrams

I like to start by identifying as many actors as possible .You should ask how the actors interact with the system to identify an initial set of use cases. Then, on the diagram, you connect the actors with the use cases with which they are involved. If an actor supplies

Information, initiates the use case, or receives any information as a result of the use case, and then there should be an association between them. I generally don't include arrow heads on the association lines because my experience is that people confuse them for indications of information flow, not initial invocation.

4.2Need of Case Diagram

The very first question to be answered then is why do we develop the Use Case model-what Use Cases are and also-very importantly-what they are not. The Use Case model is about describing WHAT our system will do at a high-level and with a user focus for the purpose of scoring the project and giving the application some structure. Phew! The Use Cases are the unit of estimation and also the smallest unit of delivery .Each increment that is planned and delivered is described in terms of the Use Cases that will be delivered in that increment.



or service under test. Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. Test techniques include, but are not limited to, the process of executing a program or application with the intent of finding software bugs (errors or other defects).

Different software development models will focus the test effort at different points in the development process. Newer development models, such as Agile, often employ test-driven development and place an increased portion of the testing in the hands of the developer, before it reaches a formal team of testers. In a more traditional model, most of the test execution occurs after the requirements have been defined and the coding process has been completed.

Table 4.1 Sample Test Cases

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Test CaseNo	Test Case	Result
1	Click on input image button. It should help the user in selecting an image should be displayed.	Pass
2	Click on Image enhancement. It should take only the face part of the	Pass
3	Click on feature Extraction button. It should extract all features of image.	Pass
4	Click on identification button. It should identify correct person.	Pass

5. CONCLUSION

The project has focused on face identification method using a set flow level feature descriptors analyzed by PLS, which presents the advantages of being both robust and scalable. Experimental results have shown that the method works well for single image per sample, in large galleries, and under different conditions. The use of PLS regression makes the evaluation of probe gallery samples efficient due to the necessity of only single dot product evaluation. Optimization is further employed by incorporating the tree-based structure, which largely reduces the number of projections when compared with the one-against-all approach, with a negligible effect on recognition rates. In addition, experiments had shown that the combination of multiple feature channels, the use larger image size, and the addition of counter examples improve results greatly.

REFERENCES

[1] A.Tolba ,A.El-Baz ,and A.El-Harby ,"Face recognition:A literature review, "Int.J.Signal Process .,vol. 2,no. 2, pp.88–103,2006.

[2] W.Zhao ,R.Chellappa ,P.J.Phillips ,and A.Rosenfeld," Face recognition: A lite rapture survey,"ACM Comput.Surv.,vol.35,no.4, pp.399–458, Dec.2003.

[3]W.R.Schwartz ,A.Kembhav i,D.Harwood ,and L.S.Davis, "Human detection using partial least squares analysis,"in Proc.IEEE Int. Conf .Comput. Vis.,2009, pp. 24–31.

[4] X.Tanand B.Triggs,"Fusing Gaborand LBP feature sets for kernel based face recognition,"inProc.IEEEInt.Conf. Autom. Face Gesture Recog., 2007, pp. 235–249.

[5] L.Wolf,T.Hassner ,andY. Taigman,"Effective un constrained face recognition by combining multipled escriptors and learned back ground statistics," IEEE Trans.PatternAnal.Mach.Intell.,vol.33,no.10,pp.1978–1990,Oct.2011

[6] H.Wold,"Partialleastsquares," inEncyclopedia ofStatistical Sciences,S.Kotz andN.Johnson,Eds.New York:Wiley, 1985,pp.581–591.

[7W.R.SchwartzandL.S.Davis,"Learningdiscriminativeappearancebasedmodelsusingpartialleastsquares,"inProc.BrazilianSymp.Comput.Graph. Image Process., 2009,pp.322–329.

[8] C.Dhanjal, S. Gunn,andJ. Shawe-Taylor,"Efficient sparse kernel feature extraction based on partial least squares," IEEETrans.PatternAnal.Mach.Intell., vol. 31,no.8,pp.1347–1361,Aug.2009.

[9]Q.S.Sun,Z.Jin,P.A.Heng,andD.S.Xia,"novel feature fusion method based on partial least squares regression," inProc.Int.Conf.Adv Pattern recog,2005, pp.268 – 277.

[10]M.BarkerandW.Rayens,"Partial least squares for discrimination,"J.Chemometrics,vol. 17,no.3,pp.166–173,Mar.2003.