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GENDER DETECTION USING LBP AND SVM CLASSIFICATION

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ABSTRACT: Gender classification is one among the necessary domains in image process. Now- a days the gender classification was additionally referred to as face detection helps in several aspects like in trafficking, life science etc. In projected system, the primary stage consists of input facial pictures and people area unit given to the pre-processing stage. The pre-processing stage consists of 2 parameters; those area unit image size and image filtering. The output of the pre-processing stage is useful to the face detection. The faces area unit was detected properly by victimization viola-Jones within the face detection stage. After ward the patch extraction method is begins the photographs that have obtained when face detection area unit divided into patches here. the primary main purpose victimization here is LBP (local binary patterns) and it plays an important role in feature extraction stage. The second main purpose is SVM (support vector machine) that is useful for classifying the gender either it's male or feminine. By victimization the each LBP and SVM the gender classification is finished properly when put next to different classification strategies. For characteristic the gender it take less time when put next to different strategies.

Keywords: *gender classification, LBP, SVM*

1. INTRODUCTION

Gender classification has a important role in image and face processing domain concepts like face detection, biometrics and indexing. Gender classification has attracted researcher's attention over past two decades and it is a challenge to many in gender classification, finding age and improving blur images. In the past two decades, several papers have been published on gender classification and these can be classified mainly into two groups based on the information they used,

1. Geometry based and

2. Appearance based methods.

These are shown in figure 1

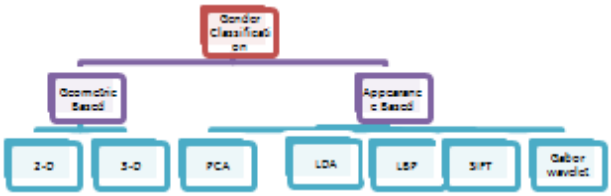

Figure 1: Approaches for Gender Classification

1.Geometry based methods deals with fiducially distances of a faces (distances between important points on the face such as eyes, nose, lips, chin and hair) for gender classification, it has 2-D,3-D process where 2-D is individual colourplaneside, (X-axis and Y-axis) and 3-D is signal processing techniques which has third dimension i.e., (Z-axis) , whereas

2. Appearance based methods use transformations or some other mathematical

operations on the pixels of a face image such as PCA, PCA stands for principle component analysis and it is a useful statistical technique that has found application in fields such as face recognition and image compression , and is a common technique for finding patterns in Data Of High dimension.LDA , LDA stands for linear discriminate analysis and It is a method used in statistics, pattern recognition and machine learning to find a linear combination of features that characterizes or separates two or more classes of objects or events.Local Binary Patterns (LBP), The LBP has been used to represent the texture information of a given face for gender classification whereas SIFT(Scale Invariant Feature Transform) used to represent the local information of a given face and Gabor Face recognition is the process of identifying one or more people in images or videos by analyzing and comparing patterns. Gabor wavelet is the important property of the wavelet is that it minimizes the product of its standard deviations in the time and frequency domain.In image processing; the standard deviation speaks about the level of brightness that is evolved among certain number of pixels. To understand the brightness levels we can make use of histograms.

Face recognition is a natural and straightforward biometric method used by us to identify one another. Face recognition is a recognition process that analyzes facial characteristics of a person. People look for more secure methods to protect their valuable information. Password authentication, card key authentication, and biometric authentication are the most commonly used authentication types.Face detection is an essential tool for face recognition system. Face detection locates and segments face regions from cluttered images obtained from still images. It has numerous applications such as surveillance, security control systems, content based image retrieval, video conferencing, and intelligent human computer interfaces. For the purpose of face representation, here we propose a compression encoding scheme based on maximum correlation criteria. This scheme effectively converts high-dimensional dense features into a much more compact representation. Furthermore, we propose a new face matching method, called the 'Adaptive Matching Framework', and conduct experiments in four different face recognition scenarios: face recognition in the wild, aging face recognition, and matching near-infrared face images and optical face images, and the FERET test. An effective compression encoding scheme based on maximum correlation criteria is proposed. Experiments are conducted to demonstrate that the proposed approach obtains a state-of-the-art result in challenging settings. The system also demonstrated that the proposed approach is generalizable to other large-scale face databases.

This paper is organized as Section 1 presents the introduction. Section 2 deals with related works. Section 3 discussed the proposed; we discussed the experiments analysis in the Section 4. We compared the proposed experiments results with existing models in the Result analysis section 5 and finally we concluded the paper in section 6.

2. Literature Survey

ShubhangiG. Rode [1] proposed a method called common feature discriminate analysis which improves infrared-optical face recognition performance. This method extracts the common features from heterogeneous face

images. It helps in reducing the great discrepancy between the infrared face images to optical face images. This method is also use for matching infrared face images to the optical face images. BaochangZhanga [2] proposed a new Local Kernel Feature Analysis (LKFA) method for object recognition where non linear relationships were captured via kernel functions. Different from traditional kernel methods for object recognition, the proposed method does not need to reserve the training samples and is designed to extract the eigenvalue features from the Hermite matrix of a local feature representation, which we have theoretically proven its robustness to noise and perturbations. Experiment results on palmprint and face recognitions demonstrated the effectiveness of the proposed LKFA that significantly improved the performance of the local feature based object recognition method.

Chi-Ho CHAN[3]A multiple kernel fusion method combining two multi resolution histogram face descriptors is proposed to create a powerful representation method for face recognition. The multi resolution histogram descriptors are based on local binary patterns and local phase coding to achieve invariance to various types of image degradation. The multi-kernel fusion is based on the computationally efficient spectral regression KDA. The proposed face recognition method is evaluated on FRGC 2.0 database with very impressive results. The results reported the accuracy is better than that of a single scale pattern method. Jiwen Lu[4] proposed a simultaneous feature and dictionary learning (SFDL) method for image set based face recognition, where each training and testing example contains a face image set captured from different poses, illuminations, expressions and resolutions. By jointly learning the feature projection matrix and the structured dictionary, this approach extracts more discriminative information for image set based face representation.

YangqingJia Chang Huang [5] adopted the idea of over-completeness by starting with a large number of receptive field candidates, and trained a classifier which uses a sparse subset of them. An efficient algorithm is proposed based on grafting and feature selection has been preformed from a set of pooling candidates. With this method, the best published performance was achieved on the CIFAR-10 dataset, using a much lower dimensional feature space than previous methods did. Zhen Lei, Stan Z. Li [6] given a learning based mechanism to learn the discriminate face descriptor (DFD) optimal for face recognition in a data-driven way. The discriminate image filters and the optimal weight assignments of neighbouring pixels are learned simultaneously to enhance the discriminative ability of the descriptor. In this way, more useful information is extracted and the face recognition performance is improved. Extensive experiments on FERET, CAS-PEAL-R1 and LFW face databases validate the effectiveness and good generalizations of the proposed method.

Zhenhua Chai [7] proposed a novel face representation method which obtains histograms of semantic pixel sets based LBP (spsLBP) with a robust code voting (rcv). By clustering according the semantic pixel relations before the histogram estimation, the spsLBP makes better use of the spatial information over the original LBP. The proposed method is evaluated on three widely used face recognition databases: AR, FERET and LFW. Experimental results show that the proposed method can outperform the original uniform LBP and its extensions. Dong Yi [8] explained the main difficulties which are owing to the complex relationship between

heterogeneous face image spaces. To avoid that they first extracted Gabor features at some localized facial points, and then used Restricted Boltzmann Machines (RBMs) to learn a shared representation locally to remove the heterogeneity around each facial point. Finally, the shared representations of local RBMs are connected together and processed by PCA.. To this end, we propose a framework for heterogeneous face recognition by incorporating RBM into the traditional face recognition pipeline. The proposed framework performed perfectly on the CUFS database and outperformed state-of-the-art methods significantly on the CASIA HFB and NIR-VIS 2.0 databases. Moreover, all experimental results illustrated the success of local RBMs to learn the shared representations.

Sifei Liu [9] focused on NIR-VIS HFR. Light Source Invariant Features (LSIFs) are derived to ex-tract the invariant parts between two types of face images. The derived LSIFs rely only on the variation patterns of the skin parameters so that the effects generated from light source can be largely reduced. The results in CASIA HFB database validate the effectiveness of the model and the recognition approach. In this paper, we propose to utilize Markov networks to represent heterogeneous face image patches separately, which take full ad-vantage of the spatial compatibility between adjacent patches. G-HFR achieves superior performance in terms of face recognition accuracy. ChunleiPeng [10] proposed a novel graphical representation based HFR method (G-HFR) in this paper. Markov networks are deployed to represent heterogeneous image patches separately, which take the spatial compatibility between neighbouring image patches into consideration. A coupled representation similarity metric(CRSM) is designed to measure the similarity between obtained graphical representations. Extensive experiments conducted on two viewed sketch databases and a forensic sketch database show that the proposed method outperforms state-of-the-art methods. AnushriJaswante [11] proposed a method by using face features and neural network. These are based on the two stages one is feature extraction phase and another one is classification phase. They give 1 for male and 0 for female. They used the back propagation neural network. Dhanashri [12] proposed a method by applying principle component analysis by taking facial features which are biometrics. These are identified by minimum distance in the face. FahimMannan [13] proposed a method called dimensionality reduction technique which is having face features as dataset and it is for comparison process. The techniques used are principle component analysis and support vector machine. IhsanUllah [14] it will uses the WLD Weber's local descriptor and it is texture information. The data set used is FERET. BaharHatipoglu [15] in this a new data set is created because to overcome the disadvantages of facial features. Môn Kumar [16]it is based on the computer vision with human interaction process to detect the face images. Here, used the region of interest and discrete cosine transformations.Burhan [17] it involves from faces of images by using (Grey Level Co-occurrence Matrix) that is GLCM. Discrete wavelet transformation is also used here for getting more accuracy. Gil Levi [18] they showed the images learning representation for deep convolutional neural network. It is for gender classification through age and face features. It uses the state-of-the-art method to get more results. Arnulf [19] it uses the combined pre processing methods that is principal component analysis and locally linear embedding method. It is mainly depend on SVM to get more accuracy and

behaviour. DAMAYANTI [20] the proposed the method for security purpose and it is estimate the gender detection. They used the method of two dimensional linear discriminate analyses for feature extraction process. It is only for the gender classification. Federico MATTA [21] they proposed novel multi model gender recognition and it takes the uniform probabilistic frame work. It is for score estimation and it is for better facial recognition. Biometric method is established because it is a reliable facial recognition. YasminaAndreu [22]it is for gender recognition process which is focused on appearance based features for better recognition. Here, bottom half of the part is hidden. In order to prove that robustness and variations in the accuracy. S.Ravi [23] it is also uses a novel based model and it is under non- uniform background features. It is converting of RGB images into another colors.It locate with the lip and mouth region. By using this part of the face the gender is classified. Mainly focussing on the linear vector support machine. OndrejSmirg [24] they used methods like PCA and DCT which are used for gender classification process. The principle component analysis process is mainly focused in this paper.

They calculated the nearest neighbour for classification as well as neural network.YufangBao [25] they develop the algorithm for human face identification.They used the DRLSE method.The triple parameters are used. The values are changeable by using field of view method. Improved accuracy rate is achieved. Bau-Cheng Shen [26] they proposed a method for gender recognition they used the rectangular feature vector for identifying the gender from faces. It is learned by Ada Boost. A non linear support vector is used for better accuracy performance. Ajesh [27] it is also for age and gender classification process and it is for improving capabilities.

KNN method is mostly helpful here because facial features vectors are identified correctly. RiccardoSatta [28] pattern recognition technique is followed for gender classification. It is mostly based on the children faces detection. the best accuracy is obtained here based on children faces.Wen-Sheng Chu [29] it is for face identification purpose and it performs sub optimal performance.SVM method is followed and it is helpful in low diamentioality reduction.the result is obtained in the state-of-art-method. HarpreetKaur Bhatia [30] it is a new method for gender classification which is mainly helpful in identification of faces. The method is nothing but C means algorithm which is focused on pattern recognition

3. Proposed system:

In the existing system, Image quality is very low, difficult to capture an image, it has more complexity in handling the unreadable image and it is more expensive to handle.

To avoid these problems, a method was proposed.

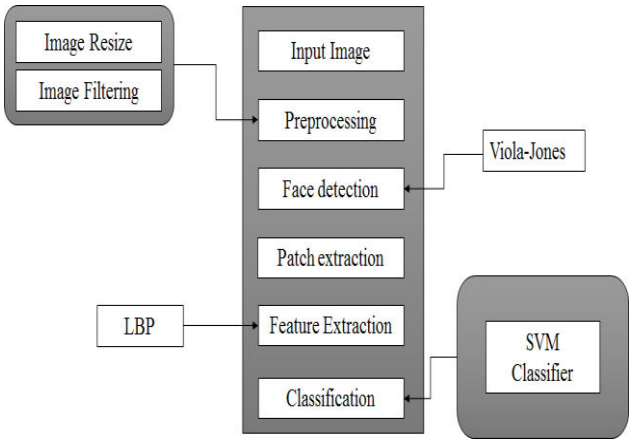

Figure3: Proposed system of gender

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- *Input Image*: The images collected were of both male and female containing only facial features.
- *Pre-processing*: In pre-processing stage the image is resized and filtered.
- *Image resize:* image should be resized and it is a first stage of pre-processing.

```
X = imread('rice.png');
Y = imresize(X, 0.5);
figure
imshow(X)
title('Original Image')
figure
imshow(Y)
title('Resized Image')
```

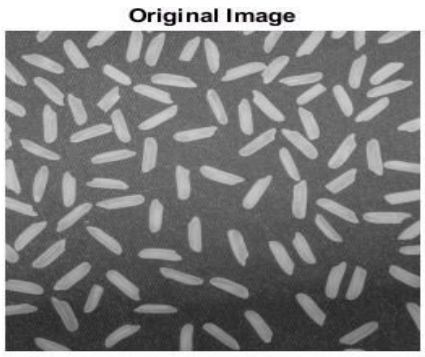

Figure4: original image of rice

Figure 5: resized image of rice

In figure4, the original image is shown which is denoted with X. in figure5; the resized image is shown which is denoted with Y.

Image filtering: Filtering is a technique which is used for modifying or enhancing an image. For example, you can filter an image to emphasize certain features or remove other features. Image processing operations implemented with filtering include smoothing, sharpening, and edge enhancement. In this proposed method we use only image resize.

Priorto feature representation, the prepocessing of face images was done. The parameters used for the Adaptive Matching Framework are shown. K denotes the size of the training subsets is described. And 'active sub-classifiers' denotes the percentage of sub-classifiers selected to compute the matching scores described. The parameters K and b were determined by experimental validation using 30% of the training data. Specifically, the K value has been increased gradually and for each K value, we determined an optimal b value that achieved the highest verification accuracy on the validation data. The optimal K and b values were determined in which optimal verification accuracy can be achieved. In this study, K is set to be 600 and b is set to be 2.865.

- Face Detection: Here the Voila-Jones algorithm is used. It helps in face detection and detecting different classes. It is implemented in Open CV as cvHaar Detect Objects ().It is robust in nature and can detect faces rapidly. It comprises for four stages namely:

1. Feature Selection using Haar wavelets.
2. Creating an integral image.
3. Training the data using Adaboost algorithm.
4. Cascading Amplifiers. Haar Feature selection matches the commonalities found in human faces. The integral image calculates the rectangular features in fixed time. Ada boost

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training algorithm is used to train the classifiers and to construct strong classifiers.

- Patch Extraction: Defining the limit or particular values for rows and columns of an image so that a sub image or patch is alone extracted which facilitates the feature extraction easily.
- Feature extraction: High-dimensional facial features can be extracted using both dense sampling landmarks and multi-scale techniques. High-dimensional facial features contain much more information than low-dimensional ones, which is important for boosting recognition performance, but this benefit comes at the expense of computational complexity. For example, projecting100K-dimensional facial features to 1K-dimensions requires100M floating point multiplications, even if using a linear projection such as Principle Component Analysis (PCA).We therefore propose an effective compression encoding method that turns dense features into a compact feature representation, while at the same time enhancing the discriminative power.

➢ LBP: It is type of visual descriptor which helps in detecting the features. It was proved that it could detect the objects, if trained correctly. The process can be done as:

1. Dividing the image into cells.
2. Comparing the pixel to each of its neighbours.
3. If centre pixel value is greater than its neighbour take it
As 0 otherwise 1.
4. Compute the histogram of each cell and concatenate
All of them.
5. The resultant is the feature of whole image.

Syntax for feature extraction usingLBP

```
features = extractLBPFeatures(X)
features
=extractLBPFeatures(X,Name,Value)
```

Features = extractLBPFeatures(X) returns extracted uniform local binary pattern (LBP) from agreyscale image.

Features = extractLBPFeatures(X,Name,Value) uses additional options specified by one or more Name, Value pair arguments

- *Classification:* Our approach is based on the following two observations:

1. difficult samples are better classified using a classification model
2. Samples can therefore be efficiently classified using existing linear classifiers, and avoiding the kernel space and its inherently high risk of over-fitting. The construction of the Adaptive Matching Framework can be divided into two steps.

A series of training subsets is constructed by repeatedly sampling the training data firstly.. In the second step, a series of linear sub-classifiers is trained based on the training subsets generated in the first step and combined to form a powerful decision.

The classification used here is SVM classifier.

➢ Support Vector Machine: It analyzes the data for both classification and regression. In it we have the kernel trick which implicitly maps their inputs into high dimensional feature spaces. It constructs a hyper plane or set of hyper planes in a high-or infinite-dimensional space, which can be used for classification, regression, or other tasks.

SVM is helpful in:

✓ SVMs are helpful in text and hypertext categorization

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✓ Classification of images can also be performed using SVMs. Syntax for multi SVM which we used

```
function[result]=multisvm(Training Set,GroupTrain,TestSet)
u=unique(GroupTrain);
numClasses=length(u);
result = zeros(length(TestSet(:,1)),1);
```

Here, multiSVM function is used for both trainingand test set. By using this gender is classified.

The SVM classify function uses the followingequation

$$z = \sum_i x_i\, k(s_j, a) + b \qquad (1)$$

Where $s_i$is the support vector, $x_i$is the weights, b is the bias, k is the kernel function.

The images from different places were taken and their pixel values and resolutions were changed such that they all are of same measurements. The images were pre-processed such that they are all of sample measurements. Now, the input image is loaded and gender is identified. Here, we are taking the sample input images from the different sites. After collecting all images of faces we are continuing the process. Here, both male and female faces are there in sample data. We are recognizing them by using LBP and SVM classifier. By using LBPand SVM classifier the gender is classified up to 99 percent. Almost all the data samples are classified correctly.

The two basic sample images are

Figure 6: sample images of both male and female faces

4. Results

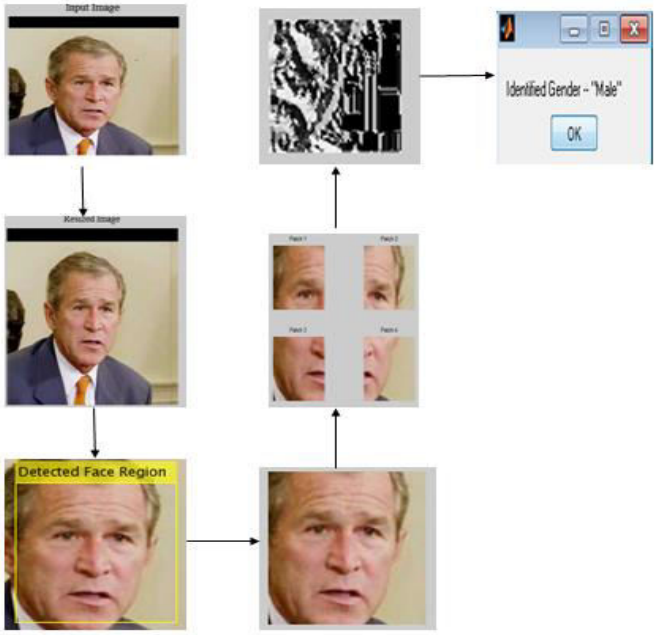

Figure7: results of the proposed system for male identification

In figure 7 the input image is taken first, the second step of this process is resizing image because to identify the image clearly, the third step of this process is detecting the face and here, the face features are only detected remaining all are removed. The forth step of this process is displaying the detected image and it is possible by using viola-jones. The fifth step of this process involves the dividing the face into four patches. That is the faces classified into four parts and each has its own histogram. After that the feature extraction process is done. Here, LBP (LOCAL BINARY PATTERNS) are used. The final stage involves the classification of gender and

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it is possible by SVM classifier.it will decide that the face is male or female face. These all steps involve identifying the gender and it is correctly classified up to 98 percent. Now we can also see the female face detection also.it is shown in figure 8.

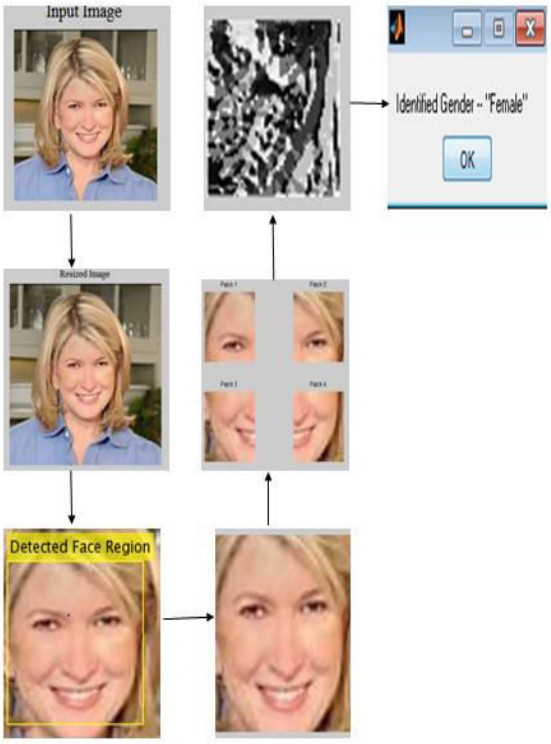

Figure8: results of the proposed system for female identification

In figure 8 the female identification process is shown and it is same as male identification process as we discussed before.

5. Conclusion

In this paper, a new face descriptor is proposed depending on a modified neighbourhood of LBP for gender classification. Here facial texture features which are obtained by concatenating histograms of proposed LBPs on each non overlapping blocks of a face were used. A linear SVM used as the classifier to classify facial texture features for gender classification. The neighbourhood LBP which is proposed represented texture in a better way with less computations and also improves the gender classification accuracy. The advantages of the proposed new approach are: it is easy to implement; it significantly reduces the dimension of face feature representation, with resulting improved computational efficiency without sacrificing recognition performance, it achieves superior performance to current state-of-the-art methods across different face recognition scenarios; it is a general approach that can be easily incorporated into many existing methods to further boost performance. This approach has performed in matching faces in the wild, cross-age face recognition, near-infrared face recognition, and the standard face recognition task. The proposed method consistently outperforms other state-of-the-art methods in several face recognition scenarios. This approach is a general face recognition framework. The proposed approach delivers impressive results and confirms its effectiveness and generalizability.

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