Face Recognition System Using Machine Learning

V.S.Padmini[1], Afreen Anjum[2], Fatima Begum[3], Kavya, Mamata[4]
[1,2,3,4] *Computer Science and Engineering, Guru Nanak Dev Engineering College, Bidar*

***Abstract* - Image compression is a relatively recent technique based on the representation of an image by a contractive transform, on the space of images, for which the fixed point is close to the original image. The aim is to discover which techniques are the most efficient and best applies to the project undertaken. It is a computer application for automatically identifying or verifying a person from digital image or a video frame from a video source. This paper presents a real-time image processing of human face identification for home service robot (HSR). This vision system is set up by two individual sub-systems. The first one is face detection and tracking subsystem based on adaptive skin detector, condensation filter with parallel computing particles, and Haar-like classifier. And a simple and fast motion predictor is also proposed for face tracking.**

INTRODUCTION

Image Processing is a method to convert an image into digital form and perform some operation on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually, image processing system includes treating images as two-dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business.

OBJECTIVE

A facial recognition system is a technology capable of matching a human face from a digital image or a video frame against a database of faces, typically employed to authenticate users through ID verification services, works by pinpointing and measuring facial features from a given image.

Existing System

In recent years, sparse representation-based methods have shown strong performance in face recognition and image classification. Gao et al. [35] proposed a new dimensionality reduction approach based on sparse representation, namely SRC-FDC, considers both the local reconstruction relationship and spatial Euclidean distribution, which encode both the local intrinsic geometric and global structure. In order to overcome the drawbacks of the method of changing the representation of the data in sparse representation. Xu et al. [36] proposed a novel transfer subspace learning method which integrates the method of classifier design and changing data representation. In [37], Tan et al., further explored group sparsity, data locality and the kernel trick, and a joint sparse representation method, named kernelized locality-sensitive group sparsity representation (KLS-GSRC) is proposed. Zheng et al. [38] proposed a iterative re-constrained group sparse representation classification (IRGSC) approach to further enhance the robustness of face recognition for complex occlusion and severe corruption, in which weighted features and groups are collaboratively adopted to encode more structure information and discriminative information than other regression based methods.

Disadvantages

- It is cumbersome.
- Maximum time is required to identify image comparison technically.

Proposed System

To address above issue, combing with the characteristics of human cognition, we proposed a Biomimetic Uncorrelated Locality Discriminant Projection (BULDP) approach. BULDP is based on UDP, but with a new way of adjacency coefficient construction which is proposed according to the characteristics of imagery thinking. The proposed adjacency coefficient does not only make use of the category information between samples, but also reflect the law between the same samples and the similarity between the different samples. Besides, BULDP introduces the concept of uncorrelated spaces, which makes the last of the vector has no correlation and reduces the redundancy of the extracted vectors. In addition, an extended version of Kernel Biomimetic Uncorrelated Locality Discriminant Projection (KBULDP) is given, which can be considered as a generalization of BULDP in kernel space. To demonstrate its effectiveness, we apply our proposed BULDP methods for face recognition and the experimental results are encouraging

Advantages

1. Face recognition is easy to use and in any case, it can be performed without a person even knowing.
2. This system is convenient.
3. Face recognition is more user-friendly.
4. It is in inexpensive techniques of identification.
5. Social acceptability.
6. Facial recognition may be a good measure to avoid the spread of diseases.
7. It can be used to unlock devices.
8. Harder to hide from criminals.
9. Can prevent all kinds of fraud.
10. May help to protect important infrastructure.

MODULES DESCRIPTION

1. Face recognition:

In the first module, we design the system such that first the image dataset folder should be indexed by the user. After index is made, it shows the number of images in the folder which we indexed. Next the query image is selected by the user. The LH and MLH are used during the face recognition process. The objective is to compare the encoded feature vector from one person with all other candidate's feature vector with the Chi-Square dissimilarity measure. This measure between two feature vectors, F1and F2, of length N is measured. The corresponding face of the feature vector with the lowest measured value indicates the match found.

2. Histogram generation:

In this module, the histogram is generated based on the query image selected from the image dataset. The horizontal axis of the graph represents the tonal variations, while the vertical axis represents the number of pixels in that particular tone. The left side of the horizontal axis represents the black and dark areas, the middle represents medium grey, and the right-hand side represents light and pure white areas. The vertical axis represents the size of the area that is captured in each one of these zones. Thus, the histogram for a very dark image will have the majority of its data points on the left side and center of the graph. Conversely, the histogram for a very bright image with few dark areas and/or shadows will have most of its data points on the right side and center of the graph.

3. Expression Recognition:

We perform the facial expression recognition by using a Support Vector Machine (SVM) to evaluate the performance of the proposed method. SVM is a supervised machine learning technique that implicitly maps the data into a higher dimensional feature space. Consequently, it finds a linear hyperplane, with a maximal margin, to separate the data in different classes in this higher dimensional space. After the histogram identified in the previous module, we extract all the feature automatically and the features are stored separately. Based on the extracted features, the expression is recognized.

4. Face Retrieval:

In this module, we retrieve the similar images based on the expression recognized on the previous module. The efficiency of the descriptor depends on its representation and the ease of extracting it from the face. Ideally, a good descriptor should have a high variance among classes (between different persons or expressions), but little or no variation within classes (same person or expression in different conditions). These descriptors are used in several areas, such as, facial expression and face recognition.

CONCLUSION

The advantages and disadvantages of UDP and other extensions of LPP are discussed in this paper. On the basis of these methods, a Biomimetic Uncorrelated Locality Discriminant Projection (BULDP) approach is proposed. First of all, a new construction method of adjacency coefficient is proposed according to the characteristics of human perception. Secondly, the concept of uncorrelated space is introduced, whose purpose is to make sure the final discriminant vectors have no correlation. And then, We give a concrete solution of BULDP. Finally, an extended version of kernel biomimetic uncorrelated locality discriminant projection, namely KBULDP, is proposed.

Experimental results on LFW, YALE, ORL, FERET and CMU PIE indicate that BULDP and KBULDP performs significantly better than the state-of-art methods.

FUTURE SCOPE

However, although BULDP has excellent performance, but the essence of BULDP belongs to supervised learning method. In reality, it is often difficult to obtain large number of unabelled samples, thus, how to make full use of unlabeled samples and how to turn it into a semi supervised method is our next research focus. In addition, when each person has only one training sample, it is called one sample problem [60], [61], the local scatter matrix SL and the total scatter matrix St are both zero matrices, then NDLPP, BULDP and KBULDP will fail to work. To address this, future studies and developments of BULDP include investigating how to solve the one sample problem for NDLPP, BULDP and KBULDP.

REFERENCE

[1] L. Zhi-fang, Y. Zhi-sheng, A.K.Jain and W. Yun-qiong, 2003, "Face Detection And Facial Feature Extraction In Color Image", Proc. The Fifth International Conference on Computational Intelligence and Multimedia Applications (ICCIMA'03), pp.126-130, Xi'an, China.

[2] C. Lin, 2005, "Face Detection by Color and Multilayer Feedforward Neural Network", Proc. 2005 IEEE International Conference on Information Acquisition, pp.518-523, Hong Kong and Macau, China.

[3] S. Kherchaoui and A. Houacine, 2010, "Face Detection Based on A Model of The Skin Color with Constraints and Template Matching", Proc. 2010 International Conference on Machine and Web Intelligence, pp. 469 - 472, Algiers, Algeria.

[4] P. Peer, J. Kovac and F. Solina, 2003, "Robust Human Face Detection in Complicated Color Images", Proc. 2010 The 2nd IEEE International Conference on Information Management and Engineering (ICIME), pp. 218 – 221, Chengdu, China.

[5] M. Ş. Bayhan and M. Gökmen, 2008, "Scale and Pose Invariant Real-Time Face Detection and Tracking", Proc. 23rd International Symposium on Computer and Information Sciences ISCIS '08, pp.1-6, Istanbul, Turkey.

[6] C.C. Tsai, W.C. Cheng, J.S. Taur and C.W. Tao, 2006, "Face Detection Using Eigenface and Neural Network", Proc. 2006 IEEE International Conference on Systems, Man, and Cybernetics, pp.4343-4347, Taipei, Taiwan.

[7] X. Liu, G. Geng and X. Wang, 2010, "Automatically Face Detection Based on BP Neural Network and Bayesian Decision", Proc. 2010 Sixth International Conference on Natural Computation (ICNC 2010), pp.1590-1594, Shandong, China.

[8] M. Tayyab and M. F. Zafar, 2009, "Face Detection Using 2D-Discrete Cosine Transform and Back Propagation Neural Network", Proc. 2009 International Conference on Emerging Technologies, pp.35-39, Islamabad, Pakistan. The 15th International Conference on Machine Design and Production June 19 – 22, 2012, Pamukkale, Denizli, Turkey 12

[9] W. Wang, Y. Gao, S. C. Hui and M. K. Leung, 2002, "A Fast and Robust Algorithm for Face Detection and Localization", Proc. 9th International Conference on Neural Information Processing (ICONIP'O2), pp.2118-2121, Orchid Country Club, Singapore.

[10] Y. Song, Y. Kim, U. Chang and H. B. Kwon, 2006, "Face Recognition Robust to Left-Right Shadows Facial Symmetry", Pattern Recognition Vol.39 (2006), pp.1542–1545.