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A Review on Face Recognition Using Different Techniques

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Abstract:Face recognition presents a challenging problem in the field of image analysis and computer vision, and as such has received a great deal of attention over the last few years because of its many applications in various domains. This article surveys forensic face-recognition approaches and the different techniques of face recognition. Face recognition is finding identity of any detected face using different recognition methods. The propose approach involves Heterogeneous face recognition. Heterogeneous faces are the images captured from different types of devices in different light intensity. The method use has a relational feature representation for face images.

Keywords: Face Recognition, Heterogeneous Face Recognition, Kernel LDA, Kernel PCA, prototype image.

I. INTRODUCTION

Facial recognition technologies are used in a wide array of contexts, reflecting a spectrum of increasing technological sophistication in today's world. At the simplest level, the technology can be used for facial detection; that is, merely to detect and locate a face in a photo. Current uses of facial detection include refining search engine results to include only those results that contain a face; locating faces in images in order to blur them. A more refined version of facial recognition technology allows assessing characteristics of facial images.

Face recognition has always been a very challenging task for the researches. On the other hand, it has always been very difficult to implement due to all different situation that a human face can be found. Due to the difficulty of the face recognition task, the number of techniques is large and diverse. It is not think that images are always capture in ideal conditions, there may be illumination, pose, and expression variation. Such challenges are more prominent in heterogeneous face recognition. In last decades there were many method developed to tackle such problem.

From face recognition surveys it implies that they have face recognition of face images which are of same type. This restricts the face recognition for specific datatype. Such situation can be tackle by using face images of different modality, it refer as heterogeneous faces.

When designing a face detection and face recognition system, in addition to considering the aspects from psychophysics and neuroscience and the factors of human appearance variations, there are still some design issues to be taken into account.

First, the execution speed of the system reveals the possibility of on-line service and the ability to handle large amounts of data. Heterogeneous face recognition using kernel methods concentrate their works on how to speed-up the existing algorithms and how to handle large amounts of data simultaneously.

Second, the training data size is another important issue in algorithm design. It is trivial that more data are included, more information we can exploit and better performance we can achieve. While in practical cases, the database size is usually limited due to the difficulty in data acquisition and the human privacy. In propose technique we can have high dimensional data with increased data size also include some prior knowledge or try to predict and interpolate the missing and unseen data.

In previous technique had problem that how to bring the algorithms into uncontrolled conditions technique. In this research we'll try to combine the existing algorithms and modify the weights and relationship among them to see if face detection and recognition could be extended into uncontrolled conditions.

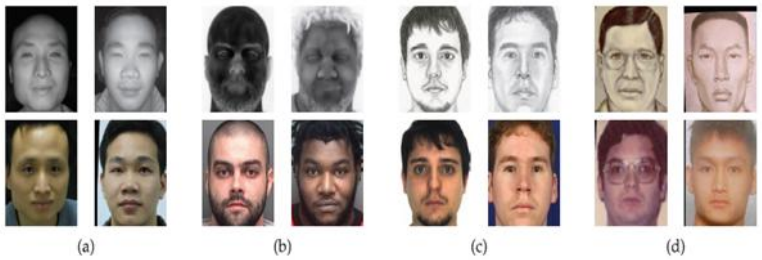

Fig 1: Examples of Images for Heterogeneous Face Scenario

So, the propose technique refer as heterogeneous face recognition, in which we are matching the two face images from alternate imaging modalities, such as an infrared image to a photograph or a sketch to a photograph. While

heterogeneous face recognition can involve matching between any two imaging modalities, the majority of scenarios involve a gallery dataset consisting of visible light photographs. Probe images can be of any other modality, though the practical scenarios of interest to us are infrared images (NIR and thermal) and hand-drawn facial sketches. The core of the proposed approach involves using a relational feature representation for face images. The fig 1.shows the face images capture by different equipment under different illumination.

Face recognition is mainly use for two primary tasks:

- Verification(one-to-one matching)
- Identification(one-to-many matching)

There are numerous areas in which face recognition can be exploited for these two purposes; some of them are given as follows

- Security (access control to buildings, airports/seaports, ATM machines and border checkpoints; computer/ network security; email authentication on multimedia workstations).
- Surveillance (a large number of CCTVs can be monitored to look for known criminals, drug offenders, etc.
- General identity verification (electoral registration, banking, electronic commerce, identifying newborns, national IDs, passports, drivers' licenses, employee IDs).
- Criminal justice systems (mug-shot/booking systems, post-event analysis, forensics).
- Image database investigations (searching image databases of licensed drivers, benefit recipients, missing children, immigrants and police bookings).

II. FACE RECOGNITION TECHNIQUES

2.1 Face Recognition from Intensity Images

Featured-based-

Feature-based approaches first process the input image to identify and extract (and measure) distinctive facial features such as the eyes, mouth, nose, etc., as well as other fiducial marks, and then compute the geometric relationships among those facial points, thus reducing the input facial image to a vector of geometric features[4]. Then employed standard statistical pattern recognition techniques to match faces using these measurements Subheadings should be as the above heading "2.1 Subheadings". They should start at the left-hand margin on a separate line.

Advantages and Disadvantages-

- The main advantage offered by the featured-based techniques is that such methods are relatively robust to position variations in the input image.
- The major disadvantage of these approaches is the difficulty of automatic feature detection and any of these techniques has to make arbitrary decisions about which features are important.

2.2 Holistic

Holistic approaches attempt to identify faces using global representations, i.e., descriptions based on the entire image rather than on local features of the face. These schemes can be subdivided into two groups: statistical and AI approaches.

The simple version of Holistic it represents image as 2D array of intensity value recognition is performed by direct correlation comparisons between the input face and all the other faces in the database. But it is computationally very expensive and sensitivity to face orientation, size, variable lighting conditions, background clutter, and noise. The major part of direct matching methods' recognition performance is that they attempt to perform classification in a space of very high dimensionality. Several other schemes have been proposed to counter this curse of dimensionality, that employ statistical dimensionality reduction methods to obtain and retain the most meaningful feature dimensions before performing recognition. Ex. PCA, LDA.

AI approaches utilize tools such as neural networks and machine learning techniques to recognize faces. In 50 principal components were extracted and an auto-associative neural network was used to reduce those components to five dimensions. In both PCA and Wavelet Transform face extraction scheme, SVM (Support Vector Machine) is used.SVM employed as binary classifiers and the SVM outputs were mapped to probabilities.

These schemes have reportedly yielded promising results for various difficult face recognition scenarios.

2.3 Multiple Classifier Systems

Since the performance of any classifier is more sensitive to some factors and relatively invariant to others, a recent trend has been to combine individual classifiers in order to integrate their complementary information and thereby create a system that is more robust than any individual classifier to variables that complicate the recognition task. Such systems have been termed as multiple classifier systems (MCSs)[4].

The main advantage of the holistic approaches is that they do not destroy any of the information in the images by concentrating on only limited regions or points of interest. Consequently, these techniques are not only computationally expensive but require a high degree of correlation between the test and training images, and do not perform effectively under large variations in pose, scale and illumination, etc. result of which these approaches appear to produce better recognition results than the feature-based ones in general.

2.4 Face Recognition from Video Sequences

Face recognition system based on video typically consists of three modules: one for detecting the face; a second one for tracking it; and a third one for recognizing it .Most of these systems choose a few good frames and then apply one of the recognition techniques for intensity images to those frames in order to identify the individual. Ex. Howell and Buxton employed a two-layer RBF network for learning/training and used Difference of Gaussian (DoG) filtering and Gabor wavelet analysis for the feature representation, while the scheme from was utilized for face detection and tracking[4].

The advantage of this scheme is, it provides temporal continuity, so classification information from several frames can be combined to improve recognition performance. Moreover, video allows the tracking of face images such that variations in facial expressions and poses can be compensated for, resulting in improved recognition.

Dynamic face recognition scheme appears to be disadvantages due to low quality image, clutter background, the presence of more than one face in the picture; and a large amount of data to process.

2.5. Face Recognition from Other Sensory Inputs

The research on face recognition has been focused on identifying individuals from 2D intensity images, in recent years some attention has nevertheless been directed towards exploiting other sensing modalities, such as 3D or range data and infra-red imagery[4].

3D Model-based-

3D Model based recognition system allows us to exploit features based on the shape and the curvature of the face (such as the shape of the forehead, jaw line, and cheeks) without being plagued by the variances caused by lighting, orientation and background clutter that affect 2D systems.

Infra-red-

For detecting and recognizing faces thermal infra-red imagery of faces is use because it is insensitive to variations in lighting. Since infra-red facial images reveal the vein and tissue structure of the face which is unique to each individual (like a fingerprint), some of the face recognition techniques for the visible spectrum should therefore yield favorable results when applied to these images.

III. TABLES, FIGURES AND EQUATIONS

3.1 Tables and Figures

To insert "Tables" or "Figures", please paste the data as stated below. All tables and figures must be given sequential numbers (1, 2, 3, etc.) and have a caption placed below the figure ("FigCaption") or above the table("FigTalbe") being described, using 8pt font and please make use of the specified style "caption" from the drop-down menu of style categories

Table 1: Margin specifications

Margin	***A4 Paper***	US Letter Paper
Left	18.5 mm	14.5 mm (0.58 in)
Right	18mm	13 mm (0.51 in)

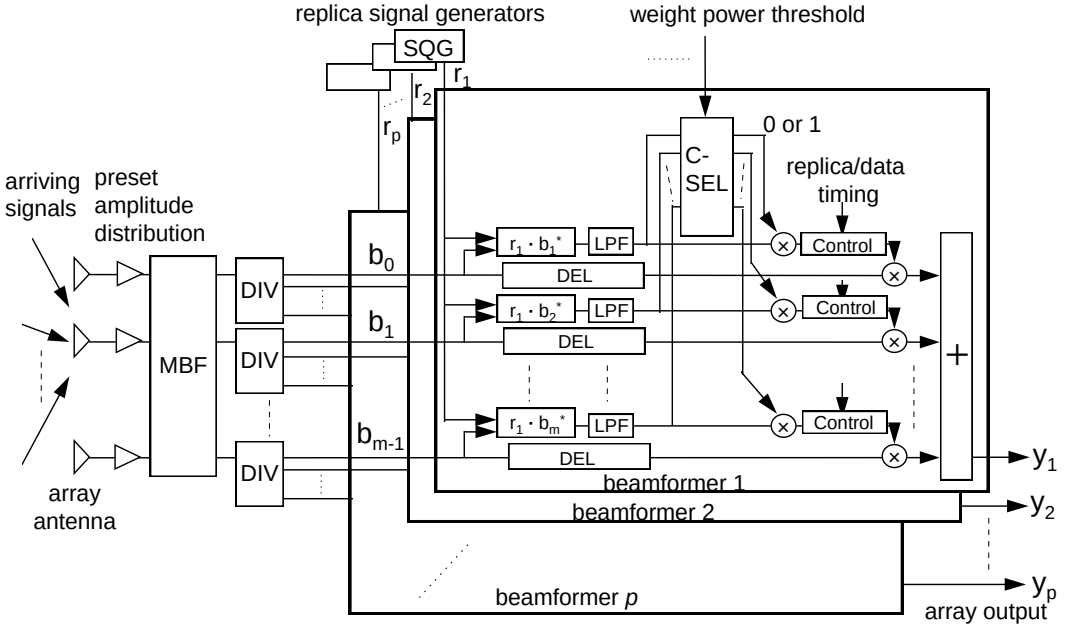

Fig. 1 Proposed beam former.

3.2 Equations

They should be numbered consecutively throughout the text. Equation numbers should be enclosed in parentheses and flushed right. Equations should be referred to as Eq. (X) in the text where X is the equation number. In multiple-line equations, the number should be given on the last line.

$$y_i(N) = \sum_{n=0}^{m-1} w_n(N) b_n(N)$$

$$= \sum_{n=0}^{m-1} \overline{b_n^*(N) r_i(N)} \cdot b_n(N) \qquad (1)$$

IV. CONCLUSIONS

The better your paper looks, the better the Journal looks. Thanks for your cooperation and contribution.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

ACKNOWLEDGMENTS

Insert acknowledgment, if any. The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank ... .” Instead, write “F. A. Author thanks ... .” Sponsor and financial support acknowledgments are also placed here.

REFERENCES

[1] A. A. Name, and B. B. Name, Book Title, Place: Press, Year.
[2] A. Name, and B. Name, "Journal Paper Title", Journal Name, Vol. X, No. X, Year, pp. xxx-xxx.
[3] A. Name, "Dissertation Title", M.S.(or Ph.D.) thesis, Department, University, City, Country, Year.
[4] A. A. Name, "Conference Paper Title", in Conference Name, Year, Vol. x, pp. xxx-xxx.

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