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Linear Discriminant Analysis for Face Detection to Overcome Segregate Investigation

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ABSTRACT—*Face (facial) recognition is the identification of humans by the unique characteristics of their Faces. Face recognition technology is the least intrusive and fastest bio-metric technology. It works with the most obvious individual identifier the human face. With increasing security needs and with advancement in technology extracting information has become much simpler. We aims on building an application based on face recognition using different algorithms and comparing the results. The basic purpose being to identify the face and retrieving information stored in computer. It involves two main steps. First to identify the distinguishing factors in image n storing them and Second step to compare it with the existing images and returning the data related to that image. The various algorithms used for face detection are PCA Algorithm. Face recognition is an important application of Image processing owing to its use in many fields. The project presented here was developed after study of various faces recognition methods and their efficiencies. An effective and real time face recognition system based on video and is developed by asp.net. The recognition produced using 3 different matching techniques are compared and the results have been presented. The correct recognition rate achieved using the normal PCA is 92.3% in comparison to the 73.1% for the LDA with Euclidean distance.*

Keywords— Face recognition, linear discriminant analysis, discrimination analysis, kernel principal component analysis.

1. INTRODUCTION

In imaging science, image processing is processing of images using mathematical operations by using any form of signal processing for which the input is an image, a series of images, or a video, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Images are also processed as three-dimensional signals where the third-dimension being time or the z-axis.

Image processing usually refers to digital image processing, but optical and analog image processing also are possible. This article is about general techniques that apply to all of

them. The acquisition of images (producing the input image in the first place) is referred to as imaging.

Closely related to image processing are computer graphics and computer vision. In computer graphics, images are manually made from physical models of objects, environments, and lighting, instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies. Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans).

In modern sciences and technologies, images also gain much broader scopes due to the ever growing importance of scientific visualization (of often large-scale complex scientific/experimental data). Examples include microarray data in genetic research, or real-time multi-asset portfolio trading in finance.

2. SCOPE OF THE PROJECT

2.1. Face Detection:

We have developed a discriminant analysis, near real-time face detection system from color images using a skin-tone color model and facial features. Major facial features are located automatically, and color bias is corrected by a lighting compensation technique that automatically estimates the reference white pixels. This technique overcomes the difficulty of detecting the low-Luma and high-Luma skin tones by applying a nonlinear transform to the color space. We have also developed a robust face detection module to extract faces from cluttered backgrounds in still images. The system is easily extended to work with video image sequences. The proposed system not only detects the face, but also locates important facial features, such as eyes and mouth. These features are crucial to the performance of the face recognition. The total computation cost to both face detection and feature localization of a 640x480 image is less than 10 seconds on a 2.7G Hz CPU. It varies due to the complexity of the image.

2.2. Face Recognition:

The problem of face recognition in a general situation (arbitrary pose, lighting and facial expression) is a very difficult problem. In this project we have successfully investigated a verity of different approaches for achieving our goals in face recognition.

We have developed four independent solutions to face recognition systems that investigate different aspects of our project goals:

- Evidence accumulation for 2D face recognition
- Demographic information extraction from 2D facial images
- 3D-model enhanced 2D face recognition with few training samples
- 3D face recognition.

3. SYSTEM ANALYSIS

3.1 Existing System

Automatic face recognition consists of subtasks in a sequential manner face detection, face segmentation normalization and face recognition, verify caution many methods of face recognition have been proposed. Basically, they can be divided into holistic template matching based system, geometrical local feature based schemes and hybrid schemes Even though schemes of all these types have been successfully applied to the task of face recognition they do have certain advantages and disadvantages. Thus an appropriate scheme should be chosen based on the specific requirements of a given task.

- Using Biometric function to detecting the face.
- Image sharing with affected quality.
- Using a webcam to detect the face.

4. MAIN FEATURES OF DISTINCTIVE ACCESS FOR EXCEPTION OVERCOME SEGREGATE INVESTIGATION

- Can prevent card counters, etc. From entering casinos.
- Can identify terrorists, criminals, etc.
- Can find missing children.
- Prevents voter fraud.
- The eye of a dead person would deteriorate too fast to be useful, so no extra precautions have to be taken with retinal scans to be sure the user is a living human being.
- Verification time is generally less than 5 seconds.

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5. IMPLEMENTATION

5.1 Face Perception/Detection

- Two stages are involved for face tracking in each shot: detecting frontal faces and expanding face tracks in surrounding frames.
  - In the first stage, an average face model is used to detect faces in each frame, where only frontal faces can be effectively detected.
  - In the second stage, we use detected faces as new face templates to search faces in the database simultaneously.
- Major facial features are located automatically, and color bias is corrected by a lighting compensation technique that automatically estimates the reference white pixels.

5.2 Face Recognition

- A recognition system is a computer application that automatically identifying or verifying a person from a digital image. One of the ways to do this is by comparing selected facial features from the image and a facial database.
- The process of recognition consists of 4 steps:
  - Capture
  - Extraction
  - Comparison
  - Match/non match
- Conversely, ethnicity and gender play an important role in face-related applications. Image-based ethnicity identification problem is addressed in a machine learning framework. The Linear Discriminant Analysis (LDA) based scheme is presented for the two-class (Asian vs. non-Asian) ethnicity classification task. Multi scale analysis is applied to the input facial images.

5.3 Discriminant Analysis

- Discriminant analysis explicitly attempts to model the difference between the classes of data. LDA is a powerful face recognition technique that overcomes the limitation of Principle component analysis technique by applying the linear discriminant criterion.

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6. PCA

Kernel PCA only allows linear dimensionality reduction. However, if the data has more complicated structures, which cannot be simplified in a linear sub-space, traditional PCA will become invalid. Fortunately, Kernel PCA allows us to generalize traditional PCA to nonlinear dimensionality reduction. A kernel principal component analysis (PCA) was previously proposed as a nonlinear extension of a PCA. The basic idea is to first map the input space into a feature space via nonlinear mapping and then compute the principal components in that feature space. This article adopts the kernel PCA as a mechanism for extracting facial features. Through adopting a polynomial kernel, the principal Components can be computed within the space spanned by high-order correlations of input pixels making up a facial image, thereby producing a good performance. KPCA is a development of the PCA method.

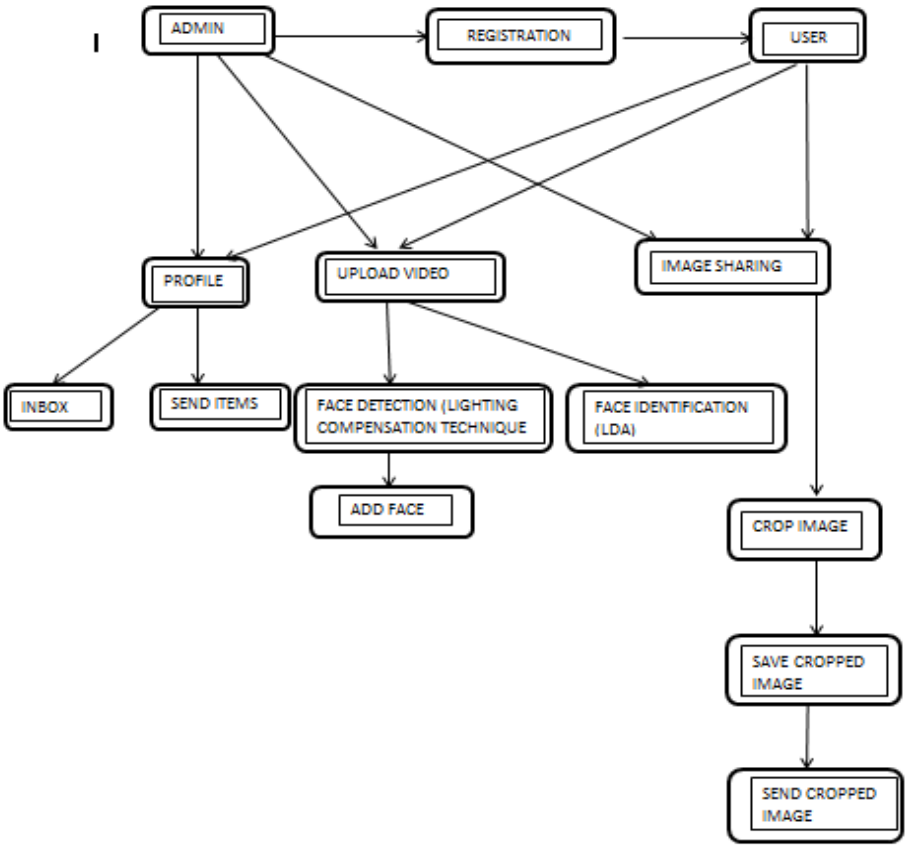

Figure 1: System Architecture

7. CONCULSION AND FUTUREWORK

To detect facial features namely: eyes, eyebrows, skin color and hair color. Then to give good approximation of the salient facial features using vertical and horizontal histogram projection.

By using the common features in future development, to develop and to share audio and video without affecting the quality. Heterogeneous data used to share the quality of images, audio and video. Finally, researchers are beginning to demonstrate that unobtrusive audio-and-video based person identification systems can achieve high recognition rates without requiring the user to be in highly controlled environments.

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