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Face-Name Graph Matching For The Personalities In Movie Screen

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Abstract

In image processing, various biometric applications, name identification from facial images plays an important role, Weber's Local Descriptor (WLD) will be used for face recognition for name identification.WLD is a texture descriptor that performs better than other similar descriptors but it is holistic due to its very construction. We divide an image into a number of blocks, calculate WLD descriptor for each block and concatenate them. This spatial WLD descriptor has better discriminatory power. It is used to represent the image in terms of differential excitations and gradient orientation histogram for texture analysis.WLD is based on Weber's law and it is robust to illumination change, noise and other distortions. So it effectively analyzes the face features to accurate matching and name identification. The feature extraction approach will be used for both test and database images to recognize for name identification. The face will be recognized by finding Euclidean distance between them. The proposed spatial WLD descriptor with simplest classifier gives much better accuracy with lesser algorithmic complexity than face recognition approaches.

Keywords- Normalization, Orientation, Differential excitation, Euclidean Distance.

1. INTRODUCTION

There are number of applications where face recognition can play an important role including biometric authentication, high technology surveillance and security systems image retrieval and passive demographical data collections .it is observable that our behaviour and social interaction are face recognition system could have great impact in improving human computer interaction systems in such a way as to make them be more user-friendly and acting more human-like. It is unarguable that face is one the most important feature that characterizes human beings. By only looking ones faces, we are not only able to tell who they are but also perceive a lot of information such as their emotions, ages and names. This is why face recognition by face has received much interest in computer vision research community over past two decades.

There are 2 main steps involved in recognizing names of humans presented in an image .These are face detection and name classification ,which are applied consecutively. In order to exploit uniqueness of faces in name recognition, the first step is to detect and localize those faces in the images. This is the task achieved by face detection systems.

As face detection is one of popular research areas, many algorithms have been proposed for it. Most of them are based on the same idea considering the face detection as a binary classification task. That is, given a part of image, the task is to decide whether it is a face or not .This is achieved by first transforming the given region into features and then using classifier trained on example images to decide if these features represent a human face. faces can appear in various locations and can also show themselves in various sizes, often a window-sliding technique is also employed .The idea is to have the classifier classifying the portions of an image, at all location and scales, as face or non-face.

2. RELATED WORKS

This section discuss about the literature survey done on various issues are

Cast list discovery problem: In the "cast list discovery "problem the faces are clustered by appearance and faces of a particular character are expected to be collected in a few pure clusters. Names for the clusters are then manually selected from the cast list. Ramanan et al. Proposed to manually label an initial set of face clusters and further cluster the rest face instances based on clothing within scenes the authors have addressed the problem of finding particular characters by building a model/classifier of the character's appearance from user-provided training data.

Multiple learning problems: Multiple instances learning (MIL) is proposed for problems with incomplete knowledge on data labels. Instead of receiving labelled instances as a conventional supervised method does, a MIL method receives a set of labelled bags, where each bag contains a number of unlabelled instances. Thus ,a label can be regarded as a constraint in the form of logical-or relationship with the labels of the instances in the bag.

Retrieval problem (AFR) in video: Recent years have seen a development of algorithms that use AFR for the analysis of media content. Most of these deal with the retrieval problem in video .Arandjelovi'c and zisserman use signature images, obtained by a cascade of transformations of the detected faces. These are matched using a robust distance measure in an image to -image or image –to-set fashion to retrieve film shots based on the presence of specific actors. sivic et al. Match face sets, representing individual faces using SIFT descriptors corresponding to salient facial features. Everingham and Zisserman employ a quasi3D model of the head to correct for varying pose and enrich the training corpus via shot tracking.

3. PROPOSED SYSTEM

The paper proposes a simple, yet very powerful and robust local descriptor, called the Weber's Local Descriptor (WLD).It is based on the fact that human perception of a pattern depends not only on the change of a stimulus (such as sound. lightening)but also on the original intensity of the stimulus specifically.WLD consists of two components differential excitation component is a function of the ratio between two terms. One is the relative intensity differences of a current pixel against its neighbours. The other is the intensity of the current pixel. For a given image, we use the two components to construct a concatenated WLD histogram .Experimental results on the Brodatz and KTH-TIPS2-a texture databases show that WLD impressively outperforms the other widely used descriptors (e.g. ,Gabor and SIFT).In addition, experimental results on human face detection also show a promising performance comparable to the best known results on the MIT+CMU frontal face test set, the AR face dataset and the CMU profile test set.

3.1CLASSIFICATION

With all necessary features have been extracted, the final task is to decide whether or not those features represent female or male face .As there are obviously two decisions to make this essentially binary classification task, that is the classifier is trained on the female and male example face images so that it learns the decision boundary between these two classes. After that it uses what it learn to make a decision on the given face images.

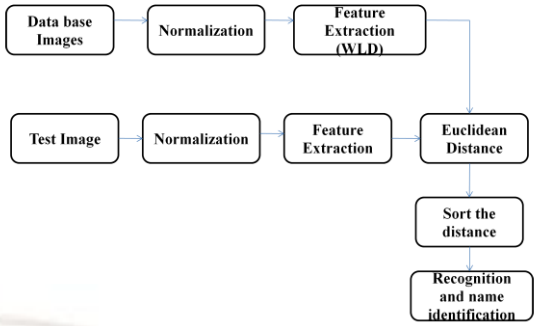

Figure 1: Block diagram for identifying face and name

3.2WLD

In this part, we describe the two components of WLD. Differential excitation ((ξ) and orientation (θ).After that we present how to compute a WLD histogram for an input image (or image region).

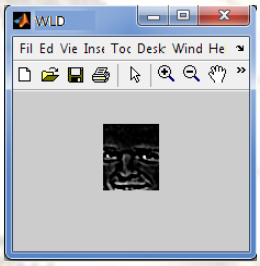

Fig 2.WLD applied Image

3.2.1 DIFFERENTIAL EXCITATION

We use the intensity differences between its neighbours and a current pixel as the changes of the current pixel. By this means, we hope to find the salient variations within an image to simulate the pattern perception of human beings. Specifically ,a differential excitationξ (xc) of a current pixel xc is computed. We first calculate the differences between its neighbours and the centre point using the filter f00

$$v_s^{00} = \sum_{i=0}^{p-1}(\Delta x_i) = \sum_{i=0}^{p-1}(x_i - x_c),$$

Where xi(i=0,1...p-1)denotes the i-th neighbours of xc and p is the number of neighbours. Following hints in Weber's Law, we then compute the ratio of the differences to the intensity of the current point by combining the outputs of the two filters f00 and f01(whose output 01 s v is the original image in fact).

$$G_{ratio}(x_c) = {v_s^{00}}/{v_s^{01}}.$$

We then employ the arctangent function on Gratio(•):

$$G_{arctan}[G_{ratio}(x_c)] = \arctan[G_{ratio}(x_c)].$$

Combining (2), (3) and (4), we have:

$$G_{arctan}\left[G_{ratio}(x_c)\right]=\gamma_s^0=\arctan\left[\frac{v_s^{00}}{v_s^{01}}\right]=\arctan\left[\sum_{i=0}^{p-1}\left(\frac{x_i-x_c}{x_c}\right)\right].$$

So, the differential excitation of the current pixel ξ(xc) is computed as:

$$\xi(x_c)=\arctan\left[\frac{v_s^{00}}{v_s^{01}}\right]=\arctan\left[\sum_{i=0}^{p-1}\left(\frac{x_i-x_c}{x_c}\right)\right].$$

Note that ξ(x) may take a minus value if the neighbour intensities are smaller than that of the current pixel. By this means, we attempt to preserve more discriminating information in comparison to using the absolute value of ξ(x).Intuitively, if ξ(x) is positive; it simulates the case that the surroundings are lighter than the current pixel. In contrast, if ξ(x) is negative, it simulates the case that the surroundings are darker than the current pixel.

3.2.2 ORIENTATION

The orientation component of WLD is the gradient orientation as in, which is computed as

$$\theta(x_c)=\gamma_s^1=\arctan\left(\frac{v_s^{11}}{v_s^{10}}\right),$$

Where 10 s v and 11 s v are the outputs of the filters f10 and f11

$$v_s^{10}=x_5-x_1,\ \text{and}\ v_s^{11}=x_7-x_3.$$

For simplicity, θ is further quantized into T dominant orientations. Before the quantization, we perform the mapping f :θaθ ′ :

$$\theta'=\arctan2(v_s^{11},v_s^{10})+\pi,\ \text{and}$$

$$\arctan2(v_s^{11},v_s^{10})=\begin{cases}\theta, & v_s^{11}>0 \text{ and } v_s^{10}>0\\ \pi-\theta, & v_s^{11}>0 \text{ and } v_s^{10}<0\\ \theta-\pi, & v_s^{11}<0 \text{ and } v_s^{10}<0\\ -\theta & v_s^{11}<0 \text{ and } v_s^{10}>0\end{cases},$$

Whereθ∈ [-π/2, π/2] and θ ′ ∈ [0, 2π]. This mapping considers the value of θ and the sign of 10 s v and 11 s v. The quantization functions is then as follows

$$\Phi_t=f_q(\theta')=\frac{2t}{T}\pi\ \text{, and}\ t=\mathrm{mod}\left(\left\lfloor\frac{\theta'}{2\pi/T}+\frac{1}{2}\right\rfloor, T\right).$$

3.3WEBER'S LAW

Ernst Weber, an experimental psychologist in the 19th century, observed that the ratio of the increment threshold to the background intensity is a constant. This relationship, known since as weber's Law, can be expressed as

$$\frac{\Delta I}{I}=k,$$

Where ΔI represents the increment threshold(just noticeable difference for discrimination).I represents the initial stimulus intensity and K signifies that the proportion on the left side of the equation remains constant despite variations in the term. The fraction ΔI/I is known as the weber's fraction. Weber's Law, more simply stated, says that the size of a just noticeable difference(i.e., ΔI) is a constant proportion of the original stimulus value. So ,for example, in a noisy environment one must shout to be heard while a whisper works in a quiet room.

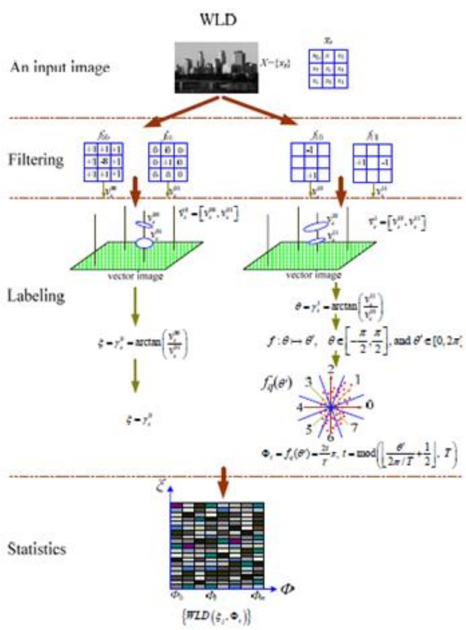

Fig 3: Illustration of computation of the WLD Descriptor.

4. IMPLEMENTATION

After faces are detected by face detection algorithm, they need to be decided his or her names .This is the task achieved by name identification based on face recognition. Similar to the face detection task, the name identification task is also considered as a binary classification problem and it will be done by recognizing the faces to identify the name though the database. Essentially, Name identification through face recognition consists of 4 main steps (1)Pre-processing, (2) Feature Detection,(3) Euclidean Distance and(4) Name Classification.

4.1PRE-PROCESSING

Since, in real-life, it is unlikely that people will face directly and frontally towards the camera, face images often consist of some in-plane and out-of-plane Rotations. Moreover, it is also unlikely that the light condition will be the same for all images. These variations greatly affect an accuracy of name classifiers. The purpose of pre-processing step is thus to remove these variations as much as possible.
As with other computer vision applications, there is no unique solution to this problem. The common techniques involved in pre-processing step are face alignment, and light normalization. Face alignment tries to align faces such that they are closed to a common or specified pose of face as much as

possible, whereas light normalization tries to get rid of the variation in illumination. one of the common employed normalization techniques in the name classification field is histogram equalization.

4.1.1NORMALIZATION

Normalization is a process that changes the range of pixel intensity values. The linear normalization of a grey scale digital image is performed according to the formula

$$I_N = (I - \mathrm{Min})\frac{\mathrm{newMax} - \mathrm{newMin}}{\mathrm{Max} - \mathrm{Min}} + \mathrm{newMin}$$

For example, if the intensity range of the image is 50 to 180 and the desired range is 0 to 255 the process entails subtracting 50 from each of pixel intensity, making the range 0 to 130.Then each pixel intensity is multiplied by 255/130,making the range 0 to 255.

4.2FEATURE DETECTION

Working directly on raw pixel values can be very slow as one small face image can contain a thousand of pixels. Furthermore, not all the pixels will be useful. There can be an underlying structure that describes the differences between male and female faces better. Thus the feature detection module is employed here.

4.3EUCLIDEAN DISTANCE

The Euclidean distance or Euclidean metric is the ordinary distance between two points that one would measure with a ruler, and is given by the Pythagorean formula. By using this formula as distance, Euclidean space(or even any inner product space)becomes a metric space. The associated norm is called the Euclidean norm. Older literature refers to the metric as Pythagorean metric

$$ED = \sqrt{\sum_{i=1}^{N}(D - Ii)^2}$$

Where, D-Database image, Ii-Input image

4.4 NAME CLASSIFICATION

Generally there are two types of features presented in the name classification context, geometric-based features and appearance-based features.

a)Geometric-based features(also called local features)came from psychophysical explorations. They represent high-level face descriptions such as distances between nose ,eyes and mouth, face width, face length, eyebrow thickness and so on.

b)Appearance-based features(also called global features)use low –level information about face image areas based on pixel values.

5. CONCLUSION

The proposed schemes are useful to improve results for identification of the face tracks extracted from uncontrolled movie videos from the sensitivity analysis. It is shown that to some degree such schemes have better robustness to the noises in constructing affinity graphs than the traditional methods. It gives best results in noise full environment also. Future scenario will extend the work to investigate that the optimal functions for different movie genres.

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