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Face Image Retrieval Using Facial Attributes By K-Means

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Abstract - **With the unpredictable growth of devices using camera, people can freely take photos to capture moments of life which are very precious, especially the ones accompanied with friends and family. The growing photo, large-scale content-based face image retrieval is an enabling technology for many emerging applications. We propose a novel method in this paper for searching consumer photos by make use of computer vision technologies in considering facial attributes and focusing on similarities between the faces of the target persons. In this proposed approach, we achieve immediate retrieval in a large-scale dataset by improving the face retrieval in the offline and online stages. The proposed fully automatic method not only allows the recognition of 22 AUs but also openly model their of time characteristics (i.e., sequences of of time segments: neutral, start, height, and balance).**

*Index Terms—**Face image retrieval, human attributes, content-based image retrieval.***

1. INTRODUCTION

Nowadays, digital devices play a critical role in the rise of social network sites and photo sharing services. It lead to the growth of consumer photos available in our life. The importance and the absolute amount of human face photos make manipulations of large-scale human face images a really important research problem and enable many real world applications [1], [2].Recent trends tell that the popularity of touch devices brings new chances and challenges to image organization. It is an enabling technology for many applications including automatic face annotation, crime investigation, etc. In this work, we provide a new attribute search by including high-level human attributes into face image representation. By combining low-level features with high-level human attributes, we find better feature representations and achieve better retrieval results than the existing system. The same idea is proposed in using fisher vectors with attributes for large-scale image retrieval. Human attributes (e.g., gender, race, hair style, and colour) are high- level semantic descriptions about a person. Using these human attributes, many researchers have achieved capable results in different applications such as face verification, identification, keyword-based face image retrieval , and same attribute. In the proposed system two orthogonal methods are used namely attribute-enhanced sparse coding and attribute-embedded inverted indexing. Attribute-enhanced sparse coding activities the global structure of feature space and uses several important human attributes combined with low-level features to construct semantic code words in the offline stage. On another method Attribute-embedded inverted indexing locally considers human attributes of the selected input image in a binary signature and provides efficient retrieval in the online stage. By combining these two methods, we build a large-scale content-based face image retrieval system by taking advantages of both low-level(Look) features and high-level (facemask) semantics. In order to evaluate the performance of the proposed methods, we conduct extensive experiments on two separate public Datasets named LFW and Pub fig. These two datasets Cover faces taken in unconstraint environment and are really challenging for content-based face image retrieval.

2. RELATED WORK

Traditional CBIR techniques use image content like colour, quality and grade to represent images. To deal with large-scale data, mainly two kinds of indexing systems are used. These methods can achieve high accuracy on inflexible object retrieval, they undergo from low recollection problem due to the semantic gap. Recently, some researchers have focused on connecting the semantic gap by finding semantic image representations to improve the CBIR performance and propose to use extra documented in- formation to construct semantic code. Automatically detected human attributes have been shown promising in different applications recently. Using automatically detected human attributes, they achieve excellent performance on keyword- based face image retrieval and face verification. Further extend the framework to deal with multi-attribute queries for keyword-based face image retrieval and propose a Bayesian network approach to utilize the human attributes for face identification. To further improve the quality of attributes the works demonstrate the initial chances for the human attributes but are not broken to generate more semantic (scalable) code words. While images naturally have very high dimensional representations, those within the same class usually lie on a low dimensional subspace. Taking advantages of the effectiveness and simplicity of LBP feature. Doing these pre-processing steps, they ignore the rich semantic cues for a designated face such as skin colour, gender, hair style. To illustrate, the face image before and after the common pre-processing steps. After pre-processing steps, the information loss sources difficulty in identifying attributes (e.g., gender) of the face.

3. PROPOSED SYSTEM

To find the location of faces for every image in the database, we first apply Viola-Jones face detector [2]. In these paper we proposed the detection of a much larger range of facial behavior by classifying facial muscle action [action units (AUs)] that compound expressions. Action units are unsure, leaving the inference about taken determined to higher order decision making (e.g., emotion recognition). We use the framework proposed in [7] to find 73 different attribute scores. Active shape model is applied to locate 68 different facial landmarks on the image. The proposed fully automatic method not only allows the recognition of 22 Action Units but also clearly models their time-based characteristics (i.e., sequences of time-based segments: neutral, beginning, top, and balance). To do so, it uses a facial point detector based on Gabor-feature-based boosted classifiers to automatically localize 20 facial fiducially points. These points are tracked through a sequence of images using a method called particle filtering with likelihoods which are factorized. To encode AUs and their temporal activation models based on the tracking data, it applies a combination of Gentle Boost, support vector machines k means algorithm

A. Action units

The AUs are independent of any of the interpretation, which can be used for any higher order decision making process including recognition of basic emotions, or pre-programmed commands for amost automatic expression analysis systems attempt to recognize a small set of prototypic expressions (i.e. joy, surprise, anger, sadness, fear .To capture the paralinguistic communication and sensitivity of human emotion and, automated recognition offline-grained changes in facial expression is needed. For action units that is varying in the intensities, a 5-point ordinal scale is used to measure the degree of muscle contraction. Although the number of atomic action units is small, more than 7,000 combinations of action units have been observed. FACS provides the necessary detail with which to describe facial expression Automatic recognition of action units is a difficult problem. The anticipated number of hidden units to achieve a good recognition was also investigated. .Changes in the appearance of facial features also can affect the reliability of measurements of pixel motion in the face image. Closing of the lips or blinking of the eyes produces blocking.

B. Gabor-feature-based boosted

The Gabor features has attracted much attention and achieved great success in face recognition area for the advantages of Gabor features used not the best ones for the detection of facial landmarks. However, no method has been proposed on how to select the most discriminate Gabor features for recognition purpose. This paper is an attempt to answer this question by introducing the Gadabouts method into the Gabor feature-based face recognition method. Gabor filter can capture salient visual properties such as spatial localization, orientation selectivity, and spatial frequency characteristics' large number of experimental studies has shown that classifier combination can exploit the discriminating power of individual feature sets.

C. K-means algorithm

The K-Means is a simple clustering algorithm used to divide a set of objects which is based on their attributes or features, into the k clusters in which the k is a predefined or user-defined constant. Defining k centroids, one for each cluster is the main idea. The centroid of a cluster is formed in such a way that it is closely related (in terms of similarity function) to all objects of that cluster. Since we know the numbers of clusters to be formed, the objects which are in the input list are initially divided into random groups, that is, each and every object is assigned to a random cluster. *K-means* clustering aims to partition *n* observations into *k* clusters in which each observation belongs to the cluster with the mean which is the nearest, serving as a important prototype of each cluster. This results in a partitioning of the data space into Voronoi cells.

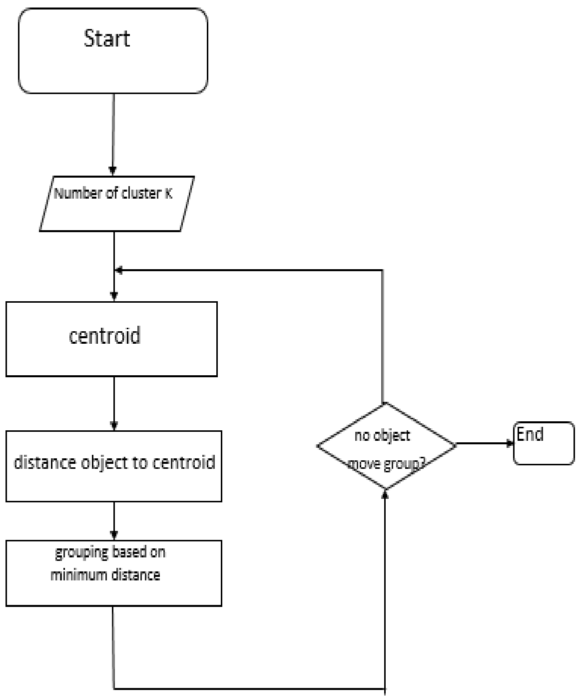
$$\underset{\mathbf{S}}{\arg\min} \sum_{i=1}^{k} \sum_{\mathbf{x}_j \in S_i} \|\mathbf{x}_j - \boldsymbol{\mu}_i\|^2$$

Where $\boldsymbol{\mu}_i$ is the mean of points in S_i.

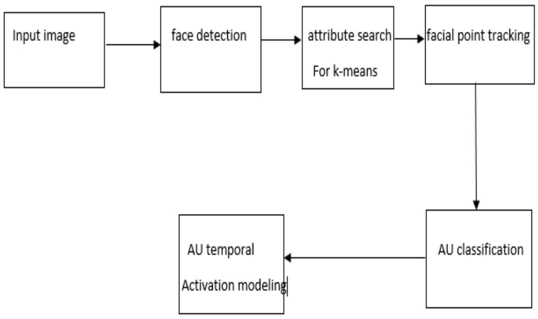
4. ALGORITHM

1. Place randomly initial group centroids into the 2d space.
2. Assign each object to the group that has the closest centroid.
3. Recalculate the positions of the centroids.
4. If the position of the centroids didn't change go to the next step, else go to step2.
5. Stop the program.

Flow diagram of the proposed system



5. ARCHITECTURAL DESIGN

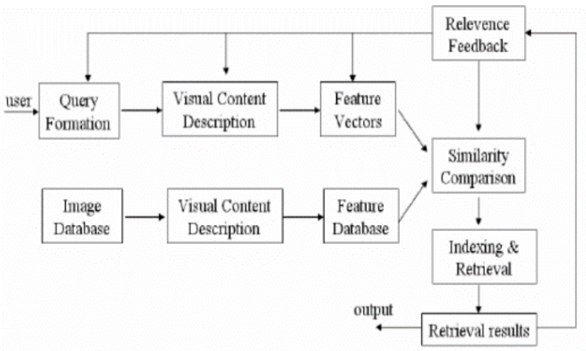


6. MODULE DESCRIPTION

1. Content based image search.
2. Attributes search.
3. Face image retrieval.

Content based image search:

Content-based image retrieval (CBIR), also known as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is the application of computer vision techniques to the image retrieval problem, which serves as the problem of searching for digital. Content-based image retrieval is opposed to concept-based approaches.



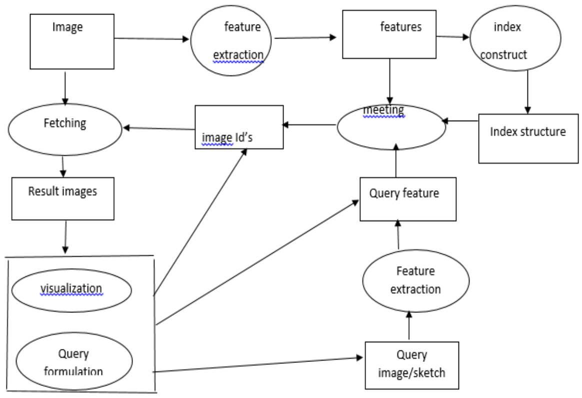
"Content-based" means that the search analyses the contents of the image rather than the metadata such as tags, keywords, or descriptions associated with the image. The term "content" in this context might refer to the shapes, colours, textures, or any other information that can be derived from the image itself. Content Based Image Retrieval is desirable because most web-based image search engines rely purely on metadata and this produces a lot of garbage in the results.

7. ATTRIBUTE SEARCH

Attribute grammar, in formal computer languagesAttributes are properties observable in images that have human-designated names (e.g., 'striped', 'four-legged')and they are valuable as a new semantic cue in various problems. For example, researchers have shown their impact for strengthening facial verification , object recognition generating descriptions of unfamiliar objects and to facilitate "zero-shot" transfer learning where one trains a classifier for an unseen object simply by specifying which attributes it has Binary attributes: Learning attribute categories allows prediction of colour or texture types and can also provide a mid-level indication for object or face recognition Beyond object recognition, the semantics intrinsic to attributes enable zero-shot transfer or description and part localization .

8. FACE IMAGE RETRIEVAL

An image retrieval system in a computer for searching, retrieving images and browsing from a large database of digital images. Most common and traditional methods of image retrieval utilize some method of adding metadata such as keywords, captioning or to which the descriptions to the images so that retrieval can be performed over the annotation words. Manual image explanation is time-consuming, and in order to the expensive; to address this, they have done a large amount of research is done based on automatic image annotation specially. Additionally, the increase in social web applications and the semantic web have inspired the development of several web-based image annotation tools.



9. CONCLUSION

In this paper we discussed about the detection of a much larger range of facial behavior by classifying facial muscle action [action units (AUs)] that compound expressions.It can be used for any higher order decision making process including recognition of basic emotions, or pre-programmed commands for a most automatic expression analysis systems attempt to recognize a small set of prototypic expressions (i.e. joy, surprise, anger, sadness, and fear. To capture the sensitivity of human emotion and automated recognition paralinguistic communication, of fine-grained changes in facial expression are discussed.

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