

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Special Issue 6, May 2015

Robust Facial Expression Recognition Using Local Directional Number Version

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ABSTRACT Image Processing is a method to convert an image into digital form and perform some operations 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. Image Processing forms core research area within engineering and computer science disciplines too.

KEYWORDS: Image Processing, Face Expression, signal processing.

I.INTRODUCTION

In imaging science, image processing is any form of signal processing for which the input is an image, 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. 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.

A facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial database.

It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. [1]

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.

Five Elements of Successful for image processing.

1. Image sharpening
2. Image smoothing
3. Multidimensional systems
4. Near sets

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5. Photo manipulation

II.ONLINE FACIAL EXPRESSION RECOGNITION BASED ON PERSONALIZED GALLERIES

The Dynamic Carpooling is more complicated than long-term/daily many-to-one or one-to-many car pooling problems. IN FACE analysis, a key issue is the descriptor of the face appearance [2].An efficient plan for the Dynamic Carpooling may require matching participant groups to a car on a semi common route or assigning a participant group to different cars on different days. It is very difficult to simultaneously and optimally determine every participant group's role (driver group or passenger group), driver group schedules, and passenger group deliveries, as well as to suitably match several participant groups in a car while still keeping in mind fairness considerations. This process involves complicated movements of driver groups (or vehicles) and passenger groups in both time and space, with consideration of driver/passenger travelling costs.

Based on the car owner needs the user able to notify others regarding his/her drive to particular route and that can be accompanied by the one who need to go on that way which enables the dynamic car share concepts and it is really worth than static car share which is tabulated already for a certain period.[3]

III.FACIAL EXPRESSION RECOGNITION IN IMAGE SEQUENCES USING GEOMETRIC DEFORMATION FEATURES AND SUPPORT VECTOR MACHINES

Two novel methods for facial expression recognition in facial image sequences are presented. The user has to manually place some of grid nodes to face landmarks depicted at the first frame of the image sequence under examination. The grid-tracking and deformation system used, based on deformable models, tracks the grid in consecutive video frames over time, as the facial expression evolves, until the frame that corresponds to the greatest facial expression intensity. The geometrical displacement of certain selected nodes, defined as the difference of the node coordinates between the first and the greatest facial expression intensity frame, is used as an input to a novel multiclass Support Vector Machine (SVM) system of classifiers that are used to recognize either the six basic facial expressions or a set of chosen Facial Action Units (FAUs). The results on the database show a recognition accuracy of 99.7% for facial expression recognition using the proposed multiclass SVMs and 95.1% for facial expression recognition based on FAU detection.

IV SKIN-BASED FACE DETECTION-EXTRACTION AND RECOGNITION OF FACIAL EXPRESSIONS

Face detection is the foremost task in building vision-based human computer interaction systems and in particular in applications such as face recognition, face identification, face tracking, expression recognition and content based image retrieval. A robust face detection system must be able to detect faces irrespective of illuminations, shadows, cluttered backgrounds, facial pose, orientation and facial expressions. Many approaches for face detection have been proposed. However, as revealed by FRVT 2002 tests, face detection in outdoor images with uncontrolled illumination and in images with varied pose (non-frontal profile views) is still a serious problem. In this chapter, we describe a Local-Global Graph (LGG) based method for detecting faces and for recognizing facial expressions accurately in real world image capturing conditions both indoor and outdoor, and with a variety of illuminations (shadows, high-lights, non-white lights) and in cluttered backgrounds. The LG Graph embeds both the local information (the shape of facial feature is stored within the local graph at each node) and the global information (the topology of the face). The LGG approach for detecting faces with maximum confidence from skin segmented images is described. The LGG approach presented here emulates the human visual perception for face detection. In general, humans first extract the most important facial features such as eyes, nose, mouth, etc. and then inter-relate them for face and facial expression representations. Facial expression recognition from the detected face images is obtained by comparing the LG Expression Graphs with the existing the Expression models present in the LGG database. The methodology is accurate for the expression models present in the database.

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V.EXTRACTING AND ASSOCIATING META-FEATURES FOR UNDERSTANDING PEOPLE'S EMOTIONAL BEHAVIOUR: FACE AND SPEECH

Emotion is a research area that has received much attention during the last 10 years, both in the context of speech synthesis, image understanding as well as in automatic speech recognition, interactive dialogues systems and wearable computing. There are promising studies on the emotional behaviour of people, mainly based on human observations. Only a few are based on automatic machine detection due to the lack of Information Technology and Engineering (ITE) techniques that can make available a deeper and large-scale noninvasive analysis and evaluation of people's emotional behaviour and provide tools and support for helping them to overcome social barriers. The present paper reports a study for extracting and associating emotional meta-features to support the development of emotionally rich man-machine interfaces (interactive dialogue systems and intelligent avatars).[6]

VIA LOCAL-GLOBAL GRAPH APPROACH FOR FACIAL EXPRESSION ECOGNITION

In this article, we present a local global graph (LGG) method for recognizing facial expressions from static images irrespective of different illumination conditions, shadows and cluttered backgrounds. First, a neural color constancy based skin detection procedure to detect skin in complex real world images is presented. Second, the LGG method for detecting faces and facial expressions with a maximum confidence from skin segmented images is presented. The LGG approach presented here emulates the human visual perception for face and expression detection. In general, humans first extract the most important facial features such as eyes, nose, mouth, etc. and then inter-relate them for face and facial expression representations.

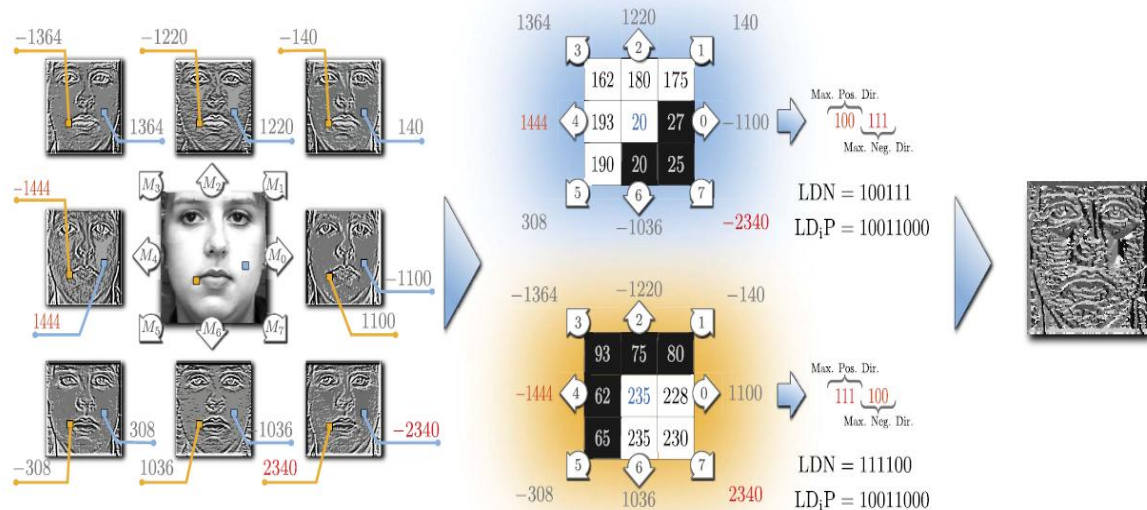


Fig 1.1 – Face Expression concepts using LDN:

Face recognition

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, F1 and F2, of length N is measured. The corresponding face of the feature vector with the lowest measured value indicates the match found.

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Histogram generation

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.

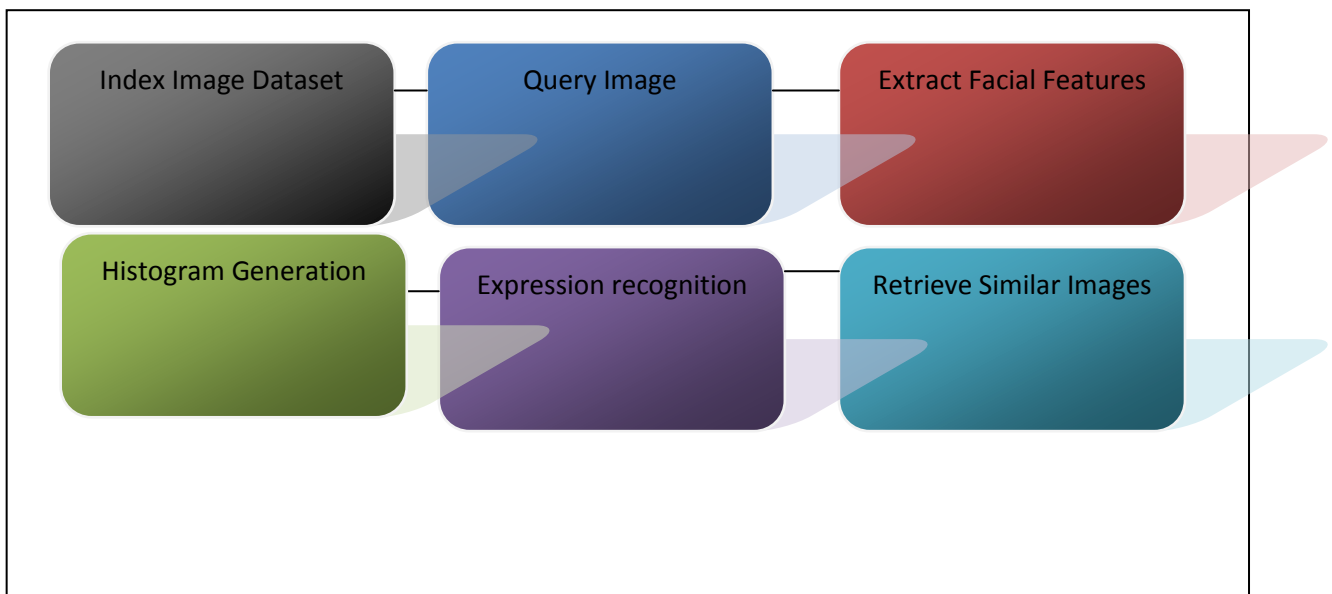
Expression Recognition

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.

Face Retrieval

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.[5]

System Architecture



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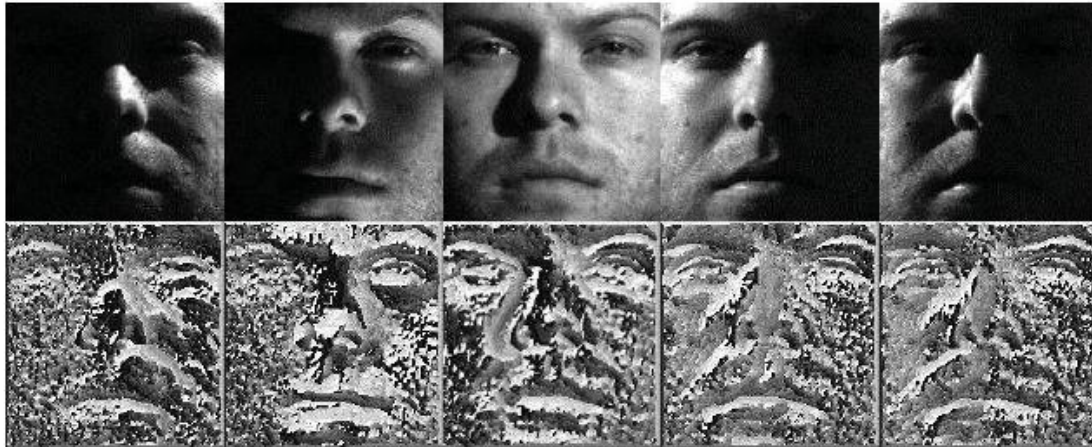


Fig 1.2 – Sample images of single object using its facial characteristics.

Effectiveness of Face Recognition System

Critics of the technology complain that the London Borough of Newham scheme has, as of 2004, never recognized a single criminal, despite several criminals in the system's database living in the Borough and the system having been running for several years. "Not once, as far as the police know, has Newham's automatic facial recognition system spotted a live target." This information seems to conflict with claims that the system was credited with a 34% reduction in crime (hence why it was rolled out to Birmingham also) However it can be explained by the notion that when the public is regularly told that they are under constant video surveillance with advanced face recognition technology, this fear alone can reduce the crime rate, whether the face recognition system technically works or does not. This has been the basis for several other face recognition based security systems, where the technology itself does not work particularly well but the user's perception of the technology does. An experiment in 2002 by the local police department in Tampa, Florida, had similarly disappointing results.[7] A system at Boston's Logan Airport was shut down in 2003 after failing to make any matches during a two-year test period.

VII.CONCLUSION

In this work, we have analysed and recommended features that enable image processing concepts with face Recognition System. LDN that takes advantage of the structure of the face's textures and that encodes it efficiently into a compact code. LDNK code is more robust to detect structural expression features than features for identification. We proposed a face descriptor that combines the information from several neighbourhoods at different sizes to encode micro patterns at those levels.

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