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An automated method for characterization of facial expression

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ABSTRACT

This paper presents a new facial expression technique, locality directional ternary pattern (LDTP), for facial emotion recognition. LDTP efficiently encode various information's of expression-related features (i.e., eyes, eyebrows, nose, mouth and lips) by using the directional information and advanced pattern in order to take advantage of the robust of advanced patterns in the edge region while overcoming the weakness of other methods in smooth regions. Our proposal, unlike existing face description methods that divide the face into multiple regions and sample the codes uniformly, uses a two-level grid to construct the face descriptor while sampling emotion information at different scales. We use a grid for stable codes (highly related to non-expression), and another one for active codes (highly related to expression). This multi-level approach enables us to do a finer description of facial motions while still characterizing the other features of the expression. Moreover, we learn the active pattern codes from the expression-related facial regions. We tested our method by using person-dependent and independent cross-validation schemes to evaluate the performance. We show that our approaches improve the overall accuracy of facial expression recognition on six data sets.

Keywords: *Face recognition, binary pattern, Emotion recognition, Detection of edge.*

1. INTRODUCTION

Image processing is a process of transforming an image into digital form and perform some methods on it, in order to get an enhancement image or to extract some amount of useful information from it. It is a type of signal methodology in which input is image, like photograph and output may be the characteristics that is associated with that image. Image Processing is used in research area within engineering.

Image processing includes the steps.

● The image is imported with scanner or digital photography.

● The image should be manipulated which includes compressing data and enhancement of image.

● The final stage is output stage.

1.1 Purpose of Image processing

The purpose of image processing are:

- Observe the objects that are not visible.
- To create a better image.
- Seek for the image of interest.
- Measures various objects in an image.
- Distinguish the objects in an image.

Types

There are two types of methods that are used for Image Processing. They are Analog and Digital Image Processing.

Analog or visual techniques is a type of image processing that can be used for the hard copies like printouts and photographs. Image analysts use various techniques of interpretation while using these visual techniques. The image processing is not just limited to

area that has to be studied but on knowledge of various analyst. Association is another important tool in image processing through various visual techniques. So analysts can apply various personal knowledge and collaborative data to image processing.

Digital processing techniques takes the raw data from imaging sensors from satellite platform contains large amount of deficiencies. To get over such deficiency and to get originality of information, it has to undergo various stages of processing. The general stages that are Pre- processing, enhancement and display, information extraction.

Thus the paper will be divided into the following sections, Introduction and abstract being the section1. Section 2 represents the Literature survey. Section3 presents the implementation used in the system. Section4 provides the hardware description of the system developed. Section5 contains the output. At last we have results and conclusions, future works are also included here.

2. LITERATURE SURVEY

The facial and geometric features are methods to extract an image[1].Local feature method is used to measure descriptor from the individual face and also provide some information[2].The gradient face have low recognition capabilities while extracting an image[3].local binary pattern algorithm is used[4].Facial landmarks are geometric features[5].pixel intensities are appearance features[6].Local phase quantization[7].The deep neural network architectures is "convolutional neural networks" is the traditional approach for researchers studying vision and deep learning. In the 2014 Image Net challenge for object recognition .The top three finishers used a CNN with the Google Net architecture achieving a remarkable 6.66% error rate in classification [8, 9]. The Google Net architecture uses a novel multi-scale by using multiple classifier structures. This architecture defeats a number of problems t decays before reaching beginning layers in the architecture. Additional layers take an elegant step towards complex network-in-network architectures described originally in Lin et al. [10]. In other word, the architecture is composed of multiple "Inception" layers. Thus it can be considered as one of the most critical stage in achieving a successful new system and in providing the user, confidence that the new system will work properly and be effective.

The implementation stage of the proposed system involves planning, analysis, design, investigation of the existing system and it's constraints on implementation, designing of methods to achieve the best solution.

Facial representation and classifier design are two basic approach for facial expression.

3. EXISTING SYSTEM

The vast majority of the past work on FER does not take the dynamics of facial expressions into account. Efforts have been made to capture and utilize facial movement features. These efforts try to adopt some features of the tracked facial points (e.g. shape vectorization, facial animation metrics, distance and angle, and trajectories, or appearance difference between holistic facial points in consequent frames (e.g. optical flows, and differential-AAM metrics, or text and motion changes in facial regions (e.g. motion units, spatiotemporal descriptors, animation units, and pixel difference).Although achieved promising results, these approaches often require accurate location and tracking of facial points, which remains problematic.

4. PROPOSED SYSTEM

We propose a facial expression recognition system using two main approaches to describe facial images: geometric-feature Learning based and appearance feature-based methods. We propose a new face descriptor for facial expression recognition. Our method encodes edge directional information of emotion-related features efficiently by removing the meaningless ones from smooth regions in the computed directional patterns. Our proposed Local Directional Ternary Pattern (LDTP) is an eight bit pattern code assigned to each pixel of an input face image.

5. IMPLEMENTATION

5.1 Algorithm

The algorithm for the system is given as follows,

Step 1: Browse the image.

Step 2: Skin colour segmentation is performed.

Step 3: Eye detection is done and RGB image is converted to binary image.

Step 4: Lip, nose are detected and apply Bezier curve for smoothing.

Step 5: Start execution.

Step 6: Coding is run for the image expression detection.

Step 7: The output is viewed in small text box.

The system should meet the following specifications,

- Improves the classification result.
- Improvement of performance of facial expression recognition.
- Avoiding generation of useless pattern.
- Avoidance of noise in the smooth region.

- Monitor eye expression of the person
- Transfer the colour image in to binary image.
- Expression is detected.
- The application must have a good user interface.
- It should be easy to access.

5.2 System Overview

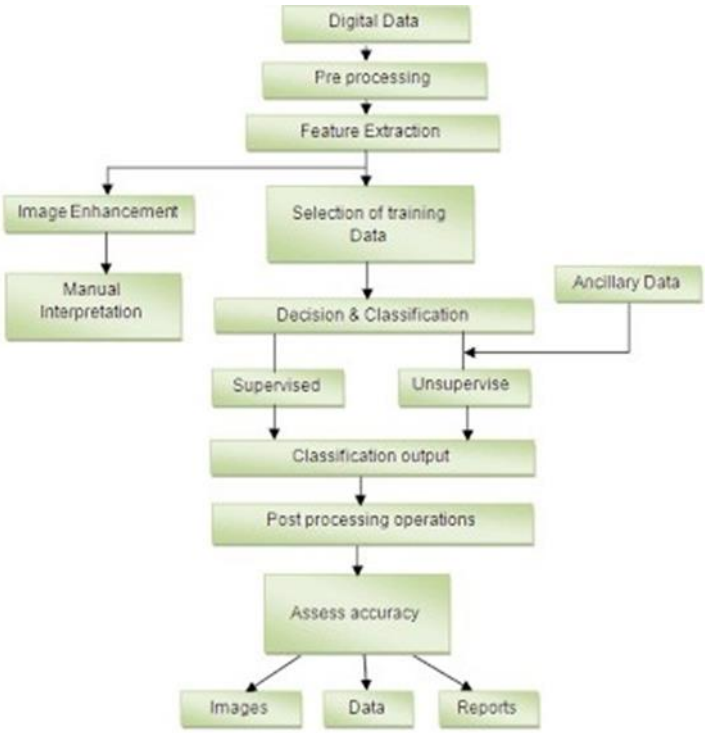

Figure 1: Block diagram of the system

The user uploads the image of his face and the image is connected to the system. Then the system converts the user's face image into binary image and the system detects skin colour, eyes, lip and apply bezier curve on eyes and lip and it extracts the feature. Database is used for storing the person's image and emotions. Finally the system will detect the emotion of the user's face.

5.3 MODULES

Face Detection

For face detection, first we need to convert the RGB image into binary image. For converting it, we calculate the average value of RGB for each pixel and the default average value is considered to be 110 so if the value is below 110, we replace it by black pixel and otherwise we replace it by white pixel. By this method, we get a binary image from the corresponding RGB image.

Skin Colour Segmentation

For skin colour segmentation, first we must contrast the given image. Then we must perform segmentation of skin colour. Then we have to check the probability that will become a face of the largest connected region. Finally it will open a new form with the corresponding largest connected region

Eyes Detection

For eyes detection, we convert the RGB image to the binary image. Now, we consider the face width by the symbol W. We scan using the formula W/4 to (W-W/4) to find the middle position between the two eyes. The highest white continuous pixel along the height between each ranges is the middle position of the two eyes.

Lip Detection

For lip detection, we determine it using the lip box. Consider the lip box. The distance between the forehead and eyes is calculated. Then the distance to determine the upper height of the lip box which will contain the lip should be added with lower height. The box contain only lip and may some part of the nose. Then the corresponding RGB image will be cutted according the box.

Apply Bezier Curve on Eye

For apply Bezier curve on eyes, first we have to remove the eyebrow from eye. First continuous black pixel then continuous white pixel and then continuous black pixel from the binary image of the eye box is searched to remove the eyebrow. Then we remove the first continuous black pixel from the box and then we get the box which only contains the eye.

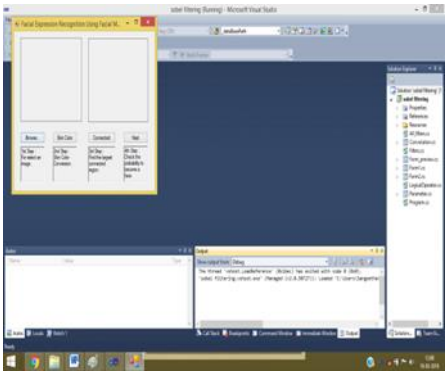

Figure 1

In the above figure, the dialog box shows the frontend of the implementation process.

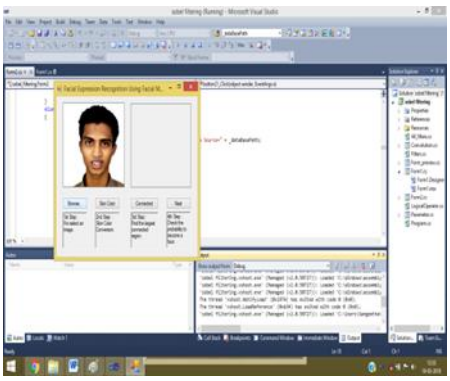

Figure 2

In the above figure the user will upload the image of his face.

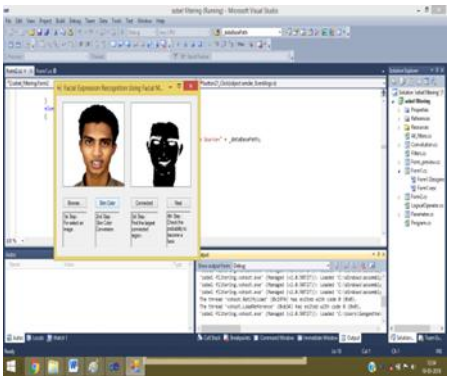

Figure 3

In the above figure skin colour segmentation is done for the user's face that he uploaded in the system.

Figure 4

In the above figure the user's image is connected to the system immediately after the skin colour segmentation is done.

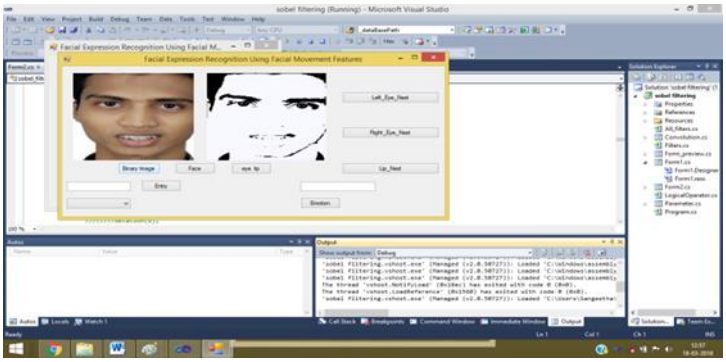

Figure 5

In the above figure, the system converts the user's image into binary image.

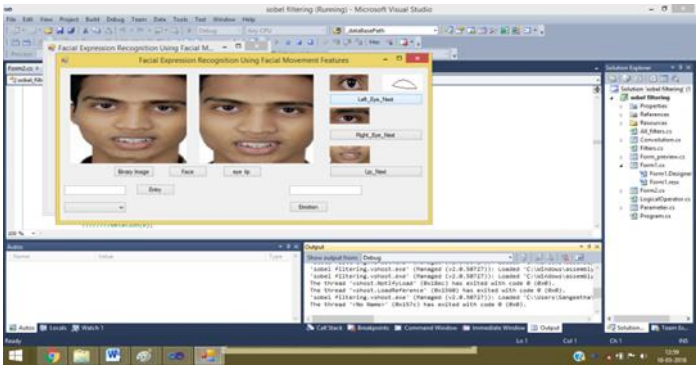

Figure 6

In the above figure, the system smoothens the eyes of the user by applying bezier curve.

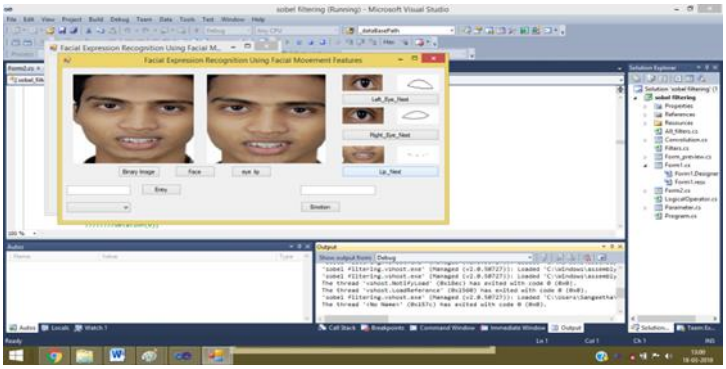

Figure 7

In the above figure, the system smoothens the lips of the user by applying bezier curve.

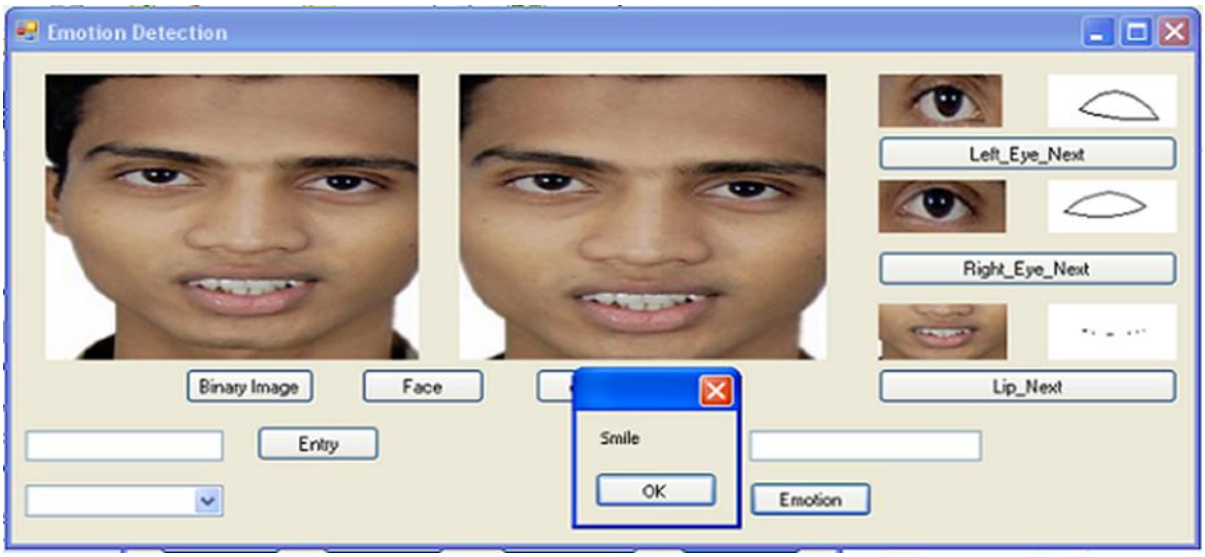

Figure 8

In the above figure the system detects the emotion of the user's face.

6. CONCLUSION

In the proposed work we developed the feature to evaluate the detect the face and recognize methods which are considered to be a benchmark.

7. RESULT AND FUTURE WORK

In this system image processing Technology is used for detecting expression of humans in accurate way using sobel edge filtering method.

The accurate expression of the person is detected and shown on a small text box.

The future work can monitor the expression of individuals in an organization or the students in a class room to check their activity in attending the lecture in stress or not.

8. REFERENCES

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