

# Spatial Temporal Analysis of Face Expression Recognition

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## To Cite this Article

Ishwarya K and Ramaraj E, "Spatial Temporal Analysis of Face Expression Recognition", *International Journal for Modern Trends in Science and Technology*, Vol. 03, Issue 07, July 2017, pp. 81-84.

## ABSTRACT

Human emotions are conveyed by different medium such as behaviors, actions, poses, facial expressions and speech. Multitudinous researches have been carried out to find out the relation between these mediums and emotions. This paper proposes a system which automatically recognizes the emotion represented on a face. Thus, a Bezier curve based mostly resolution along with image processing is used in classifying the emotions. Colored face pictures square measure given as input to the system. Then, Image process based mostly feature purpose extraction technique is applied to extract a set of group of elite feature points. Finally, extracted features like eyes and mouth, obtained after when process given as input to the curve formula to recognize the emotion contained. Experimental results show average 90% of success to analysis and recognize emotion detection.

**KEYWORDS:** Emotion Recognition, Feature Detection, Bezier Curve, Canny Edge detection algorithm.

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## I. INTRODUCTION

Facial expression is a kind of expression of the emotional state, human face has the great power of expression, and it provides a powerful and flexible nature expression in communication and emotional state. In today's era, researches focus on improving human-computer interfaces, as well as on improving the actions which computer takes on feedback from the user. When computers could detect these emotional inputs, they would give specific and appropriate help to others in ways that are more compatible with the user's needs and preferences. It doesn't deal with the rest of the body, but only the facial features. Many techniques have been proposed for emotion detection, but not all give an accurate result or are easy to implement. This paper proposes a scheme in which adopted the feature based approach, i.e. automatically

detection of eye and mouth from a still image using the Canny Edge detection algorithm and then the classification of emotion is conducted by implementing Bezier curve algorithms and measuring distance between certain points.

## II. RELATED WORK

Wenshuo gao et Al., [2] proposed a technique which combines Sobel edge detection operator and soft-threshold rippling de-noising to do edge detection on images which include White Gaussian noises. The frequently used strategies which merge mean de-noising and Sobel operator or median filtering and Sobel operator can not eliminate salt and pepper noise very well. During this paper, foremost soft-threshold rippling was used to remove noise, and then Sobel edge detection operator is used to detect edges with in the image. This technique is especially used on the images

which consist of White Gaussian noises. From the images obtained by the experiment, it shows that compared to the standard edge detection strategies, the technique proposed in this paper contain a more understandable effect on edge detection.

**Deepak Ghimire et al., [3]** proposed a method to discover human faces in color images. Many existing systems use a window-based classifier that searches the complete image for the presence of the human face and such systems suffers from cause variation, scale variation, illumination changes, etc. Here, they proposed a lighting insensitive face detection method based upon the edge and skin tone information of the input color image. Firstly, image enrichment is performed, particularly if the image is acquired from an unconstrained light condition. The result of skin segmentation is polished using the skin tone percentage index method.

**Pinaki Pratim Acharjya et al., [4]** author created a shot to review the siting detection techniques which are based on discontinuity intensity levels. The relative performance of various edge detection techniques is dispensed with two images by using MATLAB software system. It have been examined that that the Canny edge detector produces higher accuracy in detection of object edges with higher entropy, PSNR, MSE and execution time compared with Sobel, Roberts, Prewitt, Zero crossing and LOG.

**M Sudarshan et al., [5]** proposed an optimized edge detection algorithmic program appropriate for the face recognition task. The most plan of the proposed technique is to spice up the many edges so apply successive thinning algorithms. The two benefits of this technique over different gradient based mostly systems is its ability to seek out missing and broken edges a lot of accurately and suppress the less significant edges.

### III. CEDM METHOD

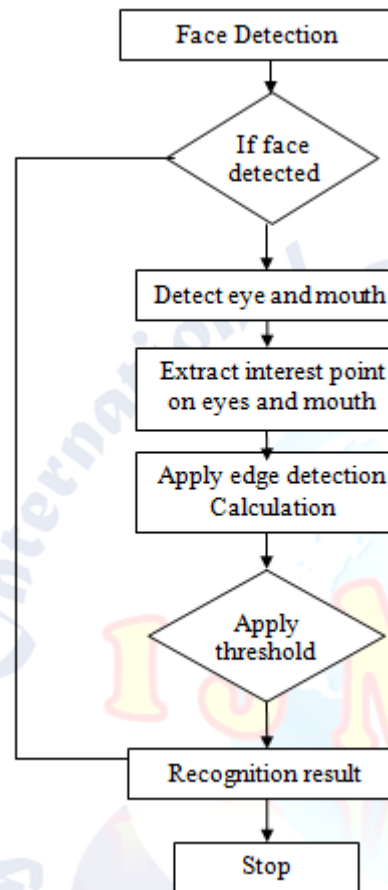


Fig1. System Architecture of Edge detection

### IV. IMPLEMENTATION OF EDGE DETECTION AND LOCATION

The implementation stage involves careful designing, investigation of the existing system and it's constraints on implementation, planning of methods to achieve changeover and analysis of transformation strategies.

#### 4.1. Contrast Stretching Of the Image

It performs min max contrast stretching of the image. Find the minimum and maximum values of the pixels in an image, and then convert pixels from the source to destination like  $((\text{pixel}-\text{min}) / (\text{max}-\text{min})) * 255$ .

#### 4.2. Skin Color Conversion of the Image:

In skin color conversion, the skin of the person is converted to white pixel and the rest of the parts are converted to black pixel.

Any RGB digital image can be converted into YCrCb color space using following equation:

$$\begin{aligned}
 Y &= 0.299R + 0.587G + 0.114B \\
 Cb &= -0.169R - 0.331G + 0.500B \\
 Cr &= 0.500R - 0.419G - 0.081B
 \end{aligned}$$

4.3. Detecting Connected Region:

Connected-component labeling is used in computer vision to find connected regions in binary digital images, although color images and data with higher spatial property can also be processed. When integrated into an image recognition system or human-computer.

4.4. Binary Conversion of the Image:

A binary image is a digital image that has only two possible values for each pixel. [1] generally the two colours used for a binary image area unit black and white though any two colors can be used. [1] The color.

4.5. Canny Edge Detection

Since the eyes are located in the middle of the top face, lips are in the middle of the bottom face, so the restricted face area search can improve the detection speed. First estimates the eyes and lips region, and then use the canny edge detection to work out the precise position of the eyes and lips.

V. COMPARATIVE ANALYSIS

Edge detection operator checks the neighborhood of each pixel and to quantify the variance rate of gray level, including determines direction, most of the use of methods based on directional derivative mask convolution.

Several commonly used edge detection operator, as shown in Figure 2, the figure can be seen from the results, the canny operator to detect the edge is the most sophisticated, the most straightforward is Robert operator, Laplace operator and Sobel operator are not obvious.

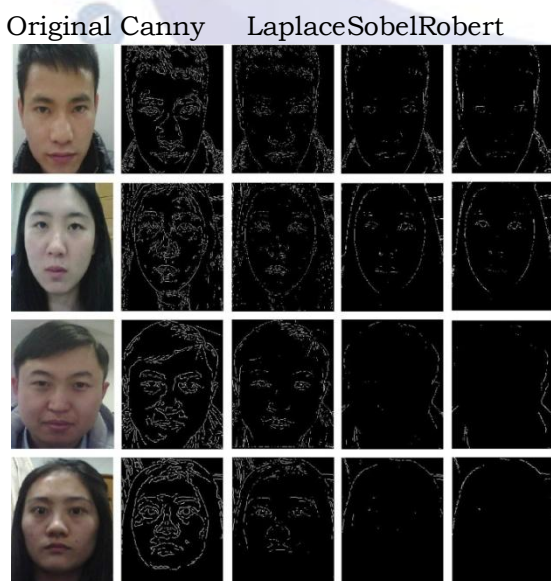


Fig 2. Comparison of the Effect of Edge Detection Algorithm

VI. RESULTS

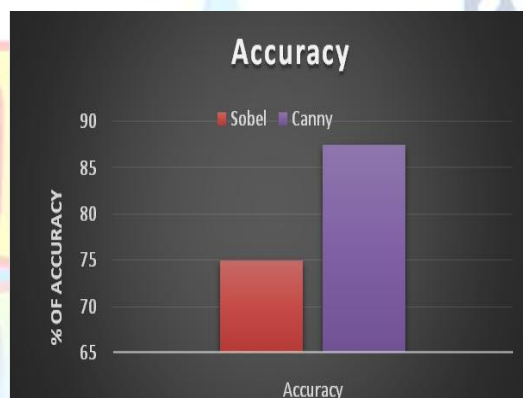
Accuracy Measure

The analysis of Accuracy Measures of edge detection algorithms from the Table 1, Canny edge detection algorithm outperforms well when compared to Sobel edge detection algorithm.

TABLE I  
CONFUSION MATRIX

Algorithms	Confusion matrix
	Accuracy (in%)
Sobel	75%
Canny	87.7%

From the graph 1, it is observed that canny edge detection algorithm attains high percentage of accuracy when compared to Sobel edge detection algorithm.



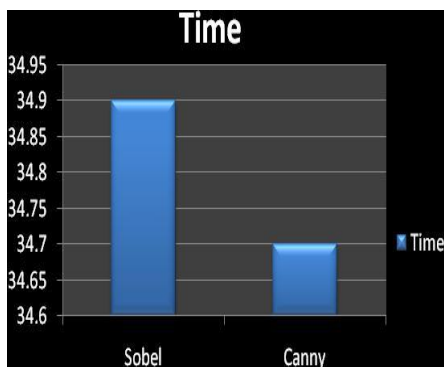
Graph 1: Accuracy measure of Edge detection

From the analysis of Accuracy Measures of edge detection algorithms from the Table 2, canny edge detection algorithm detect in fewer seconds when compared to Sobel edge detection algorithm.

TABLE II  
EXECUTION TIME OF CANNY AND SOBEL EDGE DETECTION ALGORITHM

Algorithms	Time(in sec)
Sobel	34.9
Canny	34.7

From the graph 2, it is observed that canny edge detection algorithm detects takes less execution speed when compared to Sobel edge detection algorithm.



Graph 2: Execution time for edge detection algorithm

## VII. CONCLUSIONS

In this paper introduced the design of a facial expression recognition system based on edge character, it is the main characteristics and training database under the condition of different expression of eyes and lips edge by face in the ratio, thus the face recognition. The design of other recognition system has a very high robustness with respect to conventional face recognition effect, fast and accuracy. From the final recognition effect, that the gradient operator edge algorithm is sensitive to noise, so it is suitable for the image edge gray value in the image is sharp and under the condition of litter noise. . In this research paper the relative performance of various edge detection techniques is carried out with a set of images. It have been observed that that the Canny edge detection algorithm produces higher accuracy in detection of edges and execution time compared with Sobel edge detection algorithm.

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