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FACIAL EXPRESSION RECOGNITION USING GPA ANALYSIS

Saipriya Ainapur[1], Anandkumar Patil[2]

[1]PG Student, Department of Computer Science, Sharnbasva University, Karnataka, India
[2]Professor, Department of Computer Science, Sharnbasva University, Karnataka, India

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Abstract - *The modern era of digital devices which will be equipped with the dedicated machine will have the built in features to perform the special needs of the human. The mobile devices come with the special cameras which will produce the high quality images. Human face and the facial expression system have been in the interesting field due to the great level of application it possesses. The face unlocks face detection in security areas and also the facial expression recognition has been in demand of development. The human exhibits the multiple type of ten expressions anger, sad, surprise, happy and many more. These expressions has special notation based on the human feelings and scenario. The Digital image processing technology has provided the tools to work with the images and will use the edge features, skin mapping and supervised knowledge based classifier to recognize the expressions posed by the human to assist the need.*

***Key Words*: Edge feature, Skin Mapping, GPA, SVM.**

1. INTRODUCTION

Survivalance systems have been in the trending as the security of any human or individual is essential in the modern life. The devices which we use for security like automatic door, lockers, signal systems and many has to be triggered before it can perform the actual work. As we know for any human the expression it will describe the state of the mind of the person. It will describe the human inner feelings also. Face describes the emotion status of the human being in based on the features Of the pixel co-ordinates. The face image is processed in multiple angles and the extracted co-ordinate of the face parts like eyes, nose, lips etc are used for the detection of the accurate face expression. The process of extracting the face , recognizing the expression based on the Geometrical features on the face will be a challenging aspect , as many user poses different type of the expression.

2. LITERATURE SURVEY

[1] In this author has proposed a Boosted Deep Belief Network (BDBN) in the framework of multiple layered unified loopy .A training process for the face expression has been performed in the three individual stages: feature learning, selection, and the feature classify based data construction. These features will be trained and features are extracted in the extreme manner by using the dataset of the initial images.

By using the BDBN framework, the feature set, generally used to classify the main characteristics of the expression of human facial related appearance and also the shape changes, boosted strong classifier by these feature set in the statistical way.

[2] author has proposed the multiple human facial action unit based expression recognition by the dataset modelling . the image features and the image target labels are used to classify the images. Initially the multi-task image dataset based feature learning has been adopted for the purpose of dividing the action unit recognition job into the multiple groups, later each of the shared features for every single group. Later, the Bayesian network has been used by the author to co-existent and also the data based mutual exclusive semantic in between the target labels of images of input.

[3] In this paper the author has investigated the way of using the large database, which is labelled based on the 6 universal facial expressions. Novel training based human facial expression recognition has been proposed by the author based by using the Hidden-Task Learning. HTL will exploit the relationship between the Hidden and Visible-Tasks. The values based dataset will be analyzed and classified based on the trained dataset, the use of these values will help in accurate classification of human face expression.

[4] Natural human image based emotion recognition has been proposed by the author as it has the wide range applications , like the human-computer interaction, tutoring systems, smart devices, driver assistance etc. generally the process is carried out by using the laboratory controlled image based data, which may not be exact reflection of the environment in real time. For dynamic recognize of the human facial emotions in real time based natural situations, the method known as the Extreme Sparse Learning (ESL), which is capable of creating the local dataset and perform the classification based on the previous history.

[5] Author has proposed FACS based human emotion detection system. The Facial Action Coding System (FACS) has been adopted by many of the institutions as it possesses many of the possible facial location based on the human face shape. set of the dataset which has been given will help the user to resolve the complexity in analyzing the data. The visible facial will be segmented, based on the effects facial muscle into the 30+ action units (AUs). These combinations will be divided into number of combinations again to get the accurate result in real time.

2.1 Existing System

There are a number of existing approaches for recognizing the human face expression by the image input. Cluster based approach has been popular as it collects the human face pixels in grouping to form cluster and has given efficient accurate result. Histogram based, ad boost classifier based approach and also Gabor filter has been used to detect the expression.

DISADVANTAGES:

- Requires dedicated camera set device.
- Humans are data has to be monitored and updated.

2.2 Proposed System

In this proposed work we have proposed the concept by using the digital image processing techniques. The human skin mapping, face part extraction, knowledge based (SVM) classification approaches have been used to reach the objective of the work.

ADVANTAGES:

- No need of human interference
- The data base can be updated easily

3. METHODOLOGY

In this chapter we will discuss in brief regarding the methods which has been used to locate, detect, extract the human face also classify the expression based on the previous data.

3.1 Image Acquisition

In Image acquisition, the reorganization of text acquires a scanned image as associate input image and input image should be in specific format like JPEG, BMT etc. These pictures square measure non inheritable through a camera, scanner or the other applicable digital data input device. This command reads the grey scale from the file by the string computer filename. If the file is not found in existing folder or within the MATLAB path, then it specifies the total path name.

In the initial step of any image processing based work, the given input image is processed before passing it to the main system. The pre-processing of the image includes image resizing, contrast adjustment, brightness adjustment, image cropping, image rotation etc. The output of the pre-processing will be the lab image which will be suitable for next processing.

Image Resizing: it reduces the file size to mentioned ratio.

Img = imread ("Filename.jpg");
//img is the original image of 1024*1600 pixels
Resized image=imresize (img, [512,512];

- Image Restoration: It is a simple process of taking the corrupted pixels of image and cleaning them.

3.2 Human Face Processing

In this phase of the human face processing the initially processed face will be transformed based on the requirement in the phases like lighting compensation, Edge based Unit analysis, Edge hole filling. By these extracted feature set of type human face the skin mapping is performed by using the following module.

3.3 Face Part Extraction (Skin Mapping)

Skin mapping of r the skin pixel labeling place an important role as it's the base for the later stages where the image is proceeds based on the extracted pixel values and the features form the image are extracted by these labeled pixels. Hence the probability of the image pixel in the form of

$c = [Cb\ Cr]^T$.....1

M- Number of Gaussian components model

P(j), the probability pixel at jth location

μ_j- mean

Σ_j -covariance matrix of the j^{th} pixel

Image skin pixel mapping is important aspect the input image may consider the undesired objects in the path. Hence to solve and remove the unwanted parts the skin pixel mapping by GLCM is important. The Gray level co-occurrence matrix is used for the skin pixel extraction. The gray-level co-occurrence matrix P[i, j] is consist of displacement vector(d) in which the pixel values are grouped in[3*3] array vector. The pixel value of each in the original image are copied and replaced by the equitant image pixel in gay level scale.

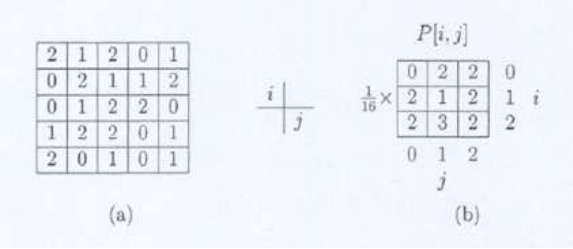


Fig.1: GLCM processing pixel by pixel

3.4 GPA based SVM classifier

SVM (Support Vector Machine) is a type of the supervised machine learning method which will examine data and identify the similar type of the patterns, which are used for

the later classification. SVM model has been able to model the complex structure of the non-linear decision boundaries with high accuracy and SVM is efficiently used for the binary classification. The purpose of SVM is to classify the data set with boundaries and extent it to nonlinear boundaries. SVM becomes prominent when pixel map is used as the dataset values as input. It gives high accuracy equivalent to neural network with elaborated features. By designing the kernel function, SVM can be applied to the complex data and this model is efficient in both linear and nonlinear data handling. It uses the kernel classes for the classification of the input dataset, which is directly applied to data not needed in the feature extraction

Support vector machine consists of two approaches:

- linearly separable
- nonlinearly separable

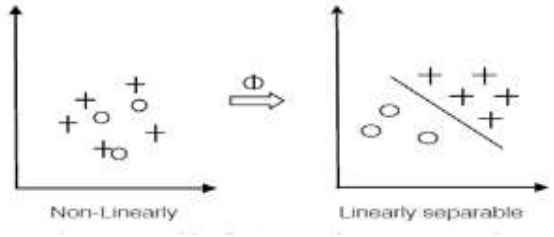


Fig.2: nonlinear and linear separable

The main purpose is to decide whether linear or nonlinear separable is to be applied because we have utilized the decision boundary technology for the classify of the dataset, it may end up to the nearer dataset compare to other set. When data is not linearly separable, straight line is not available. The main advantage of the algorithm is it will classify the type of the input query object depending on the feature based vectors and also based on the training samples. Trained features and the testing images are than classified using the Support Vector Machine classifier to get the result to the user.

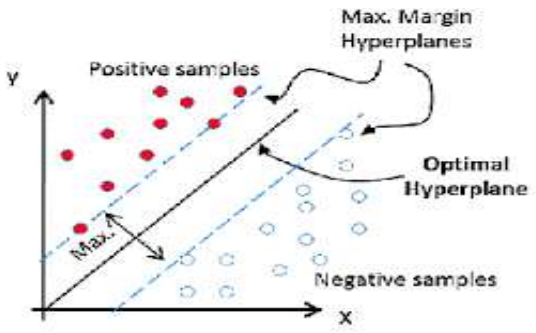


Fig.3: General SVM classifier

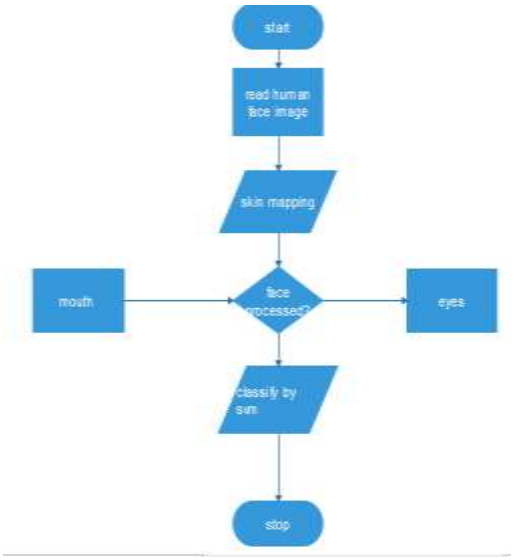
As shown in the above diagram, the SVM classifier extracts the patterns from the input sample (in our case it is an image). SVM is composed of the followings:

- Hyperplanes: among them the optimal and Maximum-minimum margin hyper planes are used in the classification of the patterns.
- Negative samples , which will drop below the required threshold values
- Positive samples, which will drop above the threshold values.

3.5 Face Extraction Algorithm

- **Step 1:** Initialization
- **Step 2**: Give input image from the data set to system.
- **Step 3**: Basic image processing has been performed
- **Step 4**: Classify images as Training and testing data set.
- **Step 5**: Feature Extraction is done to detect the expression on face image
- **Step 6**: Based on the features and results classify images by SVM.
- **Step 7**: Interpreted the obtained result to the user as a require.
- **Step 8**: Stop the system.

4. FLOWCHART



5. RESULTS

Fig.4:Normal

Fig.5:Sad

Fig.6:Happy

6. CONCLUSION AND FUTURE SCOPE

By this proposed work we are capable of determining the possible nearest expression in the input image. The DIP technology with skin mapping and skin part extractions, with the Landmark-24 pre trained dataset has been used to detect and classify the expression. The image is processed initially to extract the feature set and it is later compared to the pre trained dataset. The proposed work has found efficient and accurate to the preset dataset. The values of accuracy with system are around 94 to 95%.

In future the video enabled face expression tracking at time gap has to be developed to make the system real time application which will need a dedicated camera, device and processor.

7. REFERENCES

[1] M. Bishay and I. Patras. Fusing multilabel deep networks for facialaction unit detection. In Automatic Face & Gesture Recognition (FG2017), 2017 12th IEEE International Conference on, pages 681–688.IEEE, 2017.

[2] W.-S. Chu, F. De la Torre, and J. F. Cohn. Learning spatial and temporal cues for multi-label facial action unit detection. In Automatic Face and Gesture Conference, volume 4, 2017.

[3] S. Eleftheriadis, O. Rudovic, and M. Pantic. Multi-conditional latent variable model for joint facial action unit detection. In Proceedings of the IEEE International Conference on Computer Vision, pages 3792–3800, 2015.

[4] Q. Gan, S. Nie, S. Wang, and Q. Ji. Differentiating between posed and spontaneous expressions with latent regression bayesian network.In AAAI, pages 4039–4045, 2017.

[5] B. Jiang, M. F. Valstar, and M. Pantic. Action unit detection using sparse appearance descriptors in space-time video volumes. In Automatic Face & Gesture Recognition and Workshops (FG 2011), 2011 IEEE International Conference on, pages 314–321. IEEE, 2011.