LITERATURE SURVEY

[1]. Muzammil, Abdulrahman, Alaa Eleyan, "Facial Expression Recognition Using Support Vector Machine," *in Institute of Electrical and Electronics Engineers*, 2015.

In this paper, Principal component analysis and lower binary patterns algorithms are used as an approach for facial expression recognition. Experiments are carried out on JAFFE as well as MUFE database for which the typical Recognition rate is eighty- seven and seventy-seven with respect to PCA and SVM. Here, the Facial Feature Extraction Technique is employed to induce vital features from the face that reduces the number of information to be processed. process an entire face by exploiting linear transformation. LBP is used to divide the face image into regions and the pixels are examined based on their grayscale value. The downside of LBP cannot capture the main features of facial recognition. In PCA, is used for dimensionality reduction and retain the principal features to attenuate the loss of data. In all conducted experiments on JAFFE and MUFE databases, obtained results reveal that PCA+SVM has an average recognition rate of 62% and 59%, respectively.

[2]. Monika Dubey, Prof. Lokesh Singh," Automatic Emotion Recognition Using Facial Expression: A Review," in *International Research Journal of Engineering and Technology (IRJET)* Volume: 03 Issue: 02 | Feb-2016.

This paper gives an overview on applications of Emotion recognition. Facial expression is a kind of non-verbal communication however plays an important role when compared to verbal communication. The individual's perspective or filling & his or her mental state of affairs is represented. Image processing assists in extracting useful data from the image. Captured image is converted into digital form and some operations are performed on it to extract useful information from an image. They also came up with many challenges in proposed work. In Image Acquisition, a camera is accustomed capture the static or dynamic image of an individual that is taken as the input and Face localization is employed to see whether or not the face is enclosed in an image. Preprocessing stage is employed for enhancing the standard of the image by removing the noise and smoothing the image. Segmentation is a method of dividing the image into self-consistent regions. Feature extraction extracts the significant data from the image and Classification is the output of feature extraction and it takes care of the extracted data and clusters them into consistent with their parameters.

[3]. Garima Sharma, Shilpa Gupta, "Emotion detection in sequence of images using Advanced PCA with SVM," *in Institute of Electrical and Electronics Engineers*, 2014.

Cohn-Kanade dataset is employed and it supports all the six expressions which are Joyful, Sorrow, Angry, Disgust, Shocked and Scared. The system can automatically notice and classify the face expressions from a video sequence and different ways are used to analyze it. After the face detection, PCA formula is employed to extract the features and also the extracted features are trained using SVM classifier with fast PCA technique. And an alteration to PCA by using SVD that can produce nearly ideal correctness in precisely a number of iterations additionally being speedier than the overall PCA. Normalization technique of SVD is used to produce ideal correctness. Although the average classification rate of all six basic emotions is 75% approximately, the high percentage of accuracy can be achieved at classifying two distinct emotional expressions (happy and surprise).

[4]. A.S.Syed Navaz, T.Dhevi Sri & Pratap Mazamder, "Face recognition using Principal component analysis*," in International Journal of Computer Networking, Wireless and Mobile Communications (IJCNWMC)*Vol. 3, Issue 1, Mar 2013.

Eigen face methodology is employed here to create a face space that outlines the faces better. The principal component of a face area are premise vectors,that are used to attain the appropriate data in an image. An easy approach for fetching the data suppressed within in image is to capture the variation during an assortment of facial images. Database searching was implemented using Eigen face with PCA technique. This work came up with only face recognition systems where further face detection was their limitation.

[5]. "Emotions Detection Using Facial Expressions Recognition and EEG" Tomas Matlovic, Peter Gaspar, Robert Moro, Jakub Simko, Maria Bielikova, Slovak University of Technology in Bratislava Faculty of Informatics and Information Technologies.

The study of emotions in human-computer interaction has increased in the recent years. With successful classification of emotions, we could get instant feedback from users, gain better understanding of the human behavior while using the information technologies and thus make the systems and user interfaces more emphatic and intelligent. In our work, we focused on two approaches, namely emotions detection using facial expressions recognition and electroencephalography (EEG). Firstly, we analyzed existing tools that employ facial expressions

recognition for emotion detection and compared them in a case study in order to acquire the notion of the state-ofthe-art. Secondly, we proposed a method of emotion detection using EEG that employs existing machine learning approaches. We evaluated it on a standard dataset as well as with an experiment, in which participants watched emotion-evoking music videos. We used Emotiv Epoc to capture participants' brain activity. We achieved 53% accuracy in classifying a correct emotion, which is better compared to 19% accuracy of the existing facial expression based tool Noldus FaceReader.

[6]. "Robust Representation and Recognition of Facial Emotions Using Extreme Sparse Learning" Seyedehsamaneh Shojaeilangari, Wei-Yun Yau, *Senior Member, IEEE*, Karthik Nandakumar, *Member, IEEE*, Jun Li, and Eam Khwang Teoh, *Member, IEEE*

Recognition of natural emotions from human faces is an interesting topic with a wide range of potential applications, such as human-computer interaction, automated tutoring systems, image and video retrieval, smart environments, and driver warning systems. Traditionally, facial emotion recognition systems have been evaluated on laboratory controlled data, which is not representative of the environment faced in real-world applications. To robustly recognize the facial emotions in real-world natural situations, this paper proposes an approach called extreme sparse learning, which has the ability to jointly learn a dictionary (set of basis) and a nonlinear classification model. The proposed approach combines the discriminativepower of extreme learning machine with the reconstruction property of sparse representation to enable accurate classification when presented with noisy signals and imperfect data recordedin natural settings. In addition, this paper presents a new local spatio-temporal descriptor that is distinctive and pose-invariant. The proposed framework is able to achieve the state-of-the-art recognition accuracy on both acted and spontaneous facial emotion databases.

[7]. "Emotion Recognition by Facial Features using Recurrent Neural Networks" Amr Mostafa, Mahmoud I.Khalil, Hazem Abbas.

This paper presents emotion recognition models using facial expression features. By detecting the face in videos and extracting local characteristics (landmarks) to generate the geometric-based features to discriminate between a set of five emotion expressions (amusement, anger, disgust, fear, and sadness) for videos from BioVid Emo database. The classification operation is done using different machine learning models including random forest (RF), support

vector machines (SVM), k-nearest neighbors (KNN) and recurrent neural network (RNN), then the evaluation operation is done to generate different discrimination rates that reached up to 62% to discriminate between anger and disgust emotions.

[8]. "Speaking Effect Removal on Emotion Recognition From Facial Expressions Based on Eigenface Conversion", Chung-Hsien Wu, *Senior Member, IEEE,* Wen-Li Wei, *Student Member, IEEE,* Jen-Chun Lin, *Student Member, IEEE,* and Wei-Yu Lee.

Speaking effect is a crucial issue that may dramatically degrade performance in emotion recognition from facial expressions. To manage this problem, an eigenface conversion-based approach is proposed to remove speaking effect on facial expressions for improving accuracy of emotion recognition. In the proposed approach, a context-dependent linear conversion function modeled by a statistical Gaussian Mixture Model (GMM) is constructed with parallel data from speaking and non-speaking facial expressions with emotions. To model the speaking effect in more detail, the conversion functions are categorized using a decision tree considering the visual temporal context of the Articulatory Attribute (AA) classes of the corresponding input speech segments. For verification of the identified quadrant of emotional expression on the Arousal-Valence (A-V) emotion plane, which is commonly used to dimensionally define the emotion classes, from the reconstructed facial feature points, an expression template is constructed to represent the feature points of the non-speaking facial expressions for each quadrant. With the verified quadrant, a regression scheme is further employed to estimate the A-V values of the facial expression as a precise point in the A-V emotion plane. Experimental results show that the proposed method outperforms current approaches and demonstrates that removing the speaking effect on facial expression is useful for improving the performance of emotion recognition.

[9]. "Emotion Recognition with Facial Expressions and Physiological Signals", Boxuan Zhong, Zikun Qin, Shuo Yang, Junyu Chen, Nicholas Mudrick, Michelle Taub, Roger Azevedo and Edgar Lobaton.

This paper proposes a temporal information preserving multi-modal emotion recognition framework based on physiological and facial expression data streams. The performance of each component is evaluated and compared individually and after data fusion. Specifically, we compared the effect of different views of cameras on facial expressions for emotion recognition, and combined these views to achieve better performance. A Temporal Information Preserving

Framework (TIPF) is proposed to more accurately model the relationships between emotional and physiological states over time. Additionally, different fusion strategies are compared when combining information from different time periods and modalities. The experiments show that, TIPF significantly improves the emotion recognition performance when physiological signals are used and the best performance is achieved when fusing facial expressions and physiological data.

[10]. "Emotion Recognition Method Using Facial Expressions and Situation", Jun Hakura, Ryuta Domon , Hamido Fujita.

This paper tries to propose a method to recognize emotion of a user by systems that interact with human users. The goal of the method is achieving the same recognition results with a particular person. The main characteristic of the method is taking temporal sequence of the recognition result into account in its recognition process. The characteristic is derived from knowledge from psychology. The method uses a sequence of facial expressions of persons to estimate instantaneous emotion for a certain moment and uses the recognition result to recognize the emotional states by taking the emotional context into account. Experiments with three subjects as the particular persons who recognize the emotions of ten persons in medical interviews with a virtual medical doctor system, show that the emotion recognition using the previous recognition results outperforms that of only from the sequence of facial expressions.

RESEARCH GAPS

- It was not able to recognize the emotion of an oriented image of a face.
- The current system focuses only on static images and not the dynamic images.
- In LBP technique its small 3*3 neighborhood cannot capture the main features with large scale structures.
- Recognition rate differ with type of facial database used.
- Need to improve performance of recognition and timing for real time application.
- Could not recognize the emotion of a person when there was orientation of the face in an image.
- The database performance is not good for current systems and does not have updated database image sequence.
- Classification technique is not used in order to recognize emotions.

OBJECTIVES

The main objectives of this proposed system is to overcome the problems of previous research. The following are some of the services provided by RERS system.

- The ability to capture facial expressions, classify them into six universal emotions, and to recognize emotions in real time.
- To create a self-awareness among individuals and providing support to individuals who are afraid to share their feelings which might lead to a depression and self-discouragement and this may affect their personal, as well as their Social life.
- To establish a service so that people will understand to naturally express their emotions when they are interacting with our system.
- To figure out the conditions in which the emotion recognition application can result into objective or subjective measure improvements.
- To provide guidelines on the basis of emotion classification deployment which can give inputs to software developers to meet the user needs.