

Improved Facial Expression Recognition Using ANN and LDA

Shyamveer singh¹, Rajendra singh²

^{1,2}Dept of CSE/IT

^{1,2}NITM Datia (M.P.)

Abstract- Human face detection (FD) and recognition is a hot subject matter and a lively location of research. It is not unusual in numerous fields such as image processing (IP) and pc vision These Human facial expressions (HFE) convey a lot of information visually rather than articulately. Facial expression recognition (FER) assumes an urgent part in the zone of human-machine communication. Acknowledgment of outward appearance by PC with high acknowledgment rate is as yet a testing errand. FER usually performed in three-stages consisting of face detection, feature extraction, and expression classification. This paper introduces a study of the present work done in the field of FER strategies with different FD, feature extraction (FE) and classification methods used by them and their performance In this research paper, we proposed ANN for Classification of emotions using discrete cosine transform and physical parameters. The recognition result for surprise emotion is 99% if indicates that the proposed ANN module using DCT is less efficiency in recognition surprise emotion.

Keywords- face detection, facial expiration recognition, PCA, DCT, ANN, etc.

I. INTRODUCTION

Today FER Most Important Research Topics in Image Processing (IP). Facial expression (FE) in human alludes to the facial changes of a man. Such changes may be the consequence of the individual's condition of feeling, pondering or social association. A FER framework is a PC framework. This can be breaking down the facial highlights from either still picture or video dataset and order the outward appearance into characterized classes [1]. Facial Expression passes on non-verbal correspondence prompts in up close and personal entomb activity. Paul Ekman and Freisen have created FACS-Facial Action Coding System for portraying outwardly recognizable facial development. The Facial Expressions Two Types of Emotion: Positive Emotion And non-positive Emotion, positive feelings, we have included bliss, suspicion, intrigue, and acceptance and in non-positive emotions, we have considered anger, disgust, sad, fear, shame, contempt [2].

The human face plays an important role in communication. The face can express their sentiments through feelings. Face Expression approach [2] can be partitioned into three noteworthy advances with the goal that the face in a picture is known for additionally handling, facial element extraction which is the strategy used to speak to the FE lastly grouping which is the progression that orders the highlights extricated in the proper looks. The FE is for recognizing the fundamental human feeling like outrage, fear, joy, misery, and amazement.

Figure1 underneath demonstrating the general advance of feeling acknowledgment. From the figure, there are three essential periods of general framework. To begin with is confront discovery errand in which first noticeable highlights are removed and after that face is recognized. The second step is the place the facial component extraction and acknowledgment of outward appearances to the general highlights are evacuated toward the finish of the last advance in arrangement. Facial expressions of input image are then recognized.[3].

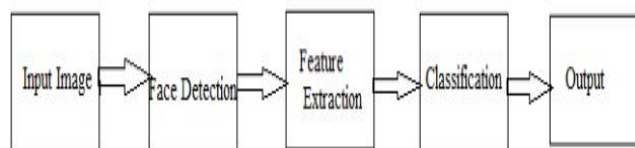


Fig. 1 General step of emotion recognition

FD is a vital part of FR gadget truly as it has the capacity to awareness computational sources on the crucial a part of a photo containing face.

FR includes perceiving people with their natural facial trademark (FC). Contrasted with different biometrics, FR is more characteristic, non-meddlesome and can be utilized without the collaboration of the person. FR system may be utilized in modes: verification and identity. Face verification machine (coordinated coordinating) incorporates affirming or denying the character asserted by methods for a particular person [4]. FI system (one-to-many matching) attempts to find the identity of a given individual against all picture templates in face individual database. FR strategies may be alienated

into look based or model-based strategies. Appearance-primarily based (Holistic) FR legally try to become aware of faces the usage of international representations based totally at the whole picture instead of nearby facial features a picture is considered as a high dimensional vector. Statistical methods are frequently used to gain a feature space from the image distribution. The pattern picture is as compared to the training set [5]. Appearance-primarily based strategies can be labeled as either linear or non-linear. Linear appearance-primarily based strategies perform a linear dimension reduction. The face vectors are projected to the premise vectors; the projection coefficient is used because the function illustration for every face picture thru the projection of the face picture vector onto the thought vectors. Straight techniques are Principal Component Analysis (PCA). Non-straight appearance-based strategies are normally more muddled than direct techniques.

II. USING TECHNIQUES

1. Principal Component Analysis (PCA)

PCA moreover called the Eigen confronts strategy and is one of the well known techniques for outward appearance recognition. Face can be effortlessly recreated by just considering little measure of data that can be acquired by utilizing Eigen faces.

2. Linear Discriminant Analysis (LDA)

Both PCA and ICA develop the face space without utilizing the face class (classification) data. The whole face training data is taken as a whole. In LDA the goal is to find an efficient or interesting way to represent the face vector space. But exploiting the class information can be helpful to the identification tasks. LDA finds the vectors in the hidden space that best segregate among classes. For all examples of all classes the between class dissipate framework SB and the inside class scramble network SW are characterized. The objective is to expand SB while limiting SW, at the end of the day, boost the proportion $\det|SB|/\det|SW|$. This proportion is expanded when the segment vectors of the projection grid are the eigenvectors of $(SW^{-1} \times SB)$. [6]

Discrete Cosine Transform (DCT)

The DCT is utilized to take out the worldwide highlights. DCT utilizes cosine works; the resultant network relies upon the even, corner to corner, and vertical frequencies. The DCT has many advantages such as energy compaction, orthogonality and separability, image

compression but the DCT is sensitive to changes in the illumination direction is the disadvantage. [7].

III. LITERATURE REVIEW

Boris V. Kostrov, et.al [8] The present paper has mentioned theoretical and practical results of application of an instrument of orthogonal transformations based on basis Walsh functions for information compression under transmission of aerospace images through the communication channel into embedded cyber physical systems. Parseval equality has been shown for quasi-two-dimensional representation of two-dimensional signals. Quality of the image restoration has been evaluated depending on the compression ratio. Protocols for transmission of the formed signal have been suggested.

Behnoosh Meskoob, et.al [9] One of the points of picture pressure, is diminishing superfluous and excess picture information for less demanding stockpiling and transmission in a powerful way, taking less stockpiling limit and less transmission transfer speed. While the pressure might bring about slightest data misfortune and most extreme closeness to the first picture. while different parameters, for example, picture estimate, add up to number of mark, envelope and coefficient capacities and different parameters are kept settled and without change. The upside of this examination is demonstrating the adaptability of SYMPES strategy towards obstruct however to a specific point where coefficient force isn't lost and signature intensity has no negative effect on envelope intensity.

Vladimir Vasiliev, et.al [10] Image compression (IC) for a class of imaging frameworks with optically-constrained determination is talked about. Specific territory of intrigue is the situation when the picture determination is restricted by the opening of focal point, or purported diffraction-constrained frameworks. Cases of diffraction-constrained imaging frameworks are top of the line pinhole cameras, high-determination microscopy and telescopic. These frameworks require high caliber of pictures, so much of the time apparent pictures are put away crude or packed with lossless or close lossless quality. Direct use of IC calculations prompts low compression proportions because of quality of noise. In our work we demonstrate that pressure proportion of these calculations can be enhanced by preparatory channel without influencing picture quality. This channel considers diffraction limited spatial data transfer capacity of optics, so compacted picture quality can be called "optically lossless". The filter can be applied before using image compression algorithms or can be integrated within compression procedure.

Yani Zhu ,et. al .[11] In this paper, Equable Principal Component Analysis (EPCA) is utilized as articulation highlights portrayal and Linear Regression Classification (LRC) is utilized as articulation classifiers. LRC manages the issue of face acknowledgment as a straight relapse issue. Tests of human pictures are performed on the Yale and JAFFE database. Contrasted with the condition-of-workmanship approaches, the acknowledgment rate of the proposed technique is higher. Therefore, the combination of LRC and EPCA for facial expression recognition is feasible.

Anil J, et. Al [12]. "Face Expression Recognition (FER) has turned into an exceptionally fascinating and testing territory in PC vision field because of its wide application potential outcomes. Mental state Recognition, Human Computer Interaction, Human conduct understanding and so on is some of its applications. Due to its wide application conceivable outcomes Face demeanor acknowledgment has accomplished an exceptionally urgent part in the zone of facial picture handling. In this paper a portion of the carefully fit face appearance Recognition calculations are displayed. This paper additionally gives a concise understanding into the component extraction strategy for these face demeanor acknowledgment procedures.

Chathurda Sri Nadith Pathirage, et.al.[13]. "The key test of face acknowledgment is to create powerful component portrayals for decreasing intra-individual varieties while developing between individual contrasts. This paper exhibits a novel non-direct discriminate blunder standard which can be utilized as a part of compelling element gaining from crude pixels. Unlike many existing methods which assume the problem to be linear in nature, the proposed method utilizes a novel deep learning (DL) framework which makes no prior assumptions thus exploiting the full potential of learning a highly non-linear transformation. High level portrayals learnt by means of the proposed display are exceedingly administered and can support the execution of resulting classifiers, for example, LDA. This investigation plainly demonstrates the estimation of utilizing non-direct discriminant blunder foundation as a tractable goal to control the learning of helpful abnormal state includes in different face related issues. The extricated highlights are learnt from neighborhood confront districts and the aftereffects of the analyses performed on 3 distinctive face picture databases exhibit the prevalence and the generalizability of our strategy contrasted with existing work, and in addition the materialness of the idea onto a wide range of profound learning models of a similar sort."

Walid Hariri, et.al.[14] "In this paper, we propose a progressive covariance portrayal for 3D confront coordinating

and acknowledgment under articulation variety. Not at all like component based vectors, have covariance-based descriptors empowered the combination and the encoding of various kinds of highlights and modalities into a conservative portrayal. The proficiency of covariance descriptors however may rely upon the measure of its district of definition. From one viewpoint, covarying highlights in a little area don't catch adequate properties of the face. Then again, substantial locales just catch coarse highlights, which may not be adequately discriminative. In this paper, we propose to speak to a 3D confront utilizing an arrangement of highlight focuses. In our trials, we exhibit the utility of this portrayal and present testing comes about on various datasets including the BU-3DFE and the GAVAB datasets."

Lajevardi and Wu [15] presented a tensor based totally illustration of the static shade pictures. They completed 68.8% accuracy in recognizing the expression with distinctive resolutions in color space. Neural network (NN) is proposed in that compresses the entire face location with 2-D discrete cosine transform (DCT).

Huang and He [16] presented an awesome decision technique to improve the FD of low resolution pictures. They carried out canonical correlation analysis (CCA) to acquire the coherent capabilities of the high resolution (HR) and low resolution (LR) pictures, and employed radial basis functions (RBF) based nonlinear mapping favoring the nearest neighbor classifier for detection of unmarried enter LR picture. The detection rate of their method examined at the Facial Detection Technology (FERET) face database become 84.Four%, 93.0% for UMIST database, and ninety five.0% of the Olivetti Research Laboratory (ORL) database.

Zhi, Flierl, Ruan, and Kleijn [17] used the predictable gradient Method and advanced the graph- preserving sparse non-bad matrix factorization 109 (GSNMF) for extraction of function proven on one-of-a-kind databases. They carried out an accuracy of 93.3% detection for eye occlusion, 94.0% for nostril occlusion, 90.1% for mouth occlusion and 96.6% for impulsive FE.

Zhang and Tjondronegoro [18] offered patch-based Gabor feature extraction from the routinely cropped images, within the type of patches matched the patches of the enter picture with the trained images by way of evaluating the distance metrics and class accomplished by means of 4 special kernels assist vector device.

IV. PROPOSE WORK

PROPOSED METHODOLOGY

In this research paper, we proposed ANN for Classification of emotions using discrete cosine transform (DCT) and physical parameters. The recognition result for surprise emotion is 99% if indicates that the proposed ANN module using DCT is less efficiency in recognition surprise emotion.

Propose Algorithm

- Step. 1. Select train dataset.
- Step. 2. Select the test Dataset.
- Step. 3. Feature Extract of Train dataset using PCA.
- Step. 4. Feature extract of test database using PCA.
- Step. 5. Apply LDA.
- Step. 6. Classification using ANN.
- Step. 7. Calculate the Accuracy and performance time

FLOWCHART-

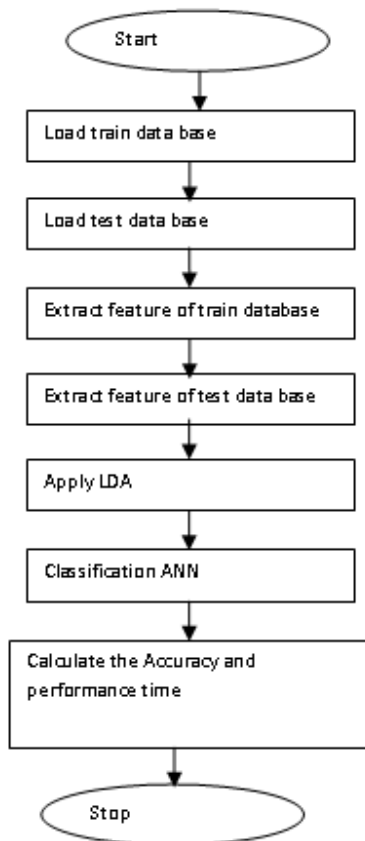


Fig. 2. Flowchart of propose work

V. RESULT ANALYSIS

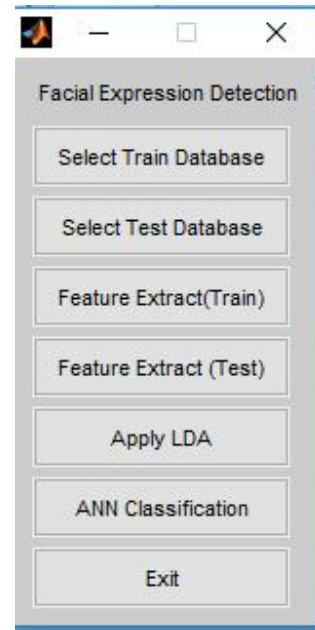


Fig. 3.First step is run the code and obtain the menu bar.

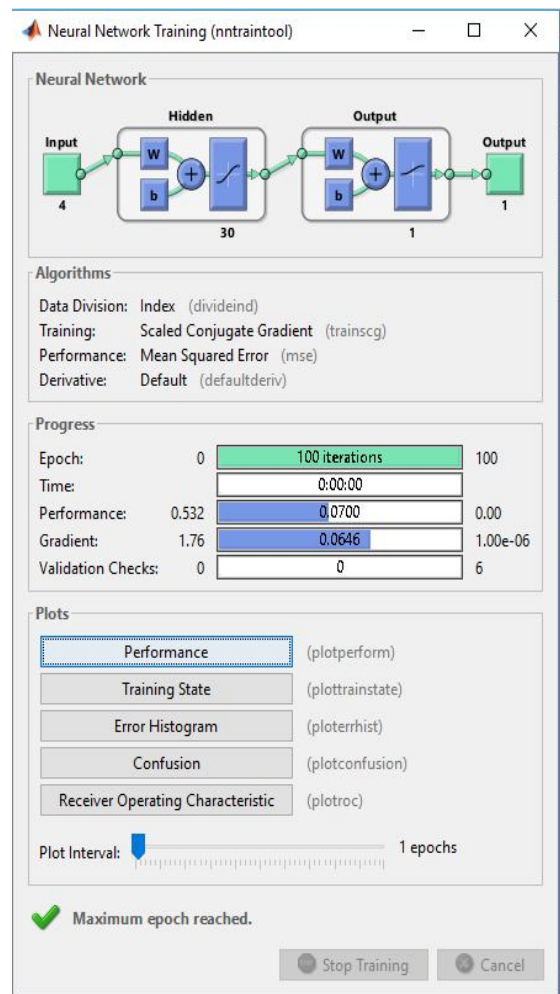


Fig.4 Apply ANN for classification

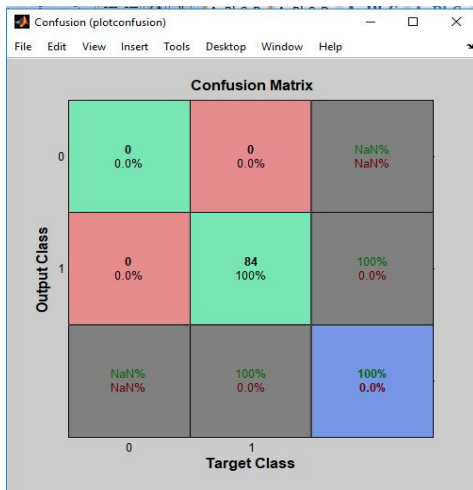


Fig.5. Plot confusion matrix using ANN

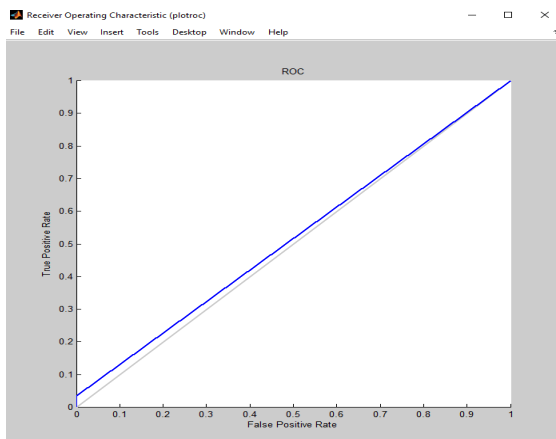


Fig.6. Receiver operation characteristic (ROC) graph

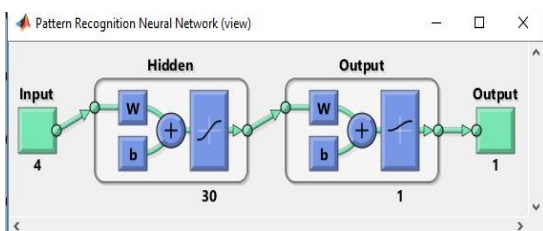


Fig.7. Pattern Recognition Neural Network

Table 1. Base processing time and Propose processing time

Base processing time	Propose performance time
37.455	18.6079

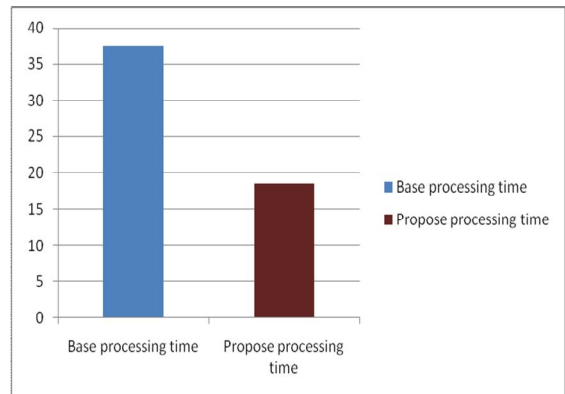


Fig. 8. Graph 1. Base processing time and Propose processing time

Table 2. Base Accuracy and Propose Accuracy

Base Accuracy	Propose Accuracy
14.6341	99.5196

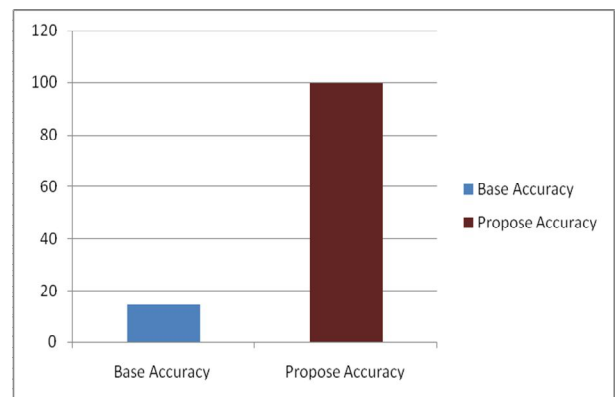


Fig. 9. Graph 2. Base Accuracy and Propose Accuracy

VI. CONCLUSION

In this artifact a new methodology for difference image based facial expression recognition by making use of properties of eigenvector rottenness is anticipated. The alteration image thus attained is designated as expression component image which imprisons the information consistent to the expression of the test image. In this paper we discussed Face Detection Technique based on LDA and DCT, PCA and principal component analysis with the help of this technique, we can recognize an accurate and high speed emotion detection system.

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