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A Combined Approach for Facial Emotion Recognition using Viola Jones and ANN Algorithm

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Abstract: ***The human face has an complex multidimensional facial structure and consequently it is extremely hard to build up a computational model for remembering it. The paper shows a technique for perceiving the human face dependent on the highlights got from the images. The proposed procedure is executed in two phases. The principal arrange identifies the human face in a picture utilizing Viola Jones calculation. In the following stage the distinguished face in the picture is perceived utilizing a Feed Forward Neural. The proposed technique utilizes ID Face Database as standard picture database.***
Keywords: Human Facial Emotion Recognition, ANN, Voila Jones, Facial Expression.

I. INTRODUCTION

In recent years, although much advance has been done in the field of human computer interaction (HCI) facial appearance acknowledgment with high acknowledgment rate is as yet an exceptionally difficult issue and turn into a center point in the field of computer science and HCI. Facial behavior is the wellspring of data to decide individual's state of mind and feelings. Facial expression have been sorted in the mid-1970s by Ekman's examinations. He has expressed that people have six detects where each sense speaks to a particular feeling, for example, outrage, glad, miserable, dread, shock and sicken.

There is much application that utilizations Facial Expression Recognition, for example, Robotics, security, Health care, human-machine communication, human behavior detector and so on. For the most part, Facial Expression Recognition fundamentally performed in three noteworthy advances:



Fig 1: Three steps for facial expression recognition.

II. CHARACTERICTICS OF IDEAL FACIAL EXPRESSION SYSTEM

We people, think that it's insignificant to take a gander at a picture and instantly distinguish faces, perceive them or even recognize a portion of the feelings. Examines have been attempting to imitate the manner in which our visual framework works and to formulate qualities of a perfect programmed FER framework.

A. Work progressively situations, with a pictures (static or video)
B. Identify faces paying little mind to introduction, goals, impeding components.
C. Be invariant to changes in light conditions
D. Be individual free, and invariant to sort or age
E. Capacity to perceive both presented or unconstrained articulations

III. LITERATURE SURVEY

Sisodia P. et al. [1], The Human Facial Expression Recognition is used as a piece of numerous fields, for instance, air recognizable proof and Human Computer Interaction (HCI). Gabor Filters are used to expel highlights. Gabor has the accommodating property of power against slight dissent turn, bowing and assortment in lighting up.

Samad R. et al. [2], Author investigate the execution of an outward appearance acknowledgment system with a base number of highlights of the Gabor wavelet. In this investigation, vital section examination (PCA) is used to pack the Gabor highlights. We likewise discuss the decision of the base number of Gabor includes that will play out the best in an acknowledgment task using a multiclass bolster vector machine (SVM) classifier. The execution of outward appearance acknowledgment using our methodology is differentiated and those gained as of now by various researchers using diverse strategies.

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Meher et al. [3], proposes a PCA for Face Recognition and FER. For PCA grouping is matters for execution. In this paper, delayed consequence of acknowledgment rate is 81.36% for CSU dataset and 85.5% for ATT dataset.

Samad R. et al. [4], present edge-based element extraction for seeing six one of a kind articulations, which are irate, fear, glad, unbiased, misery and shock. Edge acknowledgment is performed by using Gabor wavelet and convolution channels. In this paper we propose two convolution bits that are specific for the edge disclosure of facial fragments in two presentations.

Abdulrahman M. et al. [5], Author proposed an outward appearance acknowledgment approach dependent on Gabor wavelet change. Gabor wavelet channel is first used as pre-planning stage for extraction of the component vector depiction. Dimensionality of the element vector is diminished using Principal Component Analysis (PCA) and Local parallel model (LBP) calculations. Preliminaries were finished of using Japanese female outward appearance (JAFFE) database. Sabia et al. [6], Author deliver a model of a wheelchair bring interface that does not require exchange's hands. It fuses 3 important modules. They are confront distinguishing proof, outward appearance acknowledgment and request age. The item contains automated picture taking care of for face area, essential section examination for outward appearance acknowledgment and making a charge signals for interfacing the wheelchair. The calculation is attempted in MATLAB. The stale pictures address different individuals face and outward appearances of a subject, from Indian Face Database and Japanese Female Face Database are used to assess the ampleness of the calculation independently. Thai L.H. et al. [7], Author propose a novel methodology using Canny, Principal Component Analysis (PCA) and Artificial Neural Network. Immediately, in preprocessing stage, we use Canny for neighborhood of facial pictures. By then every one of nearby area's highlights will be displayed dependent on Principal Component Analysis (PCA). Finally, using Artificial Neural Network (ANN) applies for Facial Expression Classification. Sarawagi V. et al. [8], a human face has an undeniable and exceptional characteristics which impact it to accept a to a great degree fundamental part in seeing outward appearance in an "outward appearance acknowledgment system." Identifying or as we say it disclosure of demeanors has a noteworthy and important influence in an outward appearance acknowledgment structure. In case we examine a man it transforms into a straightforward errand see articulation in a particular picture progression, anyway meanwhile in case we talk about totally motorized systems generally few are by and by open or talented to do in that capacity. Chao W. L. et al. [9], Author proposed a novel structure for outward appearance acknowledgment is proposed, which upgrades the standard element extraction strategy to furthermore manhandle specific characters for each stamp. To reduce the effect from arbitrary highlights for outward appearance acknowledgment, a denoising framework is introduced. In the wake of denoising, to keep the relationship between articulation names and light up highlights and also reduce the proportion of computation, an intricate learning calculation is associated, which finding an imperative low-dimensional structure concealed in the light up highlight space. Mollahosseini A. et al. [10], Author proposes a significant neural framework designing to address the FER issue over different most likely comprehended standard face datasets. Specifically, our framework contains two convolutional layers each took after by max pooling and thereafter four Inception layers. The framework is a singular part designing that takes enrolled facial pictures as the data and groups them into both of the six basic or the impartial articulations. We coordinated thorough examinations on seven unreservedly available outward appearance databases, viz. MultiPIE, MMI, CK+, DISFA, FERA, SFEW, and FER2013.

IV. METHODOOGY

This area talks about the proposed workflow in detail. The fig. 2. Demonstrates the proposed system architecture.

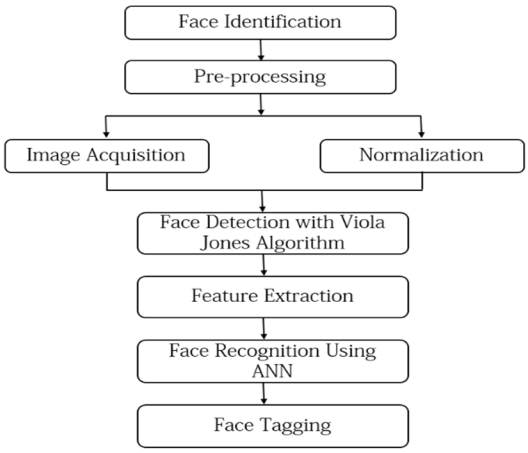


Fig. 2. Proposed System Architecture

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A. Face Identification

The input facial images are taken. The whole framework depends on two major algorithm Voila Jones and ANN. The face from the images are identified.

B. Pre-processing

A standard picture database which is promptly accessible either in shading or dim scale is considered. In the Pre-processing stage differentiate extending is performed on the gained picture where the white pixels are made more white and dark pixels are made darker.

C. Face Detection with Voila Jones

After differentiation extending viola-Jones calculation is connected for recognizing the face in the picture. Viola-Jones indicator was picked as a recognition calculation in light of its high location rate, and its capacity to keep running continuously. Indicator is best on frontal pictures of countenances and it can adapt to 45° face turn both around the vertical and even pivot. The three principle ideas which enable it to keep running progressively are the indispensable picture, Ada Boost and the course structure. The Integral Image is an calculation for financially savvy age of the total of pixel forces in a predefined square shape in a picture. It is utilized for fast calculation of Haar-like highlights. Computation of the aggregate of a rectangular region inside the first picture is to a great degree productive, requiring just four increases for any discretionary square shape estimate. AdaBoost is utilized for development of solid classifiers as direct mix of powerless classifiers. The Haar highlights utilized in voila-Jones calculation are as appeared in Fig 3.

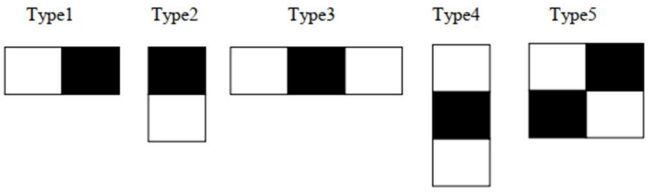


Fig. 3. Haar Features in Voila Jones

D. ANN Training

In this stage the information taken from the pictures are reproduced utilizing a recently prepared ANN. The info will be a vector cluster from the past stage. The systems are prepared with face descriptors as info. The quantity of system will be equivalent to the number of people in the database. To comprehend the idea of Artificial Neural Networks, one should know how the characteristic neural system framework in mind works. Regular Neural Networks framework in the cerebrum has neurons as the fundamental building squares. All neurons are associated by a way to convey electrical signs alluded to as neural connections.

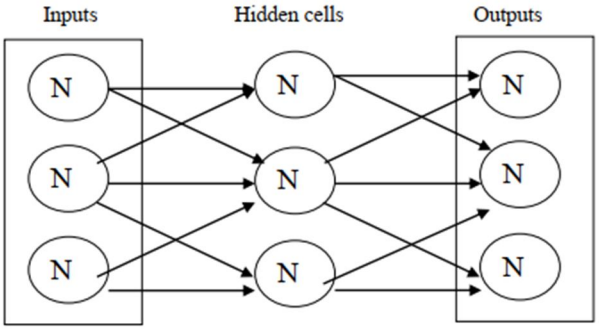


Fig.4. Artificial Neural Network

E. Face Tagging

In the Face Tagging stage the outcome from the recreation is utilized by the acknowledgment framework to label a fitting name to the picture of the individual. The information is in double frame and subsequently this square is additionally mindful in assessing the articulation into a certain esteem and coordinating it to a man's name in the name list. In any case, if the deciphered esteem isn't one of the qualities recorded in the list, at that point the name returned will be naturally predefined as "Obscure".

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V. RESULTS

In this segment, we introduce the outcomes got from executing all the algorithms. To assess and simulate proposed mechanism MATLAB is utilized. We have simulated our model in MATLAB 2010 version.

A. Step 01: Input Dataset



Fig. 5. Input Dataset (a) Happy (b) Surprised (c) Sad (d) Angrey

B. Step 02: Creating Databases and Extracting Features

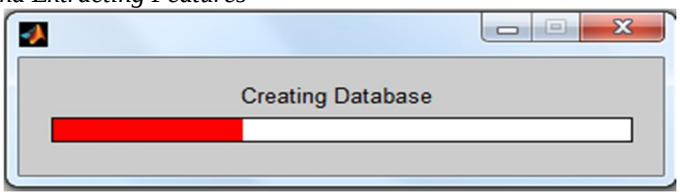


Fig. 6. Creating database and extracting features

C. Step 03: ANN Training

```
training error after epoch 93: 0.068073

training error after epoch 94: 0.065387

training error after epoch 95: 0.064286

training error after epoch 96: 0.063180

training error after epoch 97: 0.061096

training error after epoch 98: 0.059781

training error after epoch 99: 0.058469

training error after epoch 100: 0.057320

Train Accuracy - 100.00 %
Test Accuracy - 79.51 %
```

Fig. 7. ANN Training Phase

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D. TEST Output

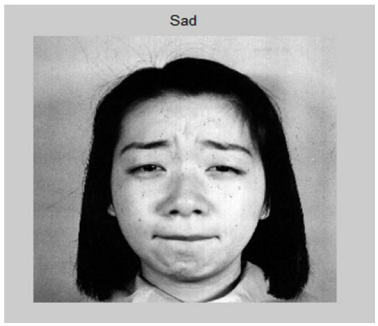


Fig. 8. Image classified as having SAD facial expression

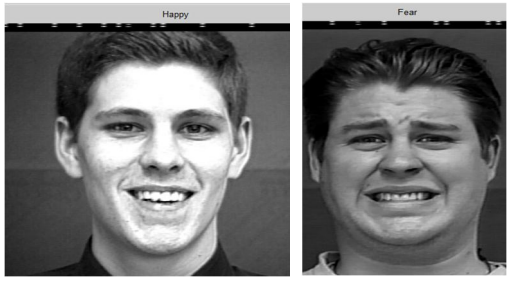


Fig. 9: Image classified as having Happy and Fear facial expression

VI. CONCLUSION

The paper shows an effective methodology for face identification and acknowledgment utilizing Viola-Jones and ANN systems. The execution of the proposed strategy is contrasted and other existing face acknowledgment techniques and it is seen that better exactness in acknowledgment is accomplished with the proposed technique. The proposed method gains 100% accuracy while training and 80% accuracy while testing.

Face identification and acknowledgment assumes a fundamental job in an extensive variety of utilizations. In a large portion of the applications a high rate of exactness in recognizing a man is wanted subsequently the proposed strategy can be considered in examination with the current strategies.

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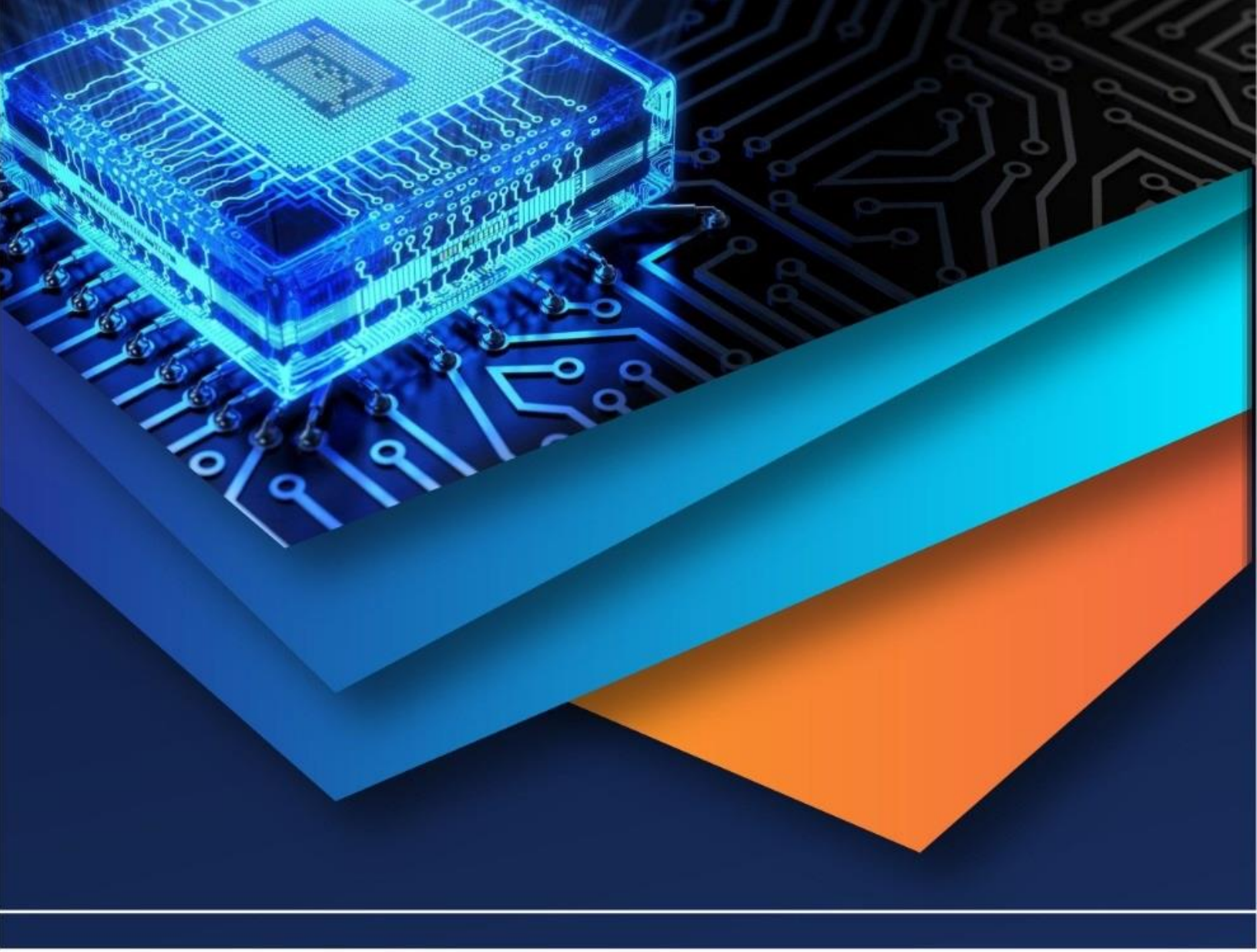
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