

DETECTION OF EMOTION AND EMOTIONLESS FACIAL EXPRESSION RECOGNITION SYSTEM (FER) USING DEEP LEARNING TECHNIQUE

S.AYEESHA¹, S.AYESHA BANU², P.VYSHNAVI³, D.SWETHA⁴

*1,2,3,4UG Student, Department of Computer Science And Engineering,, Madanapalle Institute Of Technology & Science, Angallu (V), Madanapalle-517325, Chittoor District, Andhra Pradesh, India.

Abstract - Human feelings are normal articulations that individuals will in general make normally, rather than any cognizant exertion that is joined by the reflexing of facial muscles. Which a human face can make as indicated by the various circumstances one may end up in.. A portion of the normal feelings are Happy, sad, disgust, surprised, Angry, Stable and Emotionless which a human face can make as indicated by the various circumstances one may end up in. We present the product which identifies and perceives faces just as educates significantly really concerning that individual which could be utilized to get criticism from clients or to know whether an individual necessities inspiration. The target of the task is to be a moderate and proficient item. Artificial Intelligence & Digital image processing technology used to make the system in python. Detection of eye blinking is important in certain scenarios where to avoid any accident or mis-happening like in vehicles or in security vigilance. To prevent such accidents, we are providing some buzzer system to our model to detect the person while driving.

Key Word: Deep Learning, Convolutional Neural Networks, Drowsiness detection, Emotion recognition.

1.INTRODUCTION

The area of Artificial Intelligence and Digital Image Processing is development in the world in drastically. Many areas of industry have started using the various techniques and applications of AI with deep learning. The project can be implemented for marketing and enhancement change to new thing innovation purpose also, let us know the feedback of any product development the products. It provides accurate perfect results analysis. As well as are easy to be implemented and understood in the most common systems, the features can be installed in a cost helpful and efficient approach in schools or colleges or any other area to surveillance is required, but lack of finances is a most important factor to trouble to development AI. The project, surveillance could be provided which results help in maintaining a regular health check and to identify the emotion of a person at employment place. It can also be used as criticism of

personnel after production a quantity of change at workplace.

An Artificial Intelligence & Digital image processing technology used to make the system which contains face recognition, emotion recognition, and drowsiness detection in user. The face recognition conventional KNN algorithm is used. The given proposed work has shown us that the performance of face recognition technique can be better much better by mixing Tensor flow, deep learning features extraction and the K Nearest Neighbor and Sparse Representation Classifier (KNN- SRC) for classification. The aim to development a Convolutional -Neural Network (CNN) based on Facial Expression Recognition System (FER) to analysis the facial expression. The deep learning algorithm used for drowsiness detection detects the blinking of the eye through the camera installed using Live Video Streams.

2. literature survey

1. Nian Zhang, Welezane Karimoune, Lara Thompson, and Hongmei Dang. "A Between-Class Overlapping Coherence-Based Algorithm in KNN Classification",

An improved KNN algorithm to overcome the class overlapping problem in the class distribution is skewed. Not quite the same as the ordinary KNN calculation, it's difficult discovers the k closest neighbors of each example (even the test object itself) in the preparation dataset, yet in addition the neighbors of the obscure test object. Then, at that point the legitimacy worth of an information point is processed dependent on the mark of the information and the names of its k closest neighbors. A classifier is intended to allocate the obscure test object to a class enrollment dependent on the proposed legitimacy evaluations conditions.

2. SeongJoon Baek and Koeng-Mo Sung, "Fast K-nearest-neighbor search algorithm for nonparametric classification."

Fast KNN search algorithm to uses a projection value to test whether distance calculation is required. A disparity between the projection esteems and the distance is inferred

and fused into the arrangement calculation. Experimental results confirm the effectiveness of the accurate results in K-nearest neighbor.

3. Wen-Jyi Hwang and Kuo-Wei Wen. “Fast KNN classification algorithm based on partial distance search.”,

The KNN algorithm is a nonparametric classification technique which has been shown to be effective in statistical pattern recognition applications. The technique can achieve a high classification accuracy in problems which have unknown and non - normal distributions. Not with standing, it's anything but a significant downside in that a lot of plan vectors are needed in the classifiers bringing about high computational intricacy for order.

4. Bilel Ameer, Sabeur Masmoudi, Amira Guidara Derbel, Ahmed Ben Hamida. “Fusing Gabor and LBP Feature Sets for KNN and SRC-based Face Recognition.”

The face recognition performance can be significantly improved by combining Tensor flow and deep learning extraction and the K Nearest Neighbor and Sparse Representation Classifier (KNNSRC) for classification. The best outcomes are acquired as far as time utilization and acknowledgment rate. Here proven that system efficiency depends on the size of the reduced vector obtained by the dimension reduction technique of deep learning.

5. Vedat TÜMEN, Omer Faruk SÖYLEMEZ, Burhan ERGEN. “Facial Emotion Recognition on a Dataset Using Convolutional Neural Network.”

Profound learning is a method that happens in numerous PC vision related applications and studies. While it is placed in the training for the most part on content based picture recovery, there is still opportunity to get better by utilizing it in assorted PC vision applications. In this study of aimed to build a Convolutional Neural Network (CNN) based Facial Expression Recognition System (FER), in order to automatically classify expressions presented in Facial Expression Recognition (FER2013) database.

III METHODOLOGY

The goal is to create a model to predict the emotions in an image. Steps involved in this project are as follows:

- Gathering, examining, and cleaning the data (data exploration)
- Choose a model and measure the evaluation (Neural network)
- Training
- Evaluate the models on a metric and compare

them to the benchmark.

- Compare different Machine Learning algorithms based on their accuracy of predicting the digit.
- Developing CNN model.

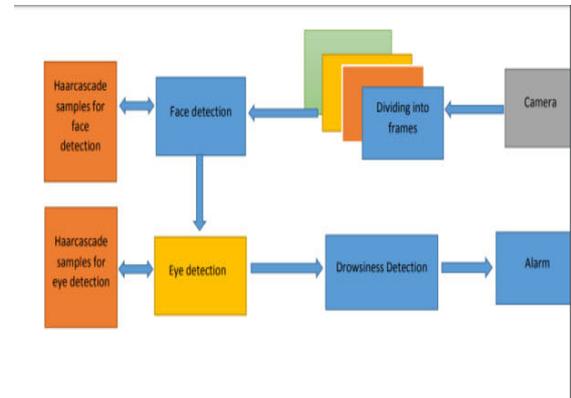


Fig1:Architecture of the model

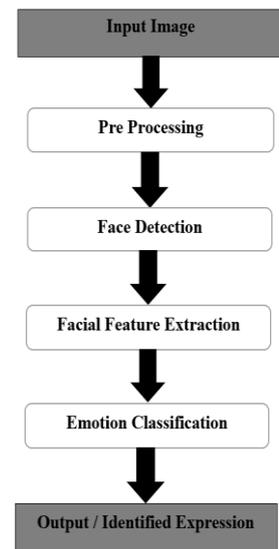


Fig 2

A. Download the dataset:

We have imported a FER.csv file which contains almost all the emotions which have been converted into numerical. It consists of approximately 60000 training images and 10000 test images, which are 28x28

Pixel grayscale images of different emotions of a person like happy, sad, neutral, surprise, fear, disgust, angry. The other dataset contains the data and images of different eye shapes/postures which is trained on detecting the drowsiness.

B. Preprocess the data:

Before training, the pre-processing model is needed whose output images will be the inputs for the training model. Pre-processing is mainly done to remove noise, resize, crop, detect edges.

C. Visualize the data:

Data visualization is a process of representing data or information in the form of a graph, chart, or another visual format. This makes the data simpler and hence makes the data easier to identify trends, patterns, and outliers within large data sets.

D. Split the data:

The Complete dataset is divided into train and test datasets. The training dataset is used to fit and tune your models. The Test dataset is used to evaluate your models. Before performing anything, data split should be split. It is the best way to get efficient estimates of models' performance.

E. Train and Test the data:

In any dataset, a training dataset is used to build a model, and a test dataset (or validation) is used to validate the model. So, we use the training data for fitting the model and testing data for testing it.

F. Predict the result:

The models produced here are then used to predict the results which are unknown, and this is named the test dataset. To test the model, some of the images are used from the test dataset.

IV MODELING AND ANALYSIS



Fig3: Different set of faces expressing various emotions

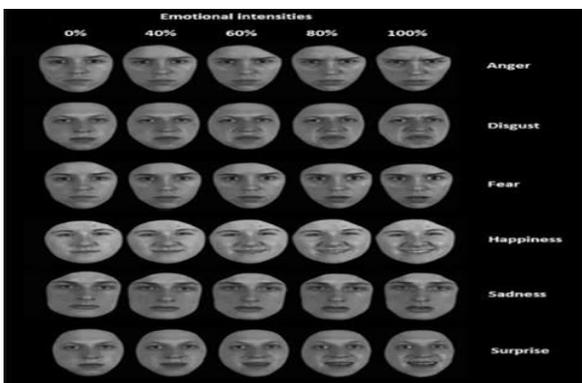


Fig4: Sample images for intensities of emotional expressions



Fig5: Drowsiness detection dataset.

Looks are significant in working with human correspondence and communications. Facial picture-based mind-set identification procedures may give a quick and down to earth approach for non-intrusive temperament location. The purpose of the present study was to develop an intelligent system for facial image based expression classification using conventional neural network(CNN).

A few facial boundaries were removed from a facial picture and were utilized to prepare a few summed up and specific neural organizations. In light of introductory testing, the best performing summed up and specific neural organizations were enrolled into dynamic panels which framed a coordinated advisory group neural organization framework. The integrated convolutional neural network system was then evaluated using data obtained from subjects not used in training or in initial testing.

Classifier Section

Convolutional Neural Network:

The convolutional neural networks are very similar to the neural networks they are formed by neurons that have parameters in the form of weights and biases that can be learned.

Basic components of a convolutional neural network neuronal:

The convolution operation:

The essential contrast between a thickly associated layer and a particular layer in the convolution activity, which we will call the convolutional layer, is that the thick layer learns worldwide examples in its worldwide info space, while the convolutional layers learn nearby examples in little windows of two measurements. All in all, the convolutions layers work on 3D tensors, called highlight maps, with two spatial tomahawks of tallness and width, just as a channel pivot additionally called profundity. For a RGB shading picture, the component of the profundity hub is 3, in light of the fact that the picture has three channels: red, green and blue.

The pooling operation:

Not with standing the convolutional layers that we have quite recently depicted, convolutional neural organizations go with the convolution layer with pooling

layers, which are typically applied following the convolutional layers. A first way to deal with comprehend what these layers are for is to see that the pooling layers work on the data gathered by the convolutional layer and make a dense rendition of the data contained in CNN Operations.

Basic architecture of a convolutional neuronal network:

We should continue onward to carry out our first convolutional neuronal organization, which will comprise of a convolution followed by a maximum pooling. For our situation, we will have 32 channels utilizing a 5x5 window for the convolutional layer and a 2x2 window for the pooling layer. We will use the ReLU activation function. In this case, we are configuring a convolutional neural network to process an input tensor of size (28, 28, 1) and we specify it by means of the value of the argument input shape = (28, 28,1) in our first layer.

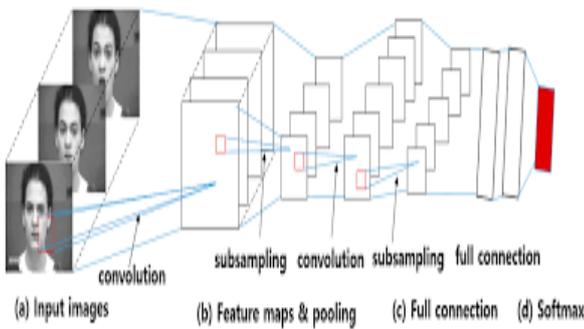


Fig6: Classification Steps

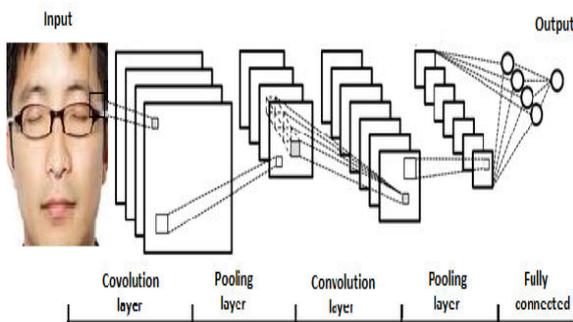


Fig 7: Overview of ER&DD

V RESULTS AND DISCUSSION

In this section, we compare the results of five classification algorithms namely K-Nearest Neighbors, Logistic Regression, Convolutional Neural Network, Random Forest Classifier and Support Vector Machine.

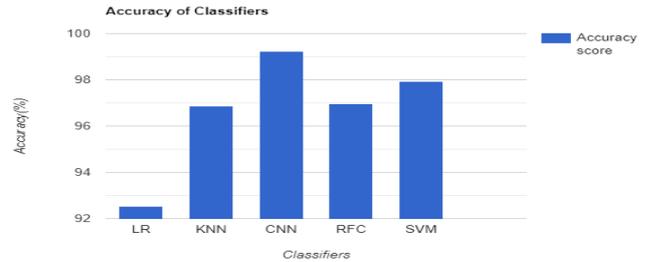


Fig 8: Comparison of accuracy

As CNN got high accuracy, it is used for training the model. The accuracies of the training and the testing dataset are plotted below.

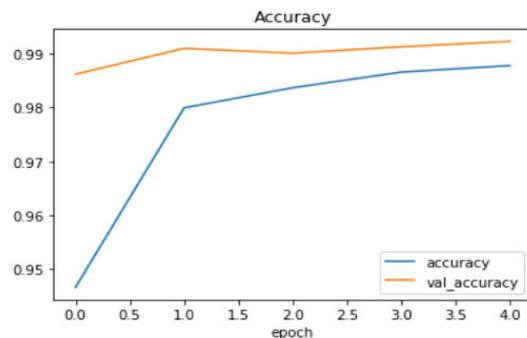


Fig : Training and Testing accuracy

So, the training accuracy of CNN is 96.23% and test accuracy is 97.53%.

VI CONCLUSION

Human feelings are regular articulations that individuals will in general make normally, rather than any cognizant exertion that is joined by the reflexing of facial muscles. We present the product which distinguishes and perceives faces just as enlightens significantly seriously regarding that individual which could be utilized to get input from clients or to know whether an individual requirements inspiration. The target of the task is to be a reasonable and proficient item. Artificial Intelligence & Digital image processing technology used to make the system in python. Identification of eye flickering is significant in specific situations where to stay away from any mishap or mishappening like in vehicles or in security carefulness. The model will detect and recognize the facial expressions and will give accurate results of the facial expressions. It will detect and recognize the eye blinking or closing the eye and it will give buzzer sound or alert alarm tune to driver or who are present in the vehicle. Identification of eye squinting is significant in specific situations where to keep away from any mishap or mishappening like in vehicles or in security carefulness. The model will detect and recognize the facial expressions and will give accurate results of the facial expressions and drowsiness of the driver.

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