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Prediction of Facial Emotions Recognition Using CNN

Dr. A. Senthil Kumar M [1], C.Chandana Priya [2], C.Akhila [2], B.Shanthi Prasanna [2], K.Gowthami[2], B. Prameela [2]

[1] Principal, Sanskrithi School of Engineering, Puttaparthi, Andhra Pradesh

[2] Department of Electronics &Communication Engineering, Sanskrithi School of Engineering, Puttaparthi, Andhra Pradesh

A B S T R A C T

This project's major goal is to deal with building a video processing system for recognising and comprehending people's facial expressions. This project's methodology calls for the identification of face landmarks and an analysis of their placement. In this experiment, facial landmarks were added to black and white images created by networks that were originally designed to function on coloured or grayscale images. With the addition of a few photographs we personally took, the training, validation, and query datasets were also modified and preprocessed from established computer vision datasets. This project offers the experimental findings and validates a number of methods

***Keywords*:** Facial Expression Recognition, Convolutional Neural Network, Facial Landmarks, Machine Learning.

1. Introduction

Humans connect with one another through words, body language, and feelings. Because of the high need for such systems across various industries. In terms of artificial intelligence, a machine will be able to communicate with people far more easily if it can recognise human emotion. Additionally, it might be useful in disciplines relating to health care, such as counselling. Depending on the status of the student, an E-Learning system may change the presentation style. As a result, the study suggests a model that aims to recognise face emotions in real time. Facial expression recognition offers a variety of real-time applications. For instance, ATMs might be programmed such that they won't dispense cash to frightened users. In the gaming business, emotion-aware games can be created that can change a level's difficulty based on the player's feelings. It can also be used for testing video games. Players typically provide comments now, whether it be written or spoken. Their facial expressions throughout various game moments can be used to infer the game's overall strengths and weaknesses.

2. Literature Review

The articles listed below offer a clear explanation of the Facial Emotion Recognition design and were chosen after a review of a few recent research publications on the topic.

Costache, Alexandru, and Popescu, Dan [1] upon The Haar cascade algorithm and CNN for image processing are employed in the development of a video processing system specifically designed for recognising and comprehending human face emotions. CNN is helpful for quick action and more accuracy. can easily execute complex images. It records static images or videos and processes them. Detecting the land markings can take up to 400 milliseconds per face.

Mehrabian, Ekman, Freisen, Agrwal et mittal, Deepak Jain, Mohammad pour [2]Review and thoughts on facial emotion identification using deep learning.To improve computer prediction, face expressions should be coded and these features should be extracted. By contrasting the suggested methods, we illustrate the progress gained while describing the architecture and data base employed. To obtain higher achievements, CNN and CNN-LSTM are utilised. information gathered by a variety of sensors, both verbal and nonverbal. By simply understanding the six fundamental emotions, in addition to neutral and more complex emotions, one is always constrained.

Recognition of emotion intensities using machine learning algorithms: A comparison study, D. Mehta, M.F.H. Siddiqui, and A.Y. Javaid [3]. Machine learning is being used to recognise emotions and their intensities. This increased use of behavioural biometric systems and human-machine interaction is crucial. Consequently, the FER is getting a lot of attention. Facial expressions can convey inner feelings and reveal a person's intentions in a social setting. Both the observed facial emotions and multiclass face actions are not encoded.

Ekmann, Byoung Chul Ko, and Friesen [4] a quick refresher of visual information-based face emotion recognition. a quick study of visual information-based face emotion recognition Conventional FER, which uses SVM Adaboost and random forest techniques as well as CNN for visual input, is used to identify faces and facial components, extract facial features, and recognise human expressions. It lessens the reliance on models based on facial physics.

CNN-based FER techniques are unable to capture the temporal changes in the face components. By allowing "end to end" learning in the pipeline directly from the input image at the pre-processing stage.

A T. Oliveira-Santos, A. De Souza, A. Lopes, E. Aguiar, and [5] Convolutional neural networks for facial expression recognition: handling sparse data and training sample order. Studies revealed that combining normalisation techniques greatly increases accuracy. Pre-processing techniques were conducted to the photos to overcome higher data usage and choose the subset of features that uses less data.

3. Design and Development

To create a machine learning model for facial emotion recognition, a thorough investigation was made. Utilising the Convolutional Neural Networks technique, the model was created. A machine learning-based method for face detection called Haar cascades involves training a cascade function with a collection of input data. There are already trained classifiers for faces in OpenCV. For the face detection in this project, we will use the Haar Cascade and LBP Cascade classifiers.

Algorithms and Classifiers:

The following algorithms and libraries have been used in the program to increase the accuracy and time complexity.

1. Convolutional Neural Networks (CNN)
2. Haar Cascade classifier

1.Convolutional Neural Network:

The following steps were used to design the sign language recognition system.

3. Data Collection
4. Image Pre-processing
5. Feature Extraction
6. Classification

Face Recognition: Nowadays, computer vision is becoming more sophisticated. Major tech companies are developing their models to resemble people more closely; in order to achieve this, machines must be able to recognise your emotions and treat you appropriately..

- Getting Data
- Preparing data
- Image Augmentation
- Build model and train
- use the webcam for detection

2.Haar Cascade Classifier

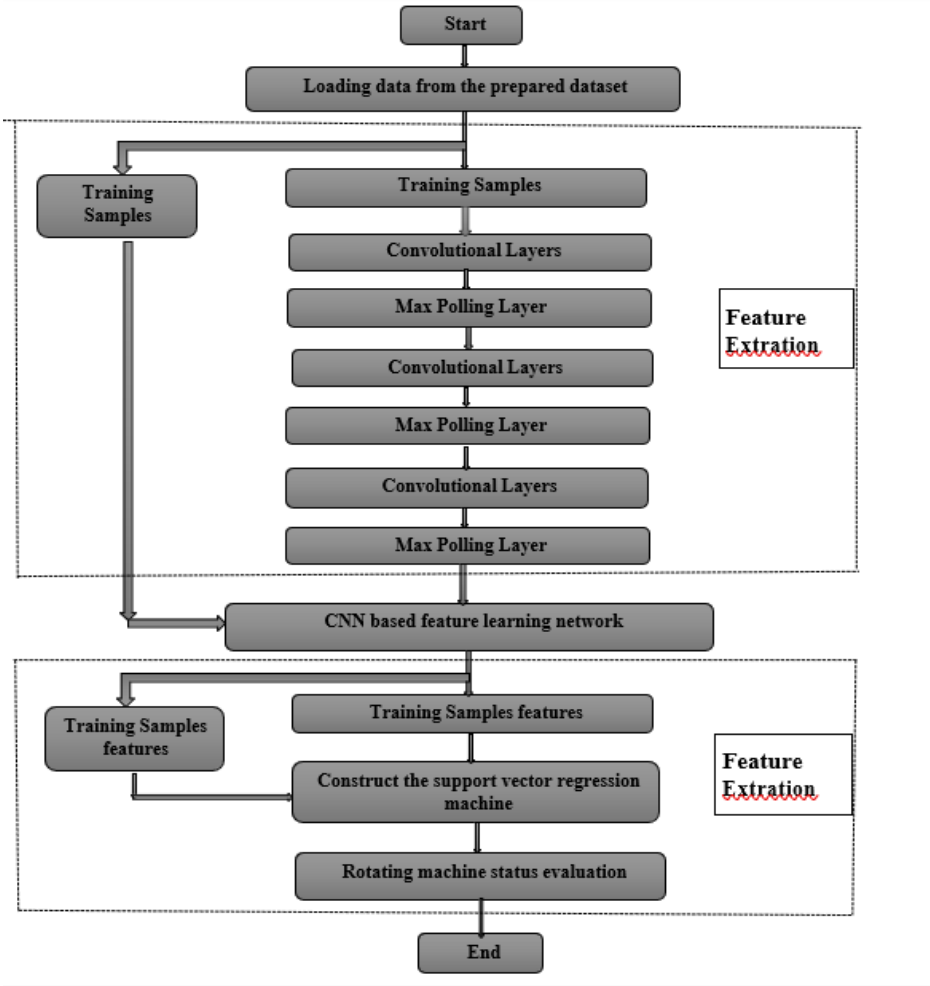
Low-Light Facial Detection in Dusky Detect We combined our CNN-based method with the Haar Cascade Classifier to improve facial recognition in low light. Prior to sending the input photos to our CNN model, the Haar Cascade Classifier was used to identify potential faces in the images. A dataset of faces in poor light was used to train the CNN model, which was created using image enhancing techniques. By integrating the two methods, we were able to recognise faces with remarkable precision and durability in dim lighting. Our experiment shows how combining traditional face detection techniques with fresh deep learning ideas might improve face recognition in challenging situations.

4. Overall Design

The system uses a hybrid strategy that combines the haar cascade classifier and convolutional neural networks (CNN) in order to detect face emotions. The CNN involves a number of phases.

- To start, we assembled a gallery of images or a recorded movie. Faces cannot be seen in low-light photographs, however. There are two methods for resolving this issue: improving the training set and image preprocessing. to determine the image's lighting situation and improve the image's quality. However, their approach is computationally impractical for a mobile product.
- In order to help the system recognise faces in low light situations, faces with different lighting and faces with dark complexion are also added to this training set.

- After that, we developed a CNN-based architecture designed specifically for face emotion recognition. Multiple convolutional and pooling layers were present in the design, which was followed by completely linked classification layers.
- After training our CNN model on the preprocessed face emotion detection (FER2013) dataset, we tested the model using webcam feed and its performance. Finally, we tested our CNN model on a new test dataset of face images, examining its accuracy, resilience, and performance.
- Overall, the design of our project entailed gathering data, preparing it, building an architecture for a CNN-based model, training and evaluating it, and analysing the results.
- CNN algorithm steps: The following steps make up a condensed CNN algorithm :
- Step 1: Select a Dataset • Select a dataset that interests you, or you can design your own image dataset to address a specific picture classification issue. On kaggle.com, selecting a dataset is simple.
- Step 2: Prepare Dataset for Training • Assigning paths, defining categories (labels), and resizing our images are all steps in preparing our dataset for training.
- Create training data in Step 3
- Training is an array that will include the image's pixel values as well as the image's index in the CATEGORIES list.
- Shuffle the dataset in Step 4
- Assigning Labels and Features in Step 5
- The classification using NEURAL NETWORKS will use this shape for both lists.
- Define, gather, and train the CNN Model in step six.
- Step 7: Score of accuracy



CNN Algorithm Flow Chart:

5. Outputs and Results:

The data from the Face Images dataset was used for the input testing; for face emotion recognition, we are using the FER 2013 dataset. We used three different strategies to distribute the testing data.

1. Data from a dataset

2. Camera input (pictures or videos)

3. Enter a video.

Figures 2(a) and 2(b) below show the results achieved when the inputs are provided using various approaches.

2(a) Neutral Expression using input data

2(b) Fear Expression using input data

6. Conclusion

In this study, we used the Haar cascade classifiers and LBP cascade classifiers to detect faces. We selected the Haar Cascade classifier for the face detection in this project based on the outcomes of face detection techniques. We have worked on facial recognition since face detection. We have employed the Convolutional Neural Networks technique for facial recognition. The facial recognition process utilises data sets from the FER-2013. The inputs were provided as input photos and web cam stream. The outcomes were contrasted. Compared to using a webcam, inputs delivered through input photos are more accurate and can recognise facial emotions more precisely. For 50 epochs, the accuracy that was acquired during training was 0.75. The algorithm has trouble predicting emotions like "disgust" because there is comparatively little data on them. Future study will be done to enhance the expressions of "disgust" prediction. In order to improve such a system, additional training examples for the trickier to forecast emotion of disgust will undoubtedly be needed. This means that the concept might very well be implemented into practical applications for efficient application in fields like healthcare, marketing, and the video game industry, with a little effort.

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References

1 Facial expression detection by combining deep learning neural networks The 12th international symposium on advanced topics in electrical engineering march 25-27, 2021 bucharest, romania

2 B.C. Ko, “A brief review of facial emotion recognition based on visual information”, Sensointernational symposium on advanced topics in electrical engineering march 25- 27, 2021 bucharest, romaniars, vol. 18, no. 2, 401, Jan. 2018.

3 D. Mehta, M.F.H. Siddiqui, and A.Y. Javaid, “Recognition of emotion intensities using machine learning algorithms: A comparative study”, Sensors, vol. 19, no. 8, 1897, Apr. 2019.

4 Facial emotion recognition using deep learning: review and insights from The 2nd International Workshop on the Future of Internet of Everything (FIoE) August 9-12, 2020, Leuven, Belgium

5 A. De Souza, A. Lopes, E. Aguiar, and T. Oliveira-Santos, “Facial expression recognition with convolutional neural networks: coping with few data and the training sample order”, Pattern recognition, vol. 61, pp. 610-628, Jan. 2016