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FACIAL EXPRESSION AND EMOTION RECOGNITION

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ABSTRACT

We propose a system to recognize different emotional states such as Surprise, Smile, Sad, Anger, Fear, Disgust based on facial expression. Basically, emotion is categorized as a positive and negative emotion. Different types of emotion recognition are face detection, extraction, Classification. Even though there is lots of research using static images, the research is still going on for future development. The computation would have less memory usage as compared to previous methods. There are various studies carried out on feature extraction on the available dataset. This model focuses on recognizing facial expressions. Facial expression is one of the most powerful medium of nonverbal communication. Our goal is to extract features used for facial expression recognition systems in real-time. The method for automatically recognizing facial expressions using Convolutional Neural Network (CNN).

INTRODUCTION

Facial expression plays an important role in the day to day life in the form of nonverbal communication. It plays an important role in recognizing facial expressions as well as identify the emotion of a person. It also indicates about feelings and allows the person to express an emotional state. It can immediately recognize the emotional state of a person. Non-verbal communication is one of the best methods to know the mental state of a person the expression of the face can be Surprise, Smile, Sad, Anger, Fear, and Disgust.

FEATURE EXTRACTION

The input can be given in two ways in the form of the video sequence and another is from the database. The process is followed by the given diagram Input taken from one of the ways below the phase of preprocessing where images are preprocessed then features are extracted and classified into seven different Surprise, Smile, Sad, Anger, Fear, Disgust. The facial component detection detects the eyes, eyes brow, nose, mouth, forehead, cheeks, ear, etc. The changes in facial expression are minor which can recognize the facial component. Using facial components feature extraction is done the minor change in the face makes the change in the emotion of the face. Convolutional Neural Network (CNN) is a Deep Learning algorithm that can take in an input image (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

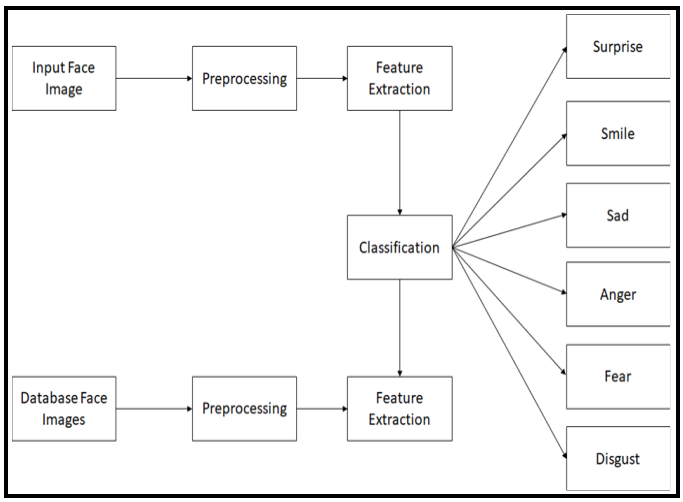

Fig 1.1 Block diagram Facial expression and emotional recognition

The pre-processing required on CNN is much lower as compared to other classification algorithms. CNN has the ability to learn these filters/characteristics. These systems are less precise and difficult to extend with more emotions. That's why we have to develop this type of system which reduces our time and executes in a rapid manner. The neural network performs a very important role in recognizing facial expression. The system identified the image according to the sex that is male and female. The system tested all the samples and matched them with existing images.

TECHNOLOGY USED

Neural Networks

In a simple word, neural networks are a set of algorithms, modeled loosely after the human brain, that is designed to recognize patterns.

They interpret data through a kind of machine perception, labeling or clustering raw input. The patterns they recognize are numerically contained in vectors, into which all real-world data, whether it may be images, sound, text or time series but must be translated in neural network. Neural networks help us cluster and classify. , Neural networks help to group unlabeled data according to similarities among the example inputs and then classify the data when they have a labeled dataset to train on. In our model, the neural network is applied on the face feature by marking the node points all over the face.

Python

Python is an interpreted, high-level, general-purpose programming language. To implement your machine learning (ML) model, you should use a programming language that is stable, flexible and has tools available. Python offers all of this, which is why we see lots of Python ML projects today. From development to deployment and maintenance, Python helps students to be productive and confident about the model they're building. Benefits that make Python the best fit for the machine learning model include simplicity and consistency, access to great libraries and frameworks for ML, flexibility, platform independence, and a wide

community. These increase the overall popularity of the language. Python is platform-independent. Python is supported by many different platforms including Linux, Windows, and macOS. Python code can be used to create standalone executable programs for most operating systems.

OpenCV

The OpenCV (Open Source Computer Vision) is a high-performance library of python programming functions mainly aimed at real-time computer vision. In simple language, it is the library used for digital Image Processing. It is mainly used to do all the operations related to Images. It helps us to load a model from storage and then pre-process an input image and to finally pass the image through the network and obtain the output classifications. The architecture of the Neural Network is highly compatible with OpenCV.

NumPy

NumPy is a library. It used for the Python programming language. It adds support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions. NumPy uses much less memory to store data than any other. Convolutional Neural Networks (CNN) involve a lot of Multiplication and this multiplication becomes easy with the knowledge of Matrix multiplication from Matrix Algebra. For all these mathematical operations, Numpy comes a very handy tool to use. It is a very important library on which almost every machine learning Python packages are available such as Scikit-learn.

Fig 2.1 Collection of Dataset

We developed a system which is effective and used for security purpose. With the help of our proposed system, we can identify the facial expressions of persons and we can detect the moods of a person. The training dataset used is CNN.

CONCLUSION

We have proposed a system that will be useful for detecting the current mood of a person. This system works faster and efficiently to recognize real-time facial expression which will convey the emotional state of a human. The proposed system is more precise and accurate. The system works on python. In the real world, this system will use to identify the real facial expressions of a person.

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