

## **Emotion Analysis With Deep Learning and Machine Learning Technologies**

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**Abstract**— The application of how emotion is extracted from expression of face i.e facial extraction with the help of combining neural networks to identify, recognize and categories different emotion that human face depict like happiness, fear, surprise, neutral, sadness etc has been discussed in this paper. Humans can show lots of different facial emotions during conversation and communication that can vary in meaning, intensity and complexity depending upon the situation. The limitation and difficulty with current existing emotion recognition using brain activity has been analyzed in this paper. We have been able to achieve 70% accuracy through the help an existing simulator which is simpler and easier than emotion detection and recognition with brain activity. Since we know human face can show, depict the brain activity through it's different expression so this system heavily uses that observation as a basis and so depend upon human face. Neural network has been used in this paper for better result. The comparisons of the system with existing human emotion recognition system has been made in this end of paper.

**Keywords**— Emotions, Detection, Gestures, Signal Processing, Expressions.

### **I. INTRODUCTION**

Face Expressions Recognizing is an image classification utility present in the wide field of computerized vision. Image classifying problem is one where in the image should be algorithmically assigned some labeled as the distinct setter of category. In FER system, especially the image is of the human face along with the category is a combination of many emotions. Emotions detecting is creating a humongous difference in how we carry out text detection mostly in the domain of marketing. Detection of emotions, to a great extent can determine the success of a campaign. Emotions from the outlooks do not look to be a very

direct problem. In our lives, we have to go through many situations and develop feelings about it. Emotions consist of a strong feeling about human situation and relations with other people. The feelings and emotion is expressed as facial expressions. These prime emotions are of six different types called; Anger, Sadness, Love, Joy, Fear and Surprise. Humans express emotions in many ways including facial expressions, speeches, actions and gestures or in written text form. This article majorly focuses on two of the expressions called; written text and speech.

Emotions in human life play a major role. At different times, the emotion that a person is feeling or what mood that person has can be read from his face. Several different features in face can be used communicate the emotion to other people. The absence or addition The addition or absence of any micro-expression can change the type of emotion that is being depicted. Apart from this, some different expression can look nearly similar but imply different meaning. Now for facial expression subtly to be captured, we use an existing simulator that captures emotions through identifying and recognising and differentiating facial expressions. This system does feature extraction and motion information extraction automatically, it is able to differentiate between various expression of face and estimates the intensity of expression.

With some advancement in technology and as it has progressed, the net is being utilized on the tabs, PCs and smartphones commonly which in turn generates very large amount of data, generally as data in the text format. It is now very much hard to analyze and detect all the data for specific purposes and that too by some humans. Newly conducted researches have been emerging from automated data analysis such as automatic emotion analysis. Emotion detection has attracted new researcher's attention because of the application in many different fields. For examples: security agency can track email, message and blog etc. as well and recognize various doubtful actions.

This process derives technique from multiple fields, such as signal's processing, machine learning, and computer visions. The computer uses different and random methods to interpret and detect emotions such as Bayesian networks

In this paper we are analyzing and depicting emotions detections as well as detect humans' facial and emotional dependency, generating a real time analysis of the human's emotions using the machine learning and deep learned algos using technology such as neural networking and which gives us classifications of human emotions which can be disguised,

angry , happy, sad and more over the furfure prospects of the projects is related with the hospital's patients where one can provide and is able to get the quick healthcare facility by detecting the human's emotions at the time of healing and the medications process.

Inter-personal interactions are often complex and vary in appearance, and success is usually based on various factors. They range over a large spectrum and may include context, behavior, mood, and time to interact, and may also be expected of participants. People who want to be a successful partner must understand the behavior of the other party because communication occurs according to advances and according to it. Fortunately for the human population these abilities are very normally and usually greatly inborn, with various kinds of levels of efficiencies. Humans can use a magnitude of the indications such as wording choices, voice based variation, and the body languages for understanding the other's feelings. This analytical ability stems from the fact that man shares a universal set of fundamental emotions. Importantly, the feeling is being shown through the face expressions that are consistent communicators. That means that instead of just the languages as well as the cultural barriers, there has to be always being some form of fundamentalist face behavior which the peoples come in contact and converse with others. After conducting some rigorous researches, this has now been generally agreed upon that humans shared 7 face expressions which reflect the experiences of the fundamental emotion. Those fundamental feeling include are Annoyed, Disliking, Stressed, Satisfactory, Saddened, Shocked, Calm.

Efforts has been made in Research in the field of interaction of computer and human that is focused on making computer empowered to recognized the human feelings and action. For ex. Gesture recognition and speech recognition.

## **II. REVIEW OF LITERATURE**

Using very large data sets there has been training for whole number of images viz. nearly around 5000 images, and on our machine learning algos in detecting 8-9 emotions like sad, happy, neutral etc. The emotions can help us in understanding the present states of any humankind and we could then, use the emotions for calculating our moves which can be then, done for the users. Emotions play vital roles as from the emotions only one can be able to recognize about what are the things that make the user angry sad, happy and then, one could observe that same thing and one can try neutralizing the emotions. With these emotions, one can identify if the user is feeling comfortable or is feeling nervous in one way or the other, and whether one is in favourable condition and whether ones condition is deteriorating.

The actual focus of the project is recognizing the emotions of the users with a video streaming from a web cam and then, finding out the current emotions of the users and then, acting accordingly to that. If users are sad, we can achieve something by making one happy, but if one is annoyed then, we won't do any such thing that could make one more agitated and angrier and we will act in a manner such that his emotions become neutralized. There are lot of field in interaction of computer and human interaction that can be used to analysed the emotion of human and understand them[2],[3]. For ex. Emotional stability is considered an essential factor in the emotional stability for personal robots which are of next generation. Like product of Sony, Sony AIBO[4]. I can also be used as effective computer tutor[6]. Some reasearchers are putting the effort in realizing the man-machine interfaces that has the capcity of understanding emotions, even though, there efforts are less in comparison to the efforts that are being made towards intention-translation means.

Whether it is a video, song, or some human behaviour, and if the current state of humans is known by the computers, then, the computers will automatically be doing something such that the state of the users will change and thus, resulting in smarter computer. As described in the overview, the purpose of this paper is to analyse the limitations with existing system Emotion recognition using brain activity [1].

If we talk about the human emotions, as long as one does not actively suppress the expression, examine a person face could be a way out for effective understand the actual behavior and reaction types. These universalities of those expressions mean that the face emotions recognizing is a job that could be accomplished by some computer as well. In added,like there are many more other significantjobs that the computers could provide the advantage over the human in analyzing and problem-solving. Computers that can recognize facial expressions can find application where their those efficiencies and automations could be being usefully, along with the inclusion of the entertaining, socialized-media, contented analyzing, criminalized justice, as well as the healthcare facilities. As an example, thecontent makers could figure out a consumer's reactions and then, adjusting their future based offerslikewise.

Having a taxonomic context to identify the seven target emotions, which can be performed by a human or computer, is important for the detection approach. One popular facial coding system that has been used by both noted and psychology practicing professionals and computerized scientists such as the Ekman and Cohan-Kanade groups is the

Facial Action-Coding-System (FACS), respectively. The systems been used are those that describe the movements in the some of the facial muscle and for classifying emotions for the muscle groupings. Action unit help expanding face movements such as in raising the innermost or outermost eyebrow or thinning of the nostril, or pulling of the or clenching and cleansing the lips, and also the information over the alternating intensities of those movements. As FACS indicating different and distinct facial movements and manipulation in accordance to the feeling of interesting, digitally images processing and analyzing of the visual facial features may be allowing trainers to be predicting of successfully facial expressions.

This has been studied for a very long time duration and is acquiring progressive in the most recently decades. Although more and more progresses have been in the making, identified face expression with some highlighted accuracy becomes hard because of the hard and complex varieties of face expression. Most commonly the humans could expressing the gestures and also the feels with the non-verbal methods such as gesturing, face emotions and also the undesired language. The system-project can be a very useful, non-verbally way for masses to converse with each other. Those important things are how the images reveal the face expressions or how fluently the system could be. This system-project is gaining more attention because it can be extensively utilized in many more fields like lies detectors, medically evaluating.

Speech signal analysis and facial expression are being targeted by most of them [7]. The other way is physiological signal analysis for emotion recognition. To recognize the emotion this seems more natural means to do it to us as the emotion influence on speech or facial expression is easily suppressible relatively and status of emotion is reflected inherently in the nervous system activity. In the area of Psychophysiology, The traditional ways to analyze the emotional status of human is based on the statistical and recording analysis of physiological signal that can be read from autonomic and central nervous system.

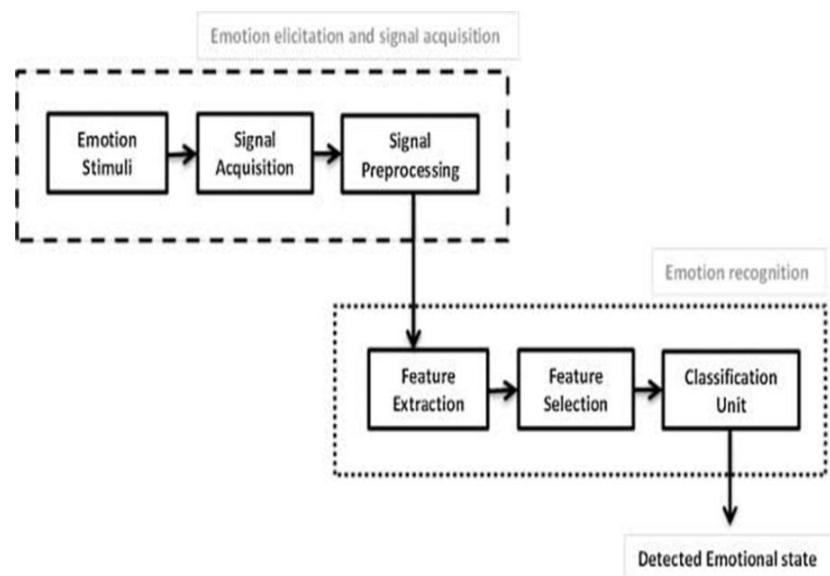
### **III. PROPOSED METHODOLOGY**

The search and recognition implementation proposed here is a supervised learning model that uses a one-to-all approach (OVA) to train and predict seven basic emotions (anger, contempt, disgust, fear, happiness, grief, and surprise). The extraction of the composite face from the image is first performed with a Viola-Jones Cascade Object Face Detector. The Viola-Jones recognition framework looks for facial features or faces (or other objects) called har-like features. This process highlights feature boxes running across an image and calculates the difference in pixel values between adjacent regions. The difference

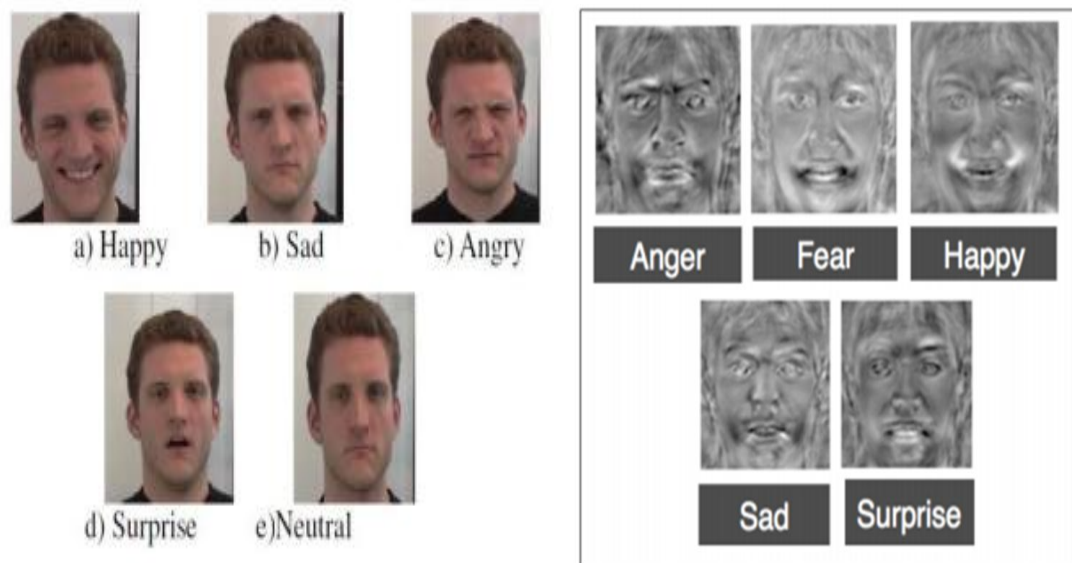
is then compared to an area that also indicates whether an object is detected or not. This requires separate feature boxes and pre-trained feature thresholds. A functional field specific to facial features is used with the expectation that most faces and functions will conform to normal conditions therein.

When an image is entered into the system, it may be retrieved in real time from the camera or from the database. The image preprocessing and resizing takes place here in this step, in which the eye recognition takes place.

The images are then compared to the database or knowledge base, and after the various measurements, it is finalized whether the person is happy or sad, or what emotions are displayed.



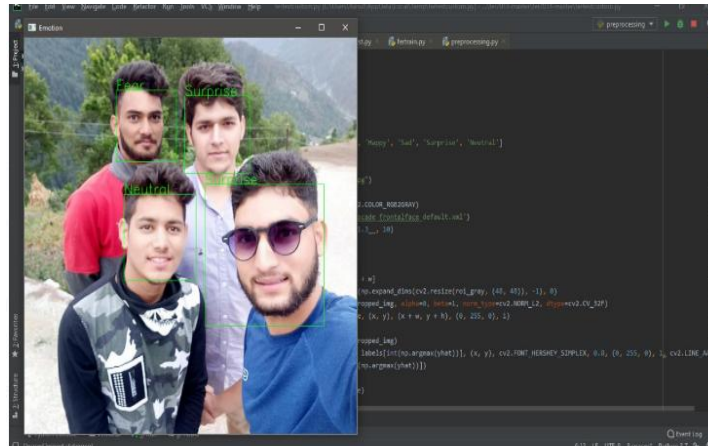
**Figure 1: Emotion elicitation and signal acquisition**



**Figure 2: Emotion types**

**IV. RESULTS AND DISCUSSIONS**

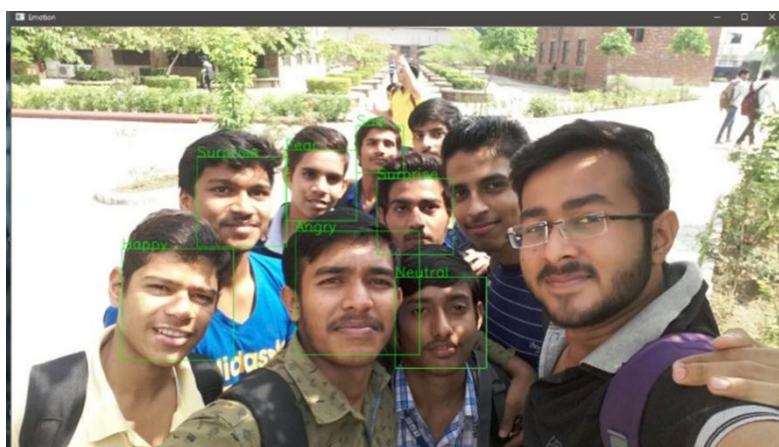
In this image, the emotions of the 7 people at max could be detected. This could be the limitation of the system been designed but the main objective of this project is to detect at most two to three persons at a time suppose at the security check points or say at the airport security check points.



**Figure 3: Real Working on various recognition of images.**

In this image, the emotions of the 7 people at max could be detected. This could be the limitation of the system been designed but the main objective of this project is to detect at most two to three persons at a time suppose at the security check points or say at the airport security check points. The mouse-type shaped hardware device that act as emotion recognition system has recently been reported by IBM researchers. [9].

Since 1990s, at the MIT Media Laboratory Picard and colleagues are trying to make a effective computer.



**Figure 4: Real Working of recognition of images.**

As much as we know, no previous study based on emotion recognition system that focuses on using physiological signal in recognizing emotion that can be extended to many users.

The another problem is required length of the signal in the current system. For making decision, monitoring of signal of at least 2-5 min is required presently[11].

Performance increases when we move from a high-resolution image to a low-resolution image. This complies with psychological findings that reduce spatial frequency bands that favor recognition of facial expression and express the cognitive basis of our model. However, it is based on such a small data set, we refrain from making any claims and only in case of small parameters can the trained parameters be trained due to the low parameters.

The main key points of this research paper are given below:

- i. The measure of facial expressions of humans is main focus of this research work.
- ii. It's main focus is not on human body, it only focuses on human face.
- iii. Running these algorithms in a real environment is tough so to simulate the current work, a simulator has been designed.
- iv. This work has been tested by making different tests.
- v. The performance analysis illustration and experiment result visualization.
- vi. Conclusions would be drawn based on analysis of performance.
- vii. Suitable future directions for future work would be prepared keeping in view the limitations of the existing work. During research work, open sources equipment and technologies usage or software which are licensed usage has been emphasized in this research work.

### **Applications:**

1. The system can be used to detect and track the user's state of mind.
2. This system can be used to view customer feedback in mini-marts, shopping centers to increase business,
3. This system can be installed at busy places like airport, railway station or bus station to detect the face and facial expressions of every person. If there are any faces that appear suspicious such as angry or frightened, the system may set an internal alarm.
4. The system can also be used for educational purposes, such as receiving feedback on how the student reacts during class.
5. This system can be used to detect lies among criminal suspects during interrogation.
6. This system can help people in emotion-related research to improve the processing of emotion data.
7. Clever marketing makes it possible to use a person's emotional knowledge that can be identified by this system.

**V. CONCLUSION**

Face recognition, when applied in a practical situation, should be able to give 100% accuracy. Since an automated system is never guaranteed 100% proficiency, the next phase of development is aimed at improving the accuracy of the number of allowances identified in real-world applications. Since real-time face recognition relies on images, image quality matters greatly, which is in turn dependent on the devices used for taking the images. Higher resolution cameras with better imaging hardware, such as sharp image capture, will help improve detection. The software currently being developed is aimed at detecting and identifying faces. Current plans for future work include adding the ability to detect and detect emotions on the faces involved, therefore expanding the range of applications for software. In its current state, software can be developed in a specialized way for specific applications, such as presence management systems. The ability to recognize multiple faces simultaneously allows the system to record users in a shorter interval of time than existing systems, which requires users to be placed in front of a camera individually. The software can be trained to identify users when they congregate in their workplace, allowing for smooth presence recording.

In this project, seven different faces images of different individuals from various datasets have been analysed. The project involves pre-processing of captured facial images in facial expression, followed by feature extraction using local binary patterns, and data training of facial images based on support vector machines. But facial expressions are classified. It recognizes more facial expressions based on the JAFFE, COHN-KANADE face database.

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