e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
( Peer-Reviewed, Open Access, Fully Refereed International Journal )
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

# CROWD FACIAL EMOTION DETECTION USING DEEP LEARNING

**Ujwala Bhogad[*1], Thimmaraju Nithya[*2], Busha Vaishnav[*3], Kasa Vinay[*4]**

[*1]Assistant Professor, Department Of Computer Science & Engineering, Anurag University, India.

[*2,3,4]Student, Department Of Computer Science & Engineering, Anurag University, India.

## ABSTRACT

Ever since the digitalization of technology has been evolving exponentially, so are the complexities related to them. One of the technologies that gained primary attention is facial expression detection. Facial expressions are the changes occurring on the human face indicating a person's internal emotional states, intents, or societal communications[1]. The approach chosen is to divide it into two phases where the first phase includes recognizing the faces, the final phase involves expression analysis. This project intends to solve the problem that arises with an increase in population and to cope up with the evolving technology to get better every day. Here the machine will automatically detect the crowd count, then it will give a complete analysis of the facial expressions and can also uphold immediate alerts if any suspicious activities take place[2]. The project is effective not only in crime investigation but also useful for analyzing the feedback, increasing security by taking care of the unusual activity tracking, it can also be used in making a cop's job easy in finding a missing child, it will also be useful in detecting the heart strokes of people.

**Keywords:** Facial Recognition, Emotion Recognition, Image Recognition, Crowd Recognition, Crowd Counting.

## I. INTRODUCTION

It is observed that due to the increase in population, analyzing problems that arise with crowds has become complex. To solve this problem a machine learning model is chosen that is used to identify the faces, recognize the person by comparing the faces and labeling them and finally the model can also recognize emotions and give individual reports for each face. It is very efficient in terms of feedback analysis, finding a missing child in a crowd, and crime detection.

The system we have developed is designed and programmed with 27 layers of Convolutional Neural Networks and the dataset used consists a total of 7 classes in which 28,821 images are used for training and 7,066 are used for testing[3]. Upon training the model, the accuracy is checked and the learning rate is calculated based on the number of epochs. An epoch is a term used in machine learning to represent the number of passes of the entire training data module. As the dataset used is of large size, we divided it into a batch size of 225. Feature Extraction being the crucial part of the training phase, extracting the specific patterns from the images was done by the max pooling function[4]. After training and extracting the features, model is created, saved, and loaded for the further testing process. The model intakes the live capturing via the default camera of the system and the output is predicted.

## II. LITERATURE SURVEY

In today's world people aren't comfortable sharing their views either due to hesitation or due to laziness. India's population has been increasing tremendously in the past 10 years from 121 crores to 136 crores, at the same time there is a huge development in the IT field. But even then the machines are not up to the mark. The system is initiated with a motive to solve this problem, where analysis of crowds becomes an easy task. Seminars, workshops are conducted in order to share knowledge with the targeted audience. Feedback at the end of these sessions plays a vital role in conducting future sessions so as to improve the way of approach. Hence an AI model can be developed that takes up facial points as input and recognizes faces along with emotions and gives individual feedback for the session.

### FINE TUNING OF EXISTING MODELS

For prediction and tracking purposes AI can also provide sufficient support such that in which manner that pandemic related to COVID-19 will be spread and in how much time. Following the previous pandemic in 2015, for Zika-virus AI-based system was developed to predict the spread of the disease. These existing models can be utilized for COVID-19 such that the system should be re-trained with data related to COVID-19. The algorithm trained for the prediction of seasonal flu can also be re-trained with new data from COVID-19[5]. For deep

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
( Peer-Reviewed, Open Access, Fully Refereed International Journal )
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

learning architecture, we need a huge amount of training data. In the state-of-the-art approaches, the databases used are very small. We cannot rely on the performance of a system that is trained with 50-100 images with only one specific kind of pneumonia caused due to COVID-19. A big database of chest x-ray images is required with different types of pneumonia to enhance the performance of the AI-based system for the detection of COVID-19.

**3D-AI FACE RECOGNITION MODEL**

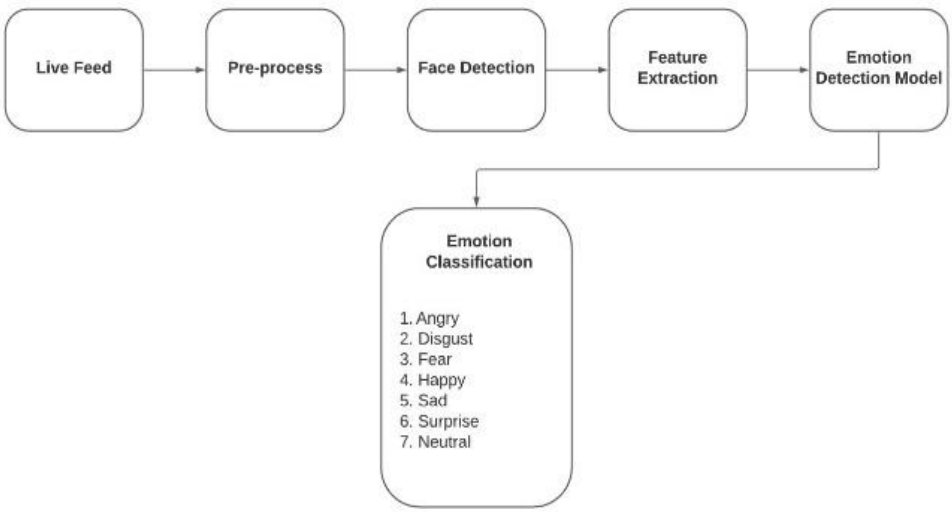
Three-dimensional face recognition technique uses 3D sensors to capture information about the shape of a face. This information is then used to identify distinctive features on the surface of a face, such as the contour of the eye sockets, nose, and chin. One advantage of 3D face recognition is that it is not affected by changes in lighting like other techniques. It can also identify a face from a range of viewing angles, including a profile view. Three-dimensional data points from a face vastly improve the precision of face recognition. 3D-dimensional face recognition research is enabled by the development of sophisticated sensors that project structured light onto the face[6]. 3D matching techniques are sensitive to expressions, therefore researchers at Teknion applied tools from metric geometry to treat expressions as isometrics. A new method of capturing 3D images of faces uses three tracking cameras that point at different angles; one camera will be pointing at the front of the subject, the second one to the side, and the third one at an angle. All these cameras will work together so it can track a subject's face in real-time and be able to face detect and recognize.

## III. METHODOLOGY

We proposed an Artificial Intelligence-based system that employs the concept of Deep face recognition where the dataset is taken of the same person in different angles (partially covered too) which eliminates the posed problem. All the attributes are marked for each person while training. Then this data is passed to a 4-layer Deep Neural Network[7]. So when a new live feed or video is given to the model, image formalization is done, and then facial points are considered followed by comparing the faces using a 4 layer Deep Neural Network, and after recognition, the emotions are considered for each person in the video/live feed.

Here the facial emotion recognition process is done using OpenCV, Cascade Classifier, and deep neural networks. The input to the model is the live capture that is intended to get a live feed, the data to this model are photographs of each person in different angles and different emotions. When the input is passed, the model is invoked and starts processing by creating frames around each face using OpenCV, the CNN model is trained and applied to detect the emotions in the faces, haarcade classifier is used to identify the faces in the feed, then the detected faces are compared with the trained data that is given at the time of registration, and when the faces are matched and the labels are returned the focus shifts to classifying emotions of the all the persons in the frame from time-to-time in the movement[8]. The emotions are detected live on the output box. This entire process of detection takes less time which results in no community spread and faster results with an inexpensive price.

**ARCHITECTURE**



e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
( Peer-Reviewed, Open Access, Fully Refereed International Journal )
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

## IV. RESULTS

The user shall provide the input video or live feed. The output is a string that gives labels of the people along with the emotion in the frame.

**Input**: It is a video that can be given by the user or live feed.

**Output**: Feedback for the session in the frame.

**Fig.** Input Image representing a crowd

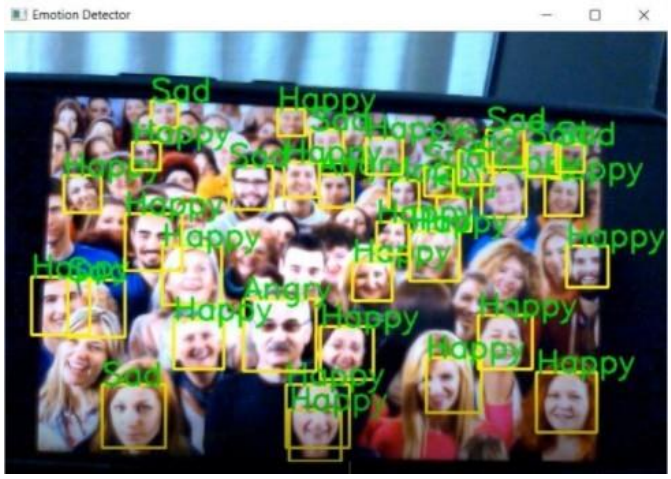



**Fig.** Output image shows the crowd having different facial expressions

## V. FUTURE ENHANCEMENTS

Emotion recognition has wide scope in many areas such as human-computer interaction, biometric security etc. So it provides insight into artificial intelligence or machine intelligence that uses various supervised And unsupervised machine-learning algorithms to simulate the human brain[9]. It would seem that this is the moment for proponents of facial expression recognition technologies to aim for performing products within a greater level of constraint and expectation, rather than continue to hope, against the growing evidence, that facial expressions represent a complete and discrete index of emotional response; and that social scientists and machine learning practitioners can entirely decode them given enough time and resources[10]. Emotion recognition finds its most advanced application in real time scenarios where human emotions must be recognized in real time. Emotion recognition can be used in applications where machines act as an instructor, helper and companion, for lie detection, for music players and similar applications based on human emotions etc. Emotion recognition from images is highly efficient but its application in real time is limited. In the case of real time emotion recognition, the video based model is required. Speech based emotion recognition is more useful in simpler applications such as emotion based music player, lie detection etc.

The proposed model can further be updated to work in flexible environments such as predicting the health attacks of a person walking on the road. The exactness of the model can be taken to another level to accurately predict the crimes that occur in crowded places.

## VI. CONCLUSION

The system developed increases the efficiency of the overall facial emotion recognition, also decreases the time complexity and workloadon a human. Furthermore, The model is beneficial for:

- Feedback for seminars, webinars.
- Crime investigation.
- Identifying health issues based onexpressions.

## VII. REFERENCES

[1] Lucey, P., Cohn, J.F., Kanade, T., Saragih, J. Ambadar, Z. The Extended Cohn-Kanade Dataset (CK+): A complete dataset for action unit and emotion-specifiedexpression. IEEE Computer Society Conference CVPRW (2010).

[2] Zhang, Z. Feature-based facial expression recognition: Sensitivity analysis and experiments with a multilayer perceptron. International Journal of Patten Recognition and Artificial Intelligence 13 (6):893-911(1999).

[3] Michael J. Lyons, Shigeru Akemastu, Miyuki Kamachi, Jiro Gyoba. Coding Facial Expressions with Gabor Wavelets, 3rd IEEE International Conference on Automatic Face and Gesture Recognition, pp. 200-205(1998).

[4] Shan C, Gong S, McOwan PW. Facial expression recognition based on local binary patterns: a comprehensive study. Image Vis Comput.27(6):803–816 (2009).

[5] Carcagnì P, Del Coco M, Leo M, Distante C. Facial expression recognition and histograms of oriented gradients: a comprehensive study. SpringerPlus. 4:645. (2015).

[6] C. Clavel, I. Vasilescu, L. Y. Devillers, G. Richard and T. Ehrette, “Fear-type emotion Recognition for future audio-based surveillance systems,” SpeechCommunication, vol. 50, no. 6, pp. 487-503, 20080

[7] L. Tan, K. Zhang, K. Wang, X. Zeng, X. Peng and Y. Qiao, “Group emotion recognition with individual facial emotion CNNs and global image based CNNs,” in Proceedings of the 19th ACM International Conference on Multimodal Interaction,Glasgow, UK, 2017.

[8] O. M. Parkhi, A. Vedaldi and A. Zisserman, “Deep Face Recognition,” in British Machine Vision Conference, 2015.

[9] L. Wang, R. Li, and K. Wang, “A Novel Automatic Facial Expression Recognition Method Based on AAM,” J. Comput., vol. 9, no. 3, pp. 608–617, 2014.