IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

HUMAN EMOTION DETECTION USING IMAGE PROCESSING

Mansee Dhamal, Suyog Rakh, Sangram Kakade, Sudhir Chaudhari

Dr.Vilas Gaikwad

* Department of Computer Engineering, JSPM's Narhe Technical Campus, Pune

District- Pune, State- Maharashtra, India 411041*

Abstract: ***In todays world of technology human cannot survive without be- ing techno-freak. Just to get workplace environment friendly we are going to introduce six emotions and positive and negative emotion recognition methods using facial image and the the development of app based on the method. In this project we will use the Deep Learning technology to generate models with emotion based facial expressions to recognized emotions. Inevitebly feelings play an important role not only in our relations with other people but also in the way we use Computers. Affective computing is a domain that focuses on user emotions while he inter- acts with computers and applications. As emotional state of person may influence concentration, task solving and decision making skills, effective computing vision is to make system stable to recognize and influence human emotions in order to enhance productivity and ef- fectiveness of working with computers. We will develop an automated system to recognize six emotions along with positive and negatives in graphs and percentages. Thus, we recognize six emotions such as Angry, Disgust, Fear, Happy, Sad, Surprise. Also classified the calculated emotion recognition scores into pos- itive, negative and neutral emotions. Then we will implement an app that provides the user with six emotions scored and positive and negative emotions***

Keywords: Image Processing, CNN, LPBH(Local Binary Pattern Histogram), AWS cloud, S3 Bucket, Haar Cascades, Feature Extractions, deep learning, Facial Images.

Introduction: We introduce a method for recognizing six emotions such as Angry, Dis-gust, Fear, Happy, Sad, Surprise, and positive and negative emotions using facial images and the development of apps based on the method. Previous research used deep-learning technology to generate models with emotion-based facial expressions to recognize emotions. The emotionrecognition Software Development Kit made by the US company "Affectiva" extracted features from facial expressions using a Histogram of Oriented Gradient (Hog) algorithm and learned 10,000 images using a Support Vector Machine (SVM) classifier. Seven facial expressions, such as anger, disgust, fear, joy, sadness, surprise, and contempt,were used for learning to recognize emotions. The generated emotion recognizer was used to develop SDK, which provides an easy interface for other users. The implemented app provides a total of six emotions and emoticons based on the emotion results. Although most emotionrecognition studies using deep learning proceeded with seven emotions,they did not recognize positive and negative emotions using the scores of the emotionrecognition results. Also in study, they just recognized positive and negative emotions using face expression. They divided into 11 features in the face and then used the amount of movement to indicate positive and negative emotions. Therefore, in this study, we added all seven emotions in the app and referred to the research developed to transfer emotion recognition to the mobile phone. We also provided positive and negative emotion-recognition results using the ranking and average of the scores from seven emotion-recognition results. We developed an emotion-recognition model using deep learnings Convolutional Neural Networks (CNN) to develop this app and proposed a method for recognizing

emotions. Thus, in this study, we classified the calculated emotion-recognition scores into positive and negative emotions and implemented an app that provides the user with scores for seven positive and negative emotions.

Related work: Human emotions play a mere important role in the day-to-day life of an individual to enhance their mental efficiency, work capability. Emotion detection leads to maintain a healthy environment in lives. In early systems, six emotions are detected using CNN & the output of that system is stored in the database & compared with a primary trained database. This approach is quite similar to the reinforcement learning method in which previously calculated outputs are store to compare with henceforth ones. The proposed system uses whole trained data to compare with calculated & generated outputs. Moreover, to make system platform independent or can say machine independent cloud data storage is used to fetch data from & to store data on, and the resultant output is shown in voice command as well as displayed on and system window.

Literature Review:

1. **Facial Emotion Recognition using ConvolutionalNeural Networks**:
   In this paper, the aim was to classify facial expressions intoone of seven emotions by using various models on the FER-2013 dataset. Models that were experimented with includedecision trees, feedforward neural networks and smallerconvolutional networks before arriving at the proposed model.The effects of different hyperparameters on the final modelwas then investigated. The final accuracy of 0.60 was achievedusing the Adam optimizer with modified hyperparameters. Itshould also be noted that a nearly state-of-the-art accuracywas achieved with the use of a single dataset as opposed to
   a combination of many datasets. While it is true that otherrelated works have managed to obtain higher accuracies - Mollahosseini et al.(0.66) and Yu and Zhang (0.61), they haveused a combination ofdifferent datasets and large models inorder to increase their overall accuracy. ?? shows a comparisonbetween the proposed approach and existing methodologies.

2. **A Face Emotion Recognition Method Using Convolutional Neural Network and Image Edge Computing:**
   In this paper, we propose a facial expression recognitionmethod using a CNN model which extracts facial features effectively. Compared to traditional methods, the proposed method can automatically learn pattern features and reduce the incompleteness caused by artificial design features. The proposed method directly inputs the image pixel value through training sample image data. Autonomous learning can implicitly acquire more abstract feature expression of the image. The training process of the proposed method uses appropriate initialization of weights which has a great impact on the updating of weights. Our extensive experimental analysis shows that compared to the past literatures, the proposed algorithm can improve the recognition rate of facial expressions in complex background to a certain extent.Compared to FRR-CNN and R-CNN models, the convergence speed of proposed model is much faster in complex background environments. Also, the proposed method achieves a higher recognition rate.

3. **Emotion Recognition Using Convolutional NeuralNetwork with Selected StatisticalPhotoplethysmogram Features**:
   In this paper, we proposed an emotion recognition model using a PPG signal for the shortrecognition interval. We presented the advantage of using a PPG signal and the feature fusion-basedneural network. To extract features, we preprocessed the PPG signal as a normalized 10 s PPG signaland 10 s NN intervals. Both preprocessed outputs were used to extract the

   statistical features and thedeep-learning features. We extracted the time domain features based on the NN intervals and the frequency domain features based on the normalized PPG signal. Among the 19 statistical features, we selected 10 statistical features that had a higher correlation coefficient through Pearson's correlation. In addition, the CNN model was adopted to extract the features of the NN interval and the normalized PPG signal. After feature extraction through CNN, statistical features and CNN-based features were fused, and all the features were trained in the fully connected layer to classify emotions. As a result, we utilized both statistical features and deep-learning features to use the advantages of both methods. Furthermore,our method showed an impressive performance for the arousal and the valence with the shortestrecognition interval of the 10 s PPG signal. It is possible to easily measure emotions in real life andapply it for stress assessment.

4. **Convolutional neural network for face recognition**:

This paper presents an empirical evaluation of face recognition system based on CNN architecture. The prominent features of the proposed algorithm is that it employs the batch normalization for the outputs of the first and final convolutional layers in training stage and that makes the network reach higher accuracy rates. In fully connected layer step, Softmax Classifier was used to classify the faces. The performance of the proposed algorithm was tested on Georgia Tech Face Database. The results showed satisfying recognition rates according to studies in the literature.

Algorithm & Proposed Work Flow:

1.Emotions Recognition Using Deep-Learning

2.Deep learning is more advanced method in which face gestures are recognized using CNN (Convolutional Neuronal Network)

3.CNN database stores metadata of already recognized images, faces, video clips and compares it with the new one.

4.This Deep learning approach is carried out in four steps:

i.Training public face database with CNN

ii.Extracting emotions probabilities for each and every face frame

iii.Aggregation of single-framed probabilities with multi-framed probabilities as well as with CNN database

iv.Classification of Emotions detected into expected using SVM (Support Vector Machin)

5.To use deep learning approach we have one open library to use API and functionalities of named as "Tensor Flow" provided by Google for emotions recognition. By using which various API to extract image and detect faces with CNN is possible.

6.To implement it we will need to create two datasets as public and laboratory datasets.Public is one with recognized image's metadata Laboratory is one with database used to compare public dataset with.

7.Once the data is extracted from images then the resultant dataset is compared with AV model(Arousal Valance):

i.This model calculates images in form of quadrants and pixels

ii.It has specified quadrant to show one emotions and if resultant dataset from previous step fits in it then that image is valid to be in that emotion.

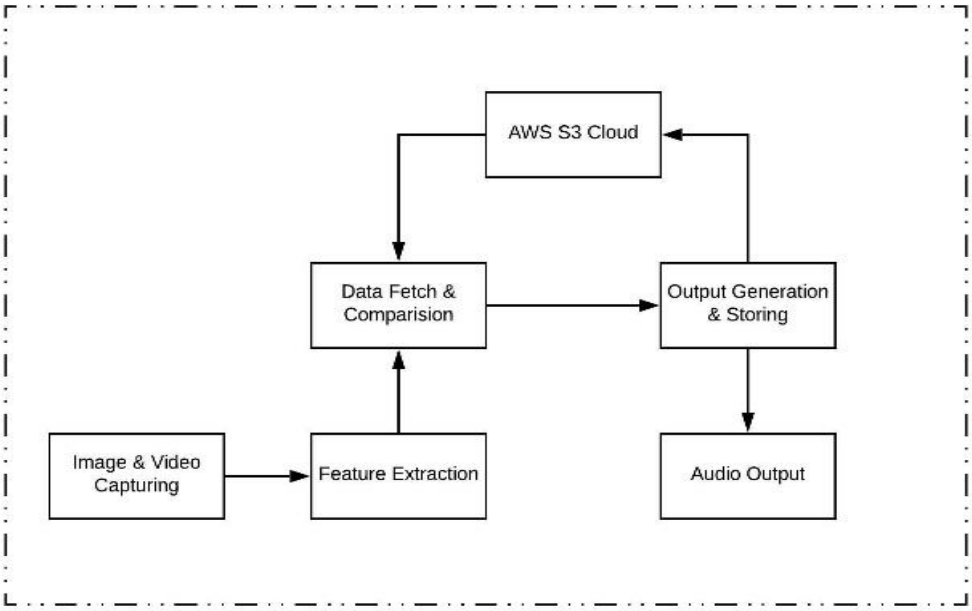
Motivation: Normally human emotions indicate the state of mind an individual is into and creating a system to calculate human emotions makes the work environment more friendly and efficient.

System Architecture: The system architecture diagram depicts the flow of the algorithm & the entire functionality of the system.

Image Capturing: As the system starts and device, an i.e. camera attached to the system will capture images with a certain frame rate fixed in order to capture perfect images.

Feature Extraction: To extract key features of face LPBH is used, this algorithm generates a binary number to compare emotions & a set of nine pixels to generate a binary number accordingly. If generated number indicates emotions such as **{** 0: angry, 1: disgust,2: fear, 3: happy, 4: sad, 5: surprise, 6: neutral}

Data Storage & Fetch: AWS S3 service used to store dataset on the cloud, captured images on the cloud too. The generated output shown in voice format.



Object Of Project:

1.Save Images To Database

2.Detect Faces

3.Match detected faces to Database

4.Recognize Faces

5.Provides accurate information about them

Scope Of Project:

1. System can be used in Offices, Schools, Big Malls and Public places.

2. System can be used remotely to detect the emotions of the humans.

3. Human satisfactions at the workplaces can be found.

4. Depending on the human emotions the work load can be distributed

among the workers.

Conclusion: The proposed system will work within time constraints and in an efficient manner, the system has user-friendly UI and platform independent base to work onto it. Proper emotions will help to maintain a friendly environment in workplaces. FERC is a novel way of facial emotion detection that uses the advantages of CNN and supervised learning (feasible due to big data). The main advantage of the FERC algorithm is that it works with diferent orientations (less than 30°) due to the unique 24 digit long EV feature matrix. The background removal added a great advantage in accurately determining the emotions. FERC could be the starting step, for many of the emotion-based applications such as lie detector and also mood-based learning for stu-dents, etc

Reference:

1. Daniel McDuff, Abdelrahman Mahmoud, Mohammad Mavadati, May Amr, Hay Turcot, Rana el Kailouby, "AFFDEX SDK: A Cross-Platform Real-Time Multi-Face Expression Recognition Toolkit", CHI, 2016
2. Affectiva, "http://www.affectiva.com"
3. Mixed emotions in multiview Face emotion recognition FarhadGoodarzi Department of computer and communications engineering, University Putra Malaysia 43400 UPM Serdang Selangor Darul Ehsan, Malaysia,2017.
4. Hyeon-Jung Lee, Kwang-Seok Hong, and W. T. Freeman, "A Study on Emotion Recognition Method and Its Application using Face Image ", A Cross-Platform Real-Time Multi-Face Expression Recog- nition Toolkit Dec 2017
5. Yu-Jin Lee, Jin-Cheol Woo, Young-Ho Jo, Ho-Jung Choi, Min-Cheol Whang, "Synchronization of Facial Micro-movement baseon Emotion", The HCI Society of Korea, 2017.
6. F. M. Dekking, C. Kraaikamp, H.P. Lopuhaa, L.E. Meester, A Mod-ern Introduction to Probability and Statistics: Understanding Why and How, Springer-Verlag, London Limited, 2005, pp:236
7. Farhad Goodarzi, and M. Iqbal Saripan, "Mixed emotions in multi-view face emotion recognition", International conference on Signal and Image Processing Applications 2017.
8. H. Hosseini, F. Marvasti, "Fast Impulse Noise Removal from Highly Corrupted Images", Available:
9. H. Hwang and R. A. Haddad, "Adaptive Median Filters: New Algorithms and Results", IEEE Transactions on Image Processing,Vol.4, No. 4, 1995 http://arxiv. org/ftp/arxiv/papers/1105/11052899.pdf
10. . Danisman T, Bilasco M, Ihaddadene N, Djeraba C (2010) Auto-matic facial feature detection for facial expression recognition. In: Proceedings of the International conference on computer vision theory and applications, pp 407–412. https://doi.org/10.5220/0002838404070412
11. Lucey P, Cohn JF, Kanade T, Saragih J, Ambadar Z, Matthews I (2010) The extended Cohn–Kanade dataset (ck+): a complete dataset for action unit and emotion-specified expression.
12. In: 2010 IEEE computer society conference on computer vision and pattern recognition-workshops. IEEE, pp 101
13. Littlewort G, Whitehill J, Wu T, Fasel I, Frank M, Movellan J, Bartlett M (2011) The computer expression recognition toolbox
14. (CERT). In: Face and gesture 2011. IEEE, pp 298–305 Shan C, Gong S, McOwan PW (2009) Facial expression recognition based on local binary patterns: a comprehensive study.
15. Image Vis Comput 27(6):803Caltech Faces (2020) http://www.vision.caltech.edu/html-files /archive.html. Accessed 05 Jan 2020 The CMU multi-pie face database (2020) http://ww1.multipie.org/. Accessed 05 Jan 2 NIST mugshot identifcation database (2020) https://www.nist.gov/itl/iad/image-group/resources/biometric-special-databases-and-software. Accessed 05 Jan 2020.
16. Zhao X, Liang X, Liu L, Li T, Han Y, Vasconcelos N, Yan S (2016)
17. Peak-piloted deep network for facial expression recognition.
18. In European conference on computer vision. Springer, pp 425–442