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Facial Expression Recognition using Machine Learning

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ABSTRACT

This paper surveys the current research works related to facial expression recognition. Emotion detection has become a topic of continuous research and innovation as over the past decade the limitations of computer vision have been lifted by the introduction of machine learning. Facial Expression (FE) is the one of the most significant features to recognize the emotion of human in daily human interaction. Humans express their emotions in number of ways including human gesture, vvocal and facial expressions.i.e., Expression plays a very important role in conveying the emotion information of different people because face can express mainly human emotion. In our project we will be using* Convolution Neural Netwok *(CNN) which will be compared with existing edge detedction method.

Key Words: ***Facial expression recognition,Convolutional neural networks (CNNs)***

1.INTRODUCTION

Facial expression, which is a fundamental technique of expressing human emotions, is important in our daily interactions. Facial expression detection is a challenging and fascinating topic with applications in vehicle safety, healthcare, and human–computer interaction, among many other areas. Face expression recognition has gained a lot of interest from computer vision researchers because of its wide variety of applications [1,2,3]. Due to the complexity and diversity of facial expressions, detecting them with high accuracy and speed remains a challenge. The general recognition method described in prior work may be split into two main major steps: face representation and classifier generation.

Features associated to the dimensionality of the features is then decreased to aid classification and generalisation.

Anger, disgust, fear, joy (or happiness), sadness, and surprise are the most common universal expressions stated in studies, however some researchers add neutral as the seventh expression.

[13]In the second stage, classifiers are created using the simplified characteristics to assign each expression to one of the six (or seven) expressions.All observable face gestures are measured in Action Units (AUs). Each type of expression can be broken down into a set of AUs.Each type of expression can be broken down into a collection of AUs. This coding system has become the most used way for classifying facial expressions in the behavioural sciences. When utilising FACS, accurate AU detection is required. However, detecting all AUs is difficult. As a result, some academics have chosen to represent face expressions using geometric or appearance-based methodologies.[14] The location and shape of facial components such as the eye, eyebrows, mouth corner, and so on are extracted in geometric-based approaches to generate a feature vector that reflects the face geometry. While geometric-based methods can achieve similar

results as appearance-based methods, they usually necessitate more accurate and reliable face component recognition and tracking, which is challenging in many instances.Three types of square areas are investigated in this project: left eye regions, right eye regions, and mouth regions. The centres of the three types of square areas, respectively, overlap with the centres of the left eye, right eye, and mouth. In this study, all of these areas are referred to as active regions. The size of the active zone influences facial emotion recognition accuracy. For facial expression classification, we propose a method for determining the optimal size of active regions. Optimized active areas are active regions that are the right size. For facial expression classification, a decision-level fusion framework was created. A CNN is trained for each of the three optimal active zones. The final facial expression classes are determined by a majority vote.Experiments are conducted on the CK+, JAFFE, and NVIE databases. The results show that the proposed method is more accurate than earlier methods. The following are the article's major contributions:

1. Instead of using the entire face region to classify facial expressions, three different active zones are used. According to the similarity of active regions, a method for searching optimum active regions is proposed.
2. We presented a decision-level fusion system to help improve facial emotion recognition accuracy

2. REALATED WORK

Earlier we used Edge-Detection algorithm for facial expression recognition. The Edge Detection Algorithm is utilized, which only segments the edges of the rice that will be examined. In existing system for identifying emotion in face they have used Edge Detection Technique. The main drawback of this system is only the edges of faces are being segmented because of these inner areas which shows the emotion cannot be segmented. Over lapping of images are also high which will increase the SNR ratio which inturn reduces the accuracy.

But there are some disadvantages for this edge-detection algorithm like Prediction of image size is not accurate, Time consumption, Overlapping of images will be high and Noise will be high. The main disadvantage of this algorithm is it can not be implemented on all images

3. PROPOSED WORK

In this paper, we propose an alternate mothodie., Convolution Neural Network (CNN). By using this CNN algorithm, all the disadvantages of the edge-detection algorithm will be resolved.

This approach is used to find the most optimal active regions in the face. To extract features and identify phrases, a CNN is trained for each type of optimal active region. On the expression images, histogram equalisation, rotation correction, and spatial normalising are performed in order to obtain representable features.

To evaluate the performance of the proposed system, experiments are conducted on both independent and fused databases. In comparison to existing research, our unique technique yields improved accuracy with the added bonus of short inference latency. Based on the literature review, we constructed our own dataset.

For each classifier, or element label, we acquired thousands of images.

After creating a dataset, we have labeled our dataset using online tools for labeling an image. After labeling an image, we have converted it into csv format because of tensor flow requirements. This graph file can be implemented on android as well as web framework to design user interface where a camera is used to detect the object from trained tensor flow model.

4. SYSTEM ARCHITECTURE

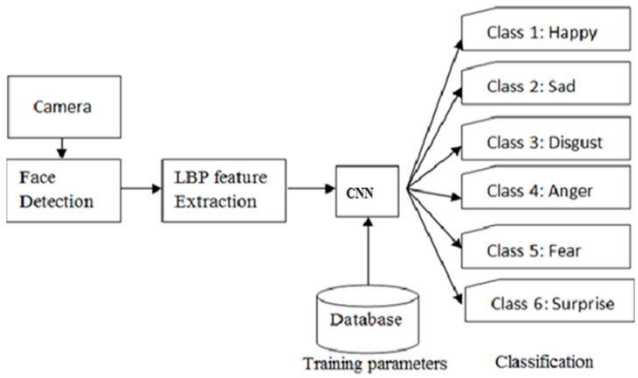

Figure 1: System Architecture

UML Diagram:

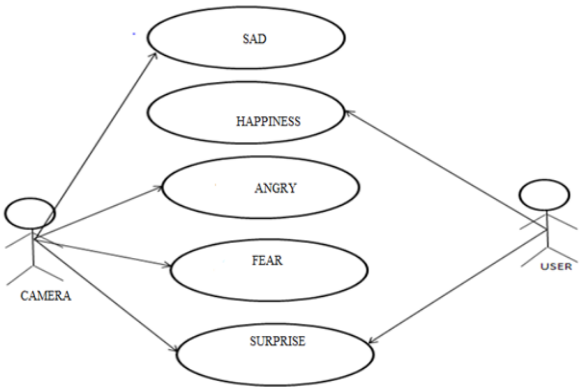

Figure 2: UML Diagram

There are mainly 5 components in the system. They are

1. Image Acquisition
2. Image preprocessing
3. Image Segmentation
4. Feature Extraction
5. Classification

Flow Chart:

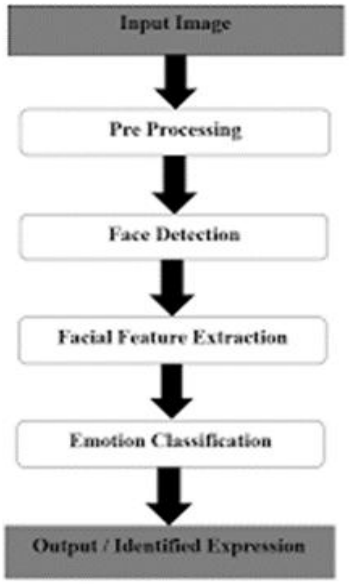

Figure 3: Flow Chart

4. DATASET INFORMATION

In this paper, the following are few sample pictures of the dataset samples of images that represent Anger, Happy,Surprise.

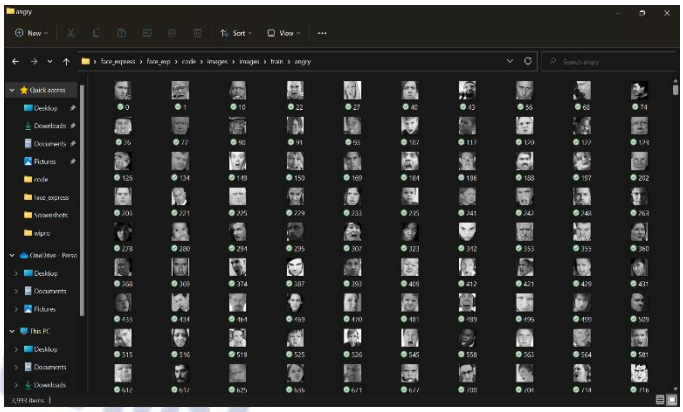

Figure 4: Angry

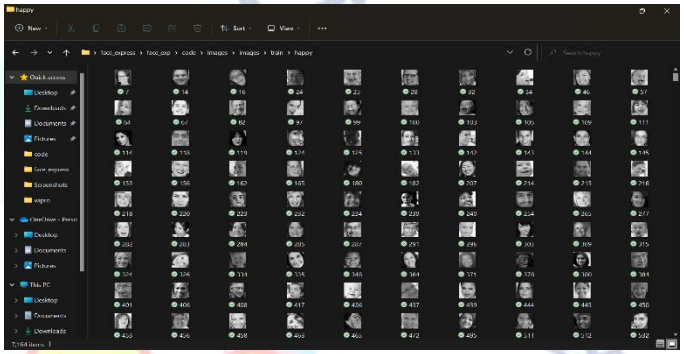

Figure 5: Happy

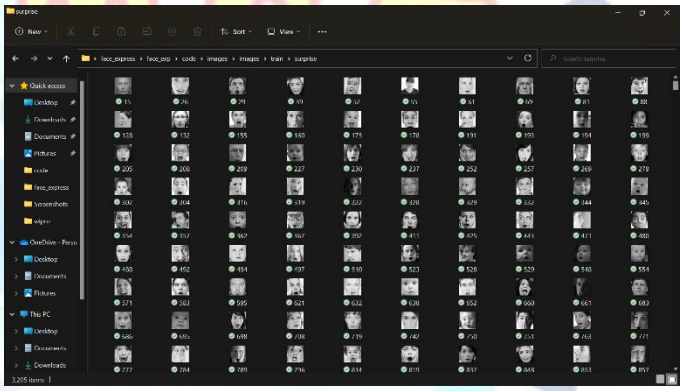

Figure 6: Surprise

5. RESULT

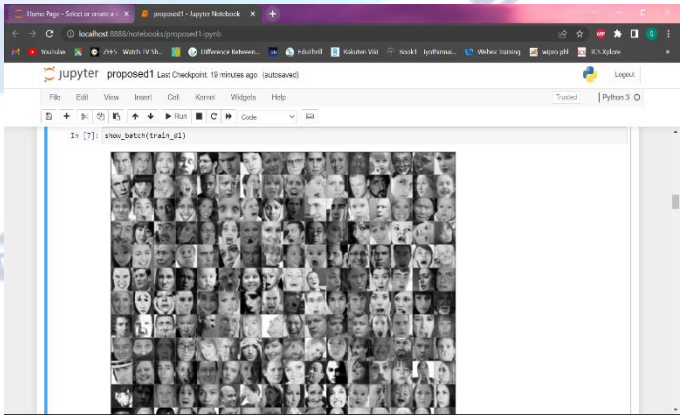

Figure 7: Images of all expressions

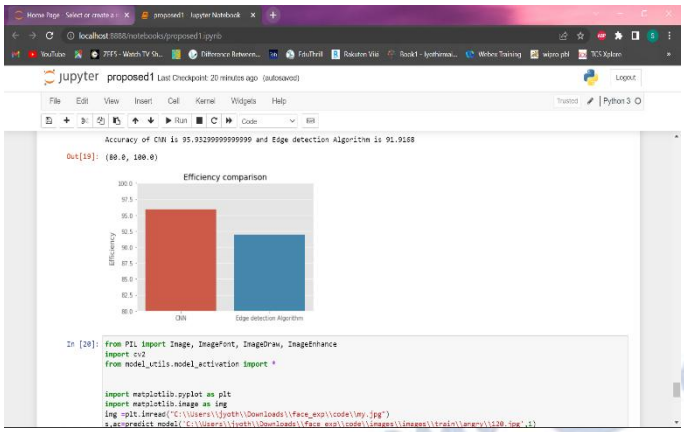

Figure 8: Efficiency Comparison

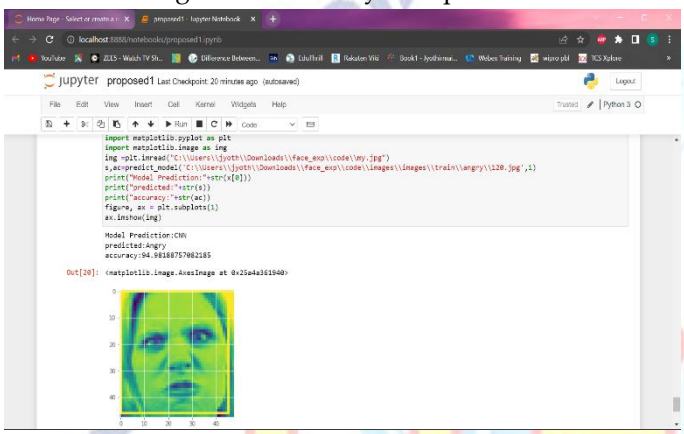

Figure 9: Final Prediction

6. CONCLUSION

In this paper, Numerous researches and work on Emotion Recognition, Machine Learning, and Deep Learning strategies for recognising emotions are conducted in this publication. In the future, a model like this, which is considerably more trustworthy and has endless possibilities in all fields, will be necessary. This study attempted to solve the challenge of emotion recognition using an inception network. Various databases were investigated, with Kaggle's and Karolinska Directed Emotional Faces (KDEF) serving as the research dataset. The model is trained using Tensor Flow. An accuracy percentage of around 39% is achieved. The same framework can also be used to construct real-time emotion recognition in the future.

FUTURE SCOPE

Deep neural-based features can better represent a face's emotion than handcrafted characteristics. When utilised with the face detection method, the performance is even greater because it can crop just the facial part. Deep features might better depict facial traits than manufactured features. We can extend this in the future by using deep neural network-based categorization to increase the algorithm's performance. Extensive testing was done on public facial expression databases, and the findings showed that the suggested method outperformed various state-of-the-art methods.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] Farahani, Fatemeh Shahrabi, Mansour Sheikhan, and Ali Farrokhi. "A fuzzy approach for facial emotion recognition." 2013 13th Iranian Conference on Fuzzy Systems (IFSC). IEEE, 2013

[2] Oh, Byung-Hun, and Kwang-Seok Hong. "A study on facial components detection method for face-based emotion recognition." 2014 International Conference on Audio, Language and Image Processing. IEEE, 2014

[3] eney, Dolly, and Neeta Tripathi. "An Efficient Method to Face and Emotion Detection." 2015 Fifth International Conference on Communication Systems and Network Technologies. IEEE, 2015.

[4] N. Cristiana, T. Shawe, An Introduction to Support Vector Machine, Cambridge University Press, 2000.

[5] Pantic, Maja, and Leon JM Rothkrantz. "Toward an affect-sensitive multimodal human-computer interaction" Proceedings of the IEEE 91.9 (2003): 1370-1390.

[6] deyanju, Ibrahim A., Elijah O. Omidiora, and Omobolaji F. Oyedokun. "Performance evaluation of different support vector machine kernels for face emotion recognition." 2015 SAI Intelligent Systems Conference (IntelliSys). IEEE, 2015.

[7] Liu, Mengyi, et al. "Combining multiple kernel methods on riemannian manifold for emotion recognition in the wild." Proceedings of the 16th International Conference on multimodal interaction. ACM, 2014.

[8] Salunke, Vibha V., and C. G. Patil. "A New Approach for Automatic Face Emotion Recognition and Classification Based on Deep Networks." 2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA). IEEE, 2017.

[9] Lee, Hyeon-Jung, and Kwang-Seok Hong. "A study on emotion recognition method and its application using face image." 2017 International Conference on Information and Communication Technology Convergence (ICTC). IEEE, 2017.

[10] Gao, Yongsheng, et al. "Facial expression recognition from line-based caricatures." IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans 33.3 (2003): 407-412.

[11] Noh, Sungkyu, et al. "Feature-adaptive motion energy analysis for facial expression recognition." International Symposium on Visual Computing. Springer, Berlin, Heidelberg, 2007.

[12] Bashyal, Shishir, and Ganesh K. Venayagamoorthy. "Recognition of facial expressions using Gabor wavelets and learning vector quantization." Engineering Applications of Artificial Intelligence 21.7 (2008): 1056-1064.

[13] Parvathi, D. S. L., Leelavathi, N., Ravikumar, J. M. S. V., & Sujatha, B. (2020, July). Emotion Analysis Using Deep Learning. In 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC) (pp. 593-598). IEEE.

[14] Kumar, J. R., Sujatha, B., &Leelavathi, N. (2021, February). Automatic Vehicle Number Plate Recognition System Using Machine Learning. In IOP Conference Series: Materials Science and Engineering (Vol. 1074, No. 1, p. 012012). IOP Publishing."

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