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Human Emotions Recognition Using Softmax Classifier and Predict the Error Level Using OpenCV Library

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Abstract. The goal of this research project is to compare the accuracy of the CNN method using the Softmax classifier and the OpenCV library by taking out new features and comparing them to the accuracy of the CNN method. To analyse the suggested system, CNN algorithms with softmax classifier and OpenCV library were used with a sample size of 20 to find facial expression recognition by comparing the accuracy and error rate between the techniques. In the proposed study, the dataset was used to collect data on the outcome and accuracy of the OpenCV error rate, and the OpenCV improvement was compared to the CNN softmax classifier technique. The average accuracy of OpenCV over techniques that use convolutional neural networks is 95.5%. The T-Test doesn't show anything important (p 0.05). Face recognition systems were used to get information from a number of places for the study. Compared to the convolution neural network method, the OpenCV algorithm made the result more accurate and less likely to make mistakes.

Keywords. Artificial Intelligence, Convolution Neural Network, OpenCV error rate, Automatic Facial Expression, Pre-Processing, Novel Feature Extraction, Max Pooling, Deep Learning

1. Introduction

The main goal of this study is to find a way to automatically recognise human facial expressions by looking at pictures of people's faces with seven different types of expressions, such as sad, teary, disgusted, scared, happy, surprised, angry, and neutral expressions [1]. The research found a way to recognise important face features by comparing the accuracy of each CNN using softmax classifier and Opencv error rate algorithm [2]. Before focusing on a few photos from the informational collection that help you understand how a face looks, many images from the dataset [3] can help you get the most accurate results and predict how a face will show an emotion. [4]. They use CNN and the OpenCV library to compare how well each one can guess how a

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person is feeling by looking at their face. The way people look is a big part of how they relate to each other [5].

There are more than 162 works on artificial intelligence and facial expressions in the IEEE Xplore Digital Library. Our research team has a lot of experience working on a wide range of technical AI research topics [6]. More research is being done in this area, which makes us want to keep working on this subject. In this study, the OpenCV library did better than CNN [7]. After training the algorithms with feature extraction and preprocessing the dataset to normalise the dataset, our comprehensive system portfolio in research has led to articles in different multidisciplinary projects [8]. Now we're focusing on this subject. According to the analysis of the research that came before, it is hard to tell what a person is feeling just by looking at their face. In order to lower the error rate, the study compared the CNN algorithm with the OpenCV package.

2. Materials and methods

The work is being done in the IOT lab at the Saveetha School of Engineering in Chennai. Face expression recognition is looked at by two groups in the study. The Convolution Neural Network method was in Group 1, while the OpenCV library was in Group 2. Clinical.com was used for the pre-test analysis, which had a G power of 83 percent and a threshold of 0.6. The sample size was estimated, and it was decided that 20 samples were taken from each group, for a total of 40 samples, with a standard deviation for Convolution neural network = 0.60698 and OpenCV = 0.51042 using G power.

Convolution neural networks have been put into many different groups and are used in many different areas of medical image processing [9]. A five-layer convolutional neural network was built and put to use for identifying facial expressions. The model as a whole was made up of seven expressions to help identify the expression [10]. An OpenCV library association technique was used to tell the difference and count the precision. Associations in the OpenCV library use these attributes to change the way they look. Feature extraction is used by the OpenCV library to classify facial expressions [11].

2.1 Statistical analysis

SPSS (version 26) software was used to compare the two groups [12]. First, two groups were set up in the factor view. Then, values were set up in the information view for the two groups, along with a test size for each group. Precision and accuracy are based on an Independent Sample Test with a significant value of 0.93, a mean difference of -.750000, and a confidence interval of -.12561.

3. Result

Table 1 compares Logistic Regression to Random Regression by grouping iterations with a sample size of 20 and calculating Mean = 1.80000, Standard Derivation =.83351, and Standard Error Mean =.18638. In SPSS version 26, the Independent Sample Test

of Accuracy and Precision was used to make sure that the variances of two groups of 20 samples each were the same with and without assuming a T-Test Score.

Table 1: Accuracy comparison for CNN and OpenCV

Parameters	S.No	Algorithm	Accuracy
Error Rate	1	CNN	76.6
	2	Open CV	95.5

In Table 2, the significant value for automatically recognising facial expressions is 0.93, the mean difference is -.750000, and the confidence interval is -.12561. Figure 1 depicts a graph of the openCV library's average accuracy, which is 95.5 percent, in comparison to the accuracy of the convolution neural network algorithm. The graph shows that openCV is better than convolution neural networks in terms of significance. The group statistics of Logistic Regression with Random Regression by grouping the iterations with Sample size 20, Mean = 1.8000, Standard Derivation = .83351, Standard Error Mean =.18638. Descriptive Independent Sample Test of Accuracy and Precision was applied for the dataset in SPSS and shown in Table 2. Here it specifies Equal variances with and without assuming a T-Test Score of two groups with each sample size of 20.

Table 2: Group Statistics of Logistic Regression with Random Regression

Parameters	Algorithm	N	Mean	Std.Deviation	Std.Error Mean
Error Rate	CNN	20	1.8000	.83351	.18638
	OpenCV	20	2.5500	1.09904	.24575

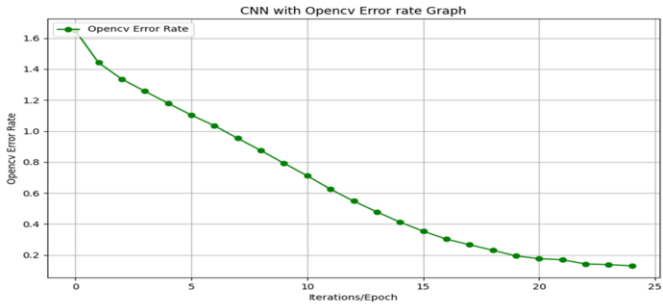

Figure 1. Prediction of the accuracy for OpenCV and CNN algorithm

Once you have the testing tool and know how to work on face emotion recognition, you can move on to the test method. The testing method was explained in great detail. Uploading datasets, preparing them for CNN training, When compared to the CNN method, the suggested method helps make the OpenCVlibrary[11] in Figure 2 more accurate. The data shows that the 95.5% accuracy of the OpenCV library profile data faces is a very important number. The accuracy of the OpenCV library is better than that of the CNN method in Figure 2. The first step was called "feature extraction," and it was a big job because it decided what the expected results would be.

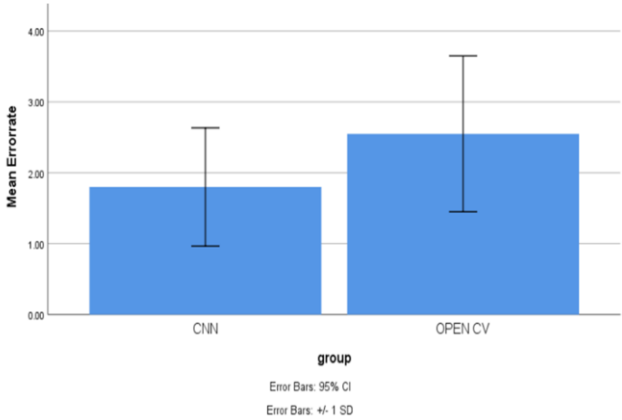

Figure 2. Comparing CNN and OpenCV algorithms to find the average accuracy.

4. Discussion

According to this study, OpenCV libraries seem to be more accurate than CNN, with a 95.5 percent accuracy rate with a graph of error rates. This study looked at how well the OpenCV library and CNN did at classifying facial expressions from the dataset. There are several things in these datasets that are used to describe facial expression recognition. The work shown shows that, in terms of classification error rate, the OpenCV library does better than CNN.

Using the openCV library, the author [12] looked at the possibilities for more modern acknowledgement frameworks and got an accuracy of about 85%. Yao et al. (2021) came up with a system for enthusiastic acknowledgment that works well and is 88 percent accurate. The author gives the method for using the openCV library, which was tested in 7 different places.

5. Conclusion

There were seven facial expressions of human emotions used to show how well CNN and the OpenCV library work. When the OpenCV libraries compared the results of the two calculations, they discovered that they were 95.5 percent accurate. In future work, datasets of real-time video from different sources, as well as different functional and non-functional factors and updated algorithms, can be used to figure out if the system is working correctly.

References

[1] Chen, Feng, Ying Tang, Yujia Sun, Vishnu PriyaVeeraraghavan, Surapaneni Krishna Mohan, and Chuanxin Cui. 2019. “6-Shogaol, a Active Constiuents of Ginger Prevents UVB Radiation Mediated Inflammation and Oxidative Stress through Modulating NrF2 Signaling in Human Epidermal Keratinocytes (HaCaT Cells).” Journal of Photochemistry and Photobiology. B, Biology 197 (August): 111518.

[2] Dinesh, S., P. Kumaran, S. Mohanamurugan, R. Vijay, D. Lenin Singaravelu, A. Vinod, M. R. Sanjay,

Suchart Siengchin, and K. Subrahmanya Bhat. 2020. “Influence of Wood Dust Fillers on the Mechanical, Thermal, Water Absorption and Biodegradation Characteristics of Jute Fiber Epoxy Composites.” Journal of Polymer Research 27 (1). https://doi.org/10.1007/s10965-019-1975-2

[3] R. S. Kumar, S. M. A., A. Balaji, G. Singh, A. Kumar and M. P, "Recursive CNN Model to Detect Anomaly Detection in X-Ray Security Image," 2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM), 2022, pp. 742-747, doi: 10.1109/ICIPTM54933.2022.9754033.

[4] Fratesi, Ashleigh. n.d. “Automated Real Time Emotion Recognition Using Facial Expression Analysis.” https://doi.org/10.22215/etd/2016-11318.

[5] Jain, Ravindra Kumar, Sridhar Prem Kumar, and W. S. Manjula. 2014. “Comparison of Intrusion Effects on Maxillary Incisors among Mini Implant Anchorage, J-Hook Headgear and Utility Arch.” Journal of Clinical and Diagnostic Research: JCDR 8 (7): ZC21–24.

[6] Johnson, Jayapriya, Ganesh Lakshmanan, Biruntha M, Vidhyavathi R M, KohilaKalimuthu, and DurairajSekar. 2020. “Computational Identification of MiRNA-7110 from Pulmonary Arterial Hypertension (PAH) ESTs: A New microRNA That Links Diabetes and PAH.” Hypertension Research: Official Journal of the Japanese Society of Hypertension 43 (4): 360–62.

[7] Kannan, Roghith, and M. S. Thenmozhi. 2016. “Morphometric Study of Styloid Process and Its Clinical Importance on Eagle’s Syndrome.” Journal of Advanced Pharmaceutical Technology & Research 9 (8): 1137.

[8] Keerthana, B., and M. S. Thenmozhi. 2016. “Occurrence of Foramen of Huschke and Its Clinical Significance.” Journal of Advanced Pharmaceutical Technology & Research 9 (11): 1835.

[9] Kirubakaran, S. Stewart, S. Stewart Kirubakaran, B. Santhosh Kumar, R. Rajeswari, and T. Daniya. 2021. “Heart Disease Diagnosis Systematic Research Using Data Mining and Soft Computing Techniques.” Materials Today: Proceedings. https://doi.org/10.1016/j.matpr.2021.02.667.

[10] Krishna, R. Nivesh, and K. YuvarajBabu. 2016. “Estimation of Stature from Physiognomic Facial Length and Morphological Facial Length.” Journal of Advanced Pharmaceutical Technology & Research 9 (11): 2071.

[11] Muppidi, Satish, P. Srinivasa Rao, and S. Stewart Kirubakaran. 2021. “An Efficient Framework for Blog Recommender System.” Materials Today: Proceedings. https://doi.org/10.1016/j.matpr.2021.02.669

[12] V. M. Babu and R. S. Kumar, "Detection of Cancer and Comparison of Survival Rate of Patients from CT Images on Long Nodules Data using Novel Support Vector Machine and 3D Convolutional Neural Network Classification," 2022 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), 2022, pp. 1701-1705, doi: 10.1109/ICSCDS53736.2022.9760844.