IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

COMMUNICATION APPLICATION FOR HERAING IMPAIRED (DEAF AND DUMB)

Battu Divyasri[1], Dr. K. Suresh Babu[2]

[*1]Student, M.Tech (Computer Science), School of Information Technology, JNTU Hyderabad, Hyderabad, India

[*2]Professor of IT, School of Information Technology, JNTU Hyderabad, Hyderabad, India

ABSTRACT: This Rather than speaking, human facial expressions provide a lot of information. In the field of human-machine interaction, the recognition of facial expressions is essential. Many things can be done using an automatic facial expression recognition system, including, but not limited to, comprehending human conduct, spotting mental illnesses, and creating fake human expressions. It is still difficult to accurately recognise facial expressions on a mobile device with a high recognition rate. By recognising their body expressions, it is an Android app for instant messaging that helps hearing-impaired users. These expressions will be stored in Firebase's cloud database. The messages are then sent to the other party, or the recipient, who may then read them and determine if the sender is pleased, sad, or experiencing other emotions by reading the text. The sender can now speak with anyone without any problems.

Keywords *– Impaired; Convolutional Neural Network (CNN); Convolutional Layers; Pooling Layers; Fully Connected Layers.*

1. INTRODUCTION

The goals of this project will be discussed after a quick introduction to the topic and its applications. Building an Android application that can recognise emotions in real time was the major objective of this project. Additionally, assessing the state of the art in as broad a manner as possible became a secondary goal due to the potential that this project will be carried by someone else and the dearth of knowledge on the subject of facial expression recognition.

The project's objective was clarified to be building a system that could detect emotions on an Android device —so, with limited computations— and was open to being further improved in the future. It was later discovered that emotion detection libraries were closed-source and did not offer options for tuning. The images captured by the camera must be used by this system in real-time. Due to the task's complexity, various limitations were set to make it easier. Only frontal faces must be examined; changes in emotion can be disregarded. Poses are also employed during speaking. The system will be evaluated on lab animals before it is possibly used in the training.

2. LITERATURE REVIEW

2.1 Introduction

The definition of emotions is "strong feelings that are related to one's circumstances or mood, and have different characteristics associated with strong mental activity and some pleasure or displeasure." These emotions are significant and have been extensively studied because they have a significant impact on human behaviour and judgement. Consequently, being able to identify emotions can aid in somewhat understanding how other people may respond to various occurrences. For instance, it might guide someone in choosing how to act or what to say or not say; in other words, it is crucial for forming social connections. Alterations in facial expressions are a typical means of expressing emotions and, consequently, of detecting them in other people. It is vital for the relationship between emotions and changes in facial expression to be universal across a wide range of participants, including those from various cultures, in order for this method to be trusted. Happiness, sorrow, anger, surprise, disgust, and fear are the six primary emotions studied; however, other researchers have found a wide range of additional emotions that can be expressed through the face. 136 emotional states are identified and categorised in a tree structure, with some more fundamental emotions (such as love, joy, surprise, rage, sadness, and fear) at the top. These main emotions are then further broken down into secondary emotions and tertiary emotions.

2.1.1 Parameterization

Associating facial expressions to emotions becomes challenging given the wide variety of expressions that can be made. The majority of the research on the subject presently makes reference to two of the approaches: the Facial Action Coding System (FACS) and the Facial Animation Parameters (FAPs). Some researchers have parameterized the potential changes in facial expressions in order to facilitate this. Researchers used human observers to gauge emotions prior to the development of the FACS. This method proved unreliable because the observer might be swayed by the context and, for instance, place more weight on the voice. Ekman and Friesen created a framework that permitted a more scientific approach as a result, and it has now become the de facto norm.

NEUTRAL	AU 1	AU 2	AU 4	AU 5
				
Eyes, brow, and cheek are relaxed.	Inner portion of the brows is raised.	Outer portion of the brows is raised.	Brows lowered and drawn together	Upper eyelids are raised.
AU 6	AU 7	AU 1+2	AU 1+4	AU 4+5
				
Cheeks are raised.	Lower eyelids are raised.	Inner and outer portions of the brows are raised.	Medial portion of the brows is raised and pulled together.	Brows lowered and drawn together and upper eyelids are raised.
AU 1+2+4	AU 1+2+5	AU 1+6	AU 6+7	AU 1+2+5+6+7
				
Brows are pulled together and upward.	Brows and upper eyelids are raised.	Inner portion of brows and cheeks are raised.	Lower eyelids cheeks are raised.	Brows, eyelids, and cheeks are raised.

An example of AU's in FACS. Figure extracted

It entails locating the muscle groups, known as Action Units or AUs that alter face behaviours. After that, an expression is linked to one or more AUs, and since there is a connection between emotions and facial expressions, it is possible to compile a list of the various AU combinations that are linked to each emotion. Therefore, using a conversion table, a system that can recognise AUs will be able to ascertain the subject's emotion. There is a comparison between FACS and a few additional systems that are FACS extensions.

3. SYSTEM ANALYSIS

The emotion recognition problem, like all classification problems, calls for an algorithm to complete feature extraction and categorical categorization. In order to categorise an emotion, we must first extract a certain feature from the data and then create a model that can categorise the input depending on the feature. Using various applications like WhatsApp, Face book, and other social media networks, we may simply and rapidly interact with one another in the present era. An applications that allow users to including those who are disabled and visually impaired to communicate. But not those who are hard of hearing.

Proposed System:

By using the Convolutional Neural Network (CNN) algorithm to do emotion classification, it is possible to address the problems with the conventional approaches. Users, who are physically challenged, including those who are typically disabled, can speak with each other by using this app. This includes those who are crippled, have their body parts paired, or have other physical challenges. Through the use of their facial expressions, this app can help hearing-impaired people (the dumb and deaf) communicate.

4. ALGORITHMS

Convolutional Neural Network (CNN):

The image sensing process is complicated by variations in location, expression, position, skin colour, pixel value, lens, and hair face. Recent advancements in face detection have the advantage of using classic vision techniques, which are far more effective. The CNN is a synthetic neural network that is used to recognise and analyse pixel images. The R-CNN generates local proposals for classifying and positioning images inside a CNN environment.

Layers of CNN:

A sophisticated CNN algorithm can generate several elements of the image and highlight them (with learnable weights and differences). A CNN is a sophisticated learning algorithm. Compared to other classification systems, ConvNet pee processing is much slower. ConvNets can pick up these filters with the right amount of practise using crude homemade filters.

Convolutional Layers:

As extractors, they are displayed by convergence layers. Convolutional layers of mapping are used to order the neurons. A group of trainable weights connects the neural region of the preceding layer to the neurons of all attributes, which are also known as filter bands. By using a non-linear activation function, the inputs are connected to weights, and the outcome is then used to create the new feature map.

Pooling Layers:

In order for spatial inconsistencies to distort the entry, the connection layers are intended to diminish the space resolution of function maps. The averages by the average group level are initially used to amplify input values in the small picture region. In more modern models, the maximum value in the max layers is dispersed across the receiving region to the following level.

Fully Connected Layers:

So that additional photos may be recovered while the network moves, multiple cool and pool-like layers are typically stored. These traits are interpreted by these layers' fully connected layers, which support higher order thinking. The SoftMax operator, in addition to DCNN, is typically used to address classification difficulties**.**

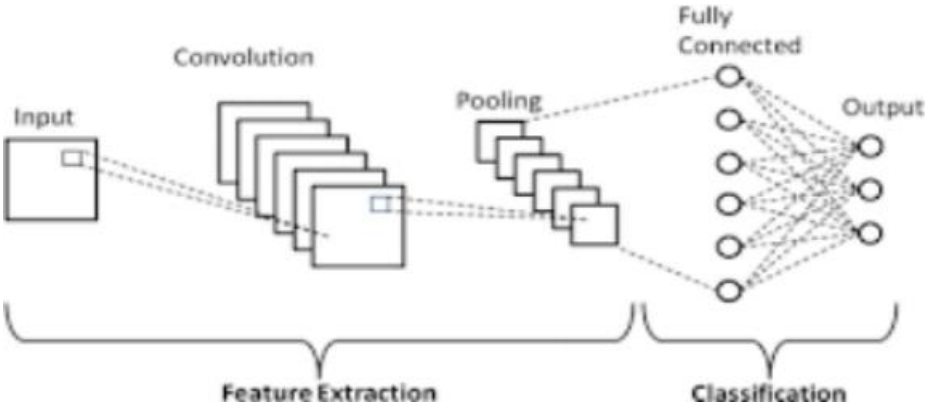
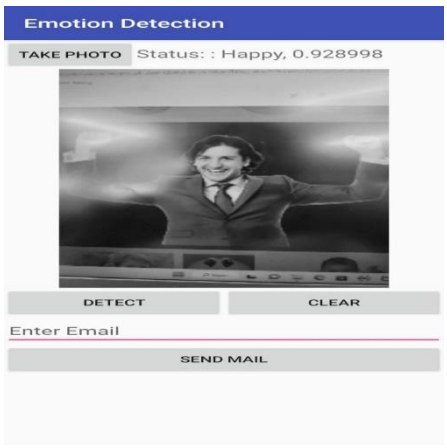


Figure: Architecture of CNN

5. EXPERIMENTAL RESULTS

Sad Emotion:

Happy Emotion:



6. CONCLUSION

The CNN facial expression architecture was implemented in Python, as was already indicated. Use of the Python programming language and the libraries Numpy, Theano, and CUDA was made. While the filter map for both layers is 20x5x5, the image batch size has been reduced to 30. The training procedure's effectiveness has been verified using a validation set. Validation errors, training, and training costs are computed in the last row of each validation cost epoch. Image setting and the associated output label are the training's input parameters. With hyper parameters like learning rates, momentum, regularisation, and decay, the training updated the weights of the feature maps. The training method was employed. With 0,99 momentum, 10e-7 normalisation, and 0,999 decay, the batch-specific learning rate in this system was 10e-5. This system's functionality focuses on the position as the fundamental attribute underlying different expressions. In genetic algorithms, the fundamental components of property are alienated as disclosed and hidden categories. The much-desired biometric cryptosystems will cease to require passwords or smarter cards thanks to this research's innovative research method to asymmetries. Studies and experimental research have demonstrated that hierarchical security systems are effective at distinguishing the geometrical physiological aspects.

7. REFERENCES

1.Abdullah, Hamsa A. “Neuro-Fuzzy Inference System Based Face Recognition Using Feature Extraction.” *TELKOMNIKA (Telecommunication Computing Electronics and Control)*, vol. 18, no. 1, 1 Feb. 2020, p. 427, **10.12928/telkomnika.v18i1.12992.**

2.Alotaibi, Munif, and Ausif Mahmood. “Improved Gait Recognition Based on Specialized Deep Convolutional Neural Network.” *Computer Vision and Image Understanding*, vol. 164,Nov. 2017, pp. 103–110, **10.1016/j.cviu.2017.10.004.**

3.An, Kwang, and Myung Chung. “Cognitive Face Analysis System for Future Interactive TV.”*IEEE Transactions on Consumer Electronics*, vol. 55, no. 4, Nov. 2009, pp. 2271–2279, **10.1109/tce.2009.5373798.** Accessed 29 Aug. 2020.

4.Cai, Y.P., et al. “Identification of Optimal Strategies for Improving Eco-Resilience to Floods in Ecologically Vulnerable Regions of a Wetland.” *Ecological Modelling*, vol. 222, no. 2, Jan. 2011, pp. 360–369, **10.1016/j.ecolmodel.2009.12.012.**

5.Calvo, Borja, et al. “Learning Bayesian Classifiers from Positive and Unlabelled Examples.” *Pattern Recognition Letters*, vol. 28, no. 16, Dec. 2007, pp. 2375–2384, **10.1016/j.patrec.2007.08.003.** Accessed 22 Apr. 2021.

6.Edwards, Michael, et al. “Graph Convolutional Neural Network for Multi-Scale Feature Learning.” *Computer Vision and Image Understanding*, Dec. 2019, p. 102881, **10.1016/j.cviu.2019.102881.**

7.“Emotion Detection Using Facial Expressions with Convolution Neural Networks.” *International Journal of Recent Technology and Engineering*, vol. 8, no. 2S11, 2 Nov. 2019, pp. 3612–3615, **10.35940/ijrte.b1452.0982s1119.** Accessed 30 Apr. 2020.