

# Personal Assistant with Emotion Recognition Based on Artificial Intelligence



N. Kumaran, Kavya Lakshmi E V, Maithreyi S

**Abstract:** This paper deals with a method adapted to create a personal assistant based on emotion recognition. It explains how the emotions of users can be recognized and suggests the relevant methods. Now, we have an abundant number of personal assistants and chatbots: we took one of such bots a step ahead and made our assistant to automatically recognize users' emotions. Through this, our assistant is made to acquire empathy and usage with a lot of fun and advantage. The application has the potential to be used in mobile phones. Many people suffer from social anxiety and depression; our assistant is intended to help them by identifying their emotions and by suggesting ways to cheer them up. The assistant induces the user to be more connected to their phone and also to other people. Initially, our idea was to create a futuristic application, but later this turned out to be more than that. It proves to be advantageous for all mobile phone users. We created a simple personal assistant (Edith) with emotion-sensing ability. We used deep learning techniques to detect users' emotions. We illustrated our model with a lot of human faces displaying different kinds of emotions. Achieving a decent accuracy while recognizing the emotion was the hardest part in this attempt because very slight differences in facial muscles portray dissimilar emotions; identifying the pattern in similar feelings is challenging. We overcame these difficulties by choosing an appropriate dataset with many images to depict our model to recognize the emotions correctly. Our model achieved better accuracy by doing so.

**Keywords-** Edith, Emotion Recognition, Personal Assistant, Virtual Assistant.

## I. INTRODUCTION

The main aim of the project is to create a virtual assistant; it is like a friend, a companion. Our vision is to create a Chatbot that could not only help people technically but also emotionally, by being a friend and understanding their emotions. Recently social bubbles have been created for ourselves; these led us to forget people around us and prevented us to be in social contact. The current pandemic has made things much worse. This state of human beings can lead to mental stress and depression. The core idea of the project has arisen in our minds, while we were playing with one of the chatbots that exists in mobile phones. We were not able to connect emotionally with the chatbot. That is where we thought of building a chatbot that detects people's emotions automatically and talks to them.

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\* Correspondence Author

**N Kumaran\***, Student, Department of Computer Science and Engineering, SCSVMV University, Kanchipuram. (Tamil Nadu), India.

**Kavya Lakshmi E V**, Student, Department of Computer Science and Engineering, SCSVMV University, Kanchipuram. (Tamil Nadu), India.

**Maithreyi S**, Student, Department of Computer Science and Engineering, SCSVMV University, Kanchipuram. (Tamil Nadu), India.

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In order to shape our thoughts into an application, we created a personal assistant with emotion recognition. The virtual assistants that we have till now such as Siri, Alexa, Google Assistant, etc., just answer back to the question that has been asked and just follows the instructions. Our idea was to take these personal assistants to the next level and make the assistant feel more like a companion than just an assistant.

## II. LITERATURE SURVEY

After a lot of contemplation on the core idea of our project, its positive and negative aspects, and the probability of completing the project successfully, we finalized and came down to a point of building a chatbot that can detect users' emotions automatically and respond accordingly [1]. We started our work by doing a lot of study on the projects and papers that are similar to our core idea and project. We then got a clear picture as to where we are going ahead in our project [2]. These research papers and surveys enabled us to understand what is necessary for us to venture into a project of this sort [3]. With their help, we could find a few loopholes in our project. By means of these research papers, we understood how emotion recognition is accomplished. Also, we used and surveyed a lot of chatbot programs that are available in the market.

Table- I: Reference Table

Research papers	Method	Remarks
1. A Review Paper on Smart Personal Assistant By Yogendra Kumar Sharma, Neeraj Sharma, 2018	Focused on natural language interaction with smart personal assistant systems	Inspired by voice interaction with personal as
2. Personal Assistant with Voice Recognition Intelligence Dr. Kshama V. Kulhalli HOD IT D.Y.	Personal Assistant with Voice Recognition Intelligence	The personal assistant works offline
3. Automatic emotion recognition using the facial expression: a review Monika Dubey, Lokesh	The identification-driven emotion recognition system	Segmentation and classification of images are done

We got inspired by a lot of ideas that arose after reading above mentioned papers. Verma et al made an analysis on the modified convolutional neural network architecture for facial emotion recognition. They compared two deep neural networks [4]; this helped us to decide the relevant deep neural network.



Dixit and coworkers have discussed a lot about facial recognition [5]. “Facial expression recognition with auto-illumination correction” was reported by Ashok Kumar etc. [6].

### III. PROPOSED METHOD

We propose a system that gets input from the user and performs tasks accordingly like any other normal chatbot or personal assistant. For simplicity, we denote the user here with “He”. While the personal assistant, Edith, gets input from the user for every 4 inputs or tasks given by the user, it automatically checks the user’s emotions and suggests tasks accordingly, if necessary. For example, if a user’s emotion is detected to be sad for the first time, then it asks the user if he would like to hear a joke, for cheering him up. Even after that if it finds its user to be sad or lonely, it gives him the idea to call his favourite person, which helps him to feel more connected to people, contradicting the notion that “technology makes people lonely”. Basically ‘Google Assistant’ also suggests its user to hear some jokes when the user says he is bored or sad. But in our project, we made the system automatically recognize the emotion and act accordingly as our friend would do.

### IV. IMPLEMENTATION

The process of our project involves creating a dataset containing human faces of different kinds of people belonging to different races, ages, and genders, portraying different emotions. For this, we used a dataset from Kaggle called FER-2013. It contains more than twenty thousand images. Then the dataset is divided into two parts, i.e. train dataset and test dataset.

#### A. Dataset

For the dataset, in the emotion recognition part, we have over 30,000 images as our train dataset and over 8000 images for our test dataset.

**Table- II: Train Dataset**

Emotion	No. of images
Surprise	3171
Fear	4079
Angry	3995
Neutral	4965
Sad	4830
Disgust	436
Happy	7215

**Table- III: Test Dataset**

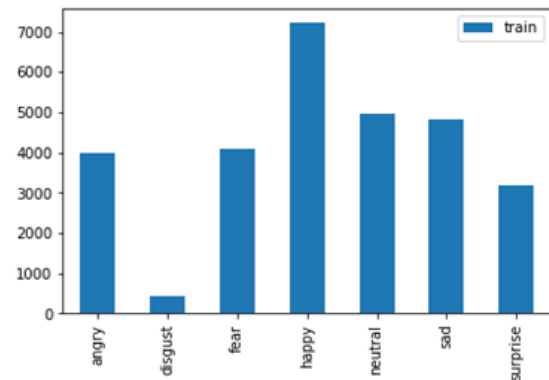
Emotion	No. of images
Surprise	831
Fear	1024
Angry	958
Neutral	1233
Sad	1247
Disgust	111
Happy	1774

We have classified the data into different sections and have named them according to their respective emotions. Our data set does not have much noise, thereby avoiding much pre-processing.

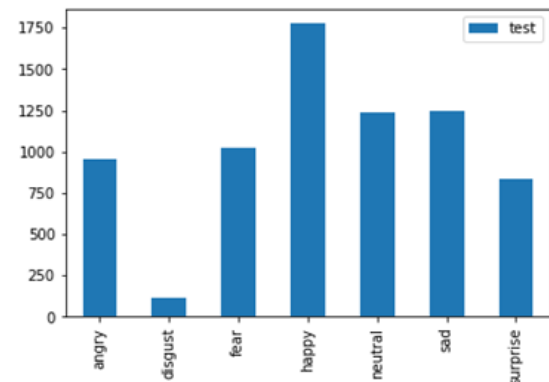
**Some examples from our data set:**



**Fig. 1. Image with emotions detected**



**Fig. 2. Train dataset**

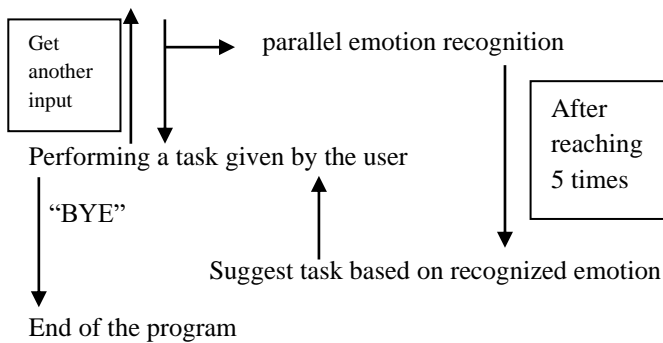


**Fig. 3. Test dataset**

After splitting up the dataset, we build a model using neural networks. The model is built in such a way that it acquires high accuracy when it is trained and tested. We adopted the trial and error method to arrive at the best model for our dataset. “Call back” and “Stop early” functions are used to save our trained model at its best accuracy curve, making it possible to call the model as and when it is required. And, for the chatbot part of Edith, we adopted a simple method to perform the tasks from the user. At the moment the project mainly focuses on the recognition of human emotions. When we run Edith, the personal assistant part of it starts and addresses some tasks or answers required by the user. Parallely emotion recognition part gets invoked automatically, and it detects the emotion of the user and performs tasks accordingly.

## V.ALGORITHM

- Step 1:** Dataset is imported  
**Step 2:** The imported dataset is read  
**Step 3:** Imported dataset images are resized  
**Step 4:** The dataset is divided into two parts, i.e., the Train dataset and Test dataset.  
**Step 5:** “Callback” functions are used and “Stop early” functions are declared  
**Step 6:** Accuracy and performance metrics are calculated to know the efficiency.  
**Step 7:** Train dataset is assigned to the models  
**Step 8:** Predictions are made for the test dataset.  
**Step 9:** Passing real-time image is taken from the camera to the trained model  
**Step 10:** The emotion of the real-time image that passes gets recognized  
 Getting voice input from the user



### Workflow of the program

## VI.RESULT AND DISCUSSION

The training dataset is passed on to the model and training of the model is done. Following the training, the process of testing the model is done using a test dataset. The accuracy of the model is predicted and printed. Training using various data sets and testing the model is carried out multiple times to ensure the model is trained with an ample amount of data to prepare the model to handle real-time data from the live input from the user. Repeated testing ensures the accuracy of the model. We received an accuracy of about 80% for our testing dataset and our model was able to predict the correct emotions of the user. After the emotion detection, the result was passed to our personal assistant and it was able to perform the tasks according to the emotions as assigned.

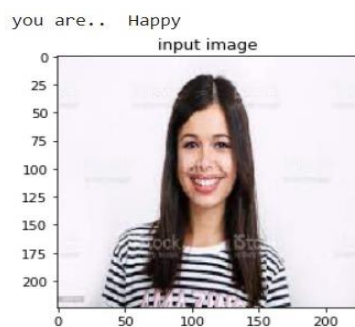


Fig .4. Prediction of various emotions

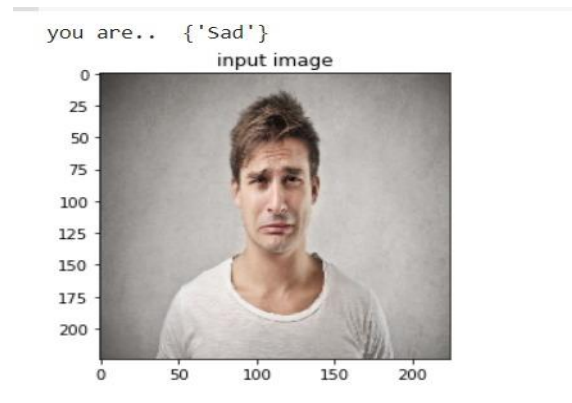


Fig .5. Prediction of various emotions



Fig. 6. Prediction of various emotions

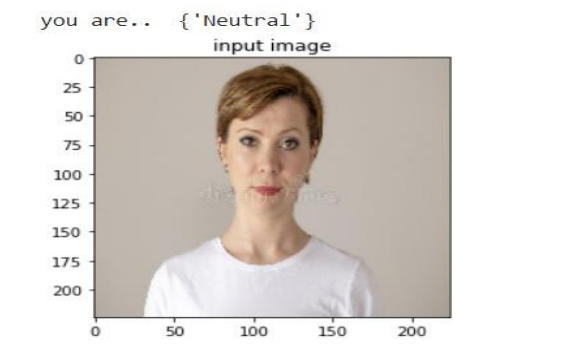


Fig. 7. Prediction of various emotions

## VII.CONCLUSION

Our vision is to create a chatbot that not only helps the user technically but also emotionally, by being his friend and understanding his emotions. Here, in this project, we have created a personal assistant that can do tasks based both on voice recognition and emotion recognition. We succeeded in creating a personal assistant ‘Edith’ in recognizing the user’s emotion and suggesting tasks accordingly.

## FUTURE ENHANCEMENT

Our personal assistant is not based on artificial intelligence. We intend to take it to the next level for better results and experience. A personal assistant based on Artificial Intelligence with facial emotion recognition is envisaged.

Our vision is to help people feel more connected and lead a depression-free life. We plan to convert our results into an application in both android and IOS operating systems. We are working with a model where the picture taken for analyzing the emotion gets immediately deleted so that the user could feel safe to use our Edith.

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## AUTHORS PROFILE



**E V Kavya Lakshmi** is a Final Year Student persueing her Bachelor's degree in Computer Science and Engineering from SCSVMV University, Kanchipuram. She got inspired by Artificial intelligence and Machine learning and is interested to incline her career towards it in the future. She has worked on a number of minor projects in the field of Artificial intelligence and in web development domain as well. She has also been teaching maths and coading for international students in a very reputed online platform. She has got a great interest in computer science and is currently working as an intern in a reputed IT company. **Email:** kavivvd@gmail.com



**Maithreyi S** is a Final Year Student persueing her Bachelor's degree in Computer Science and Engineering from SCSVMV University, Kanchipuram, with an excellent academic record and keen interest in the fields of programming, machine learning, artificial intelligence and business development. She has worked on minor projects along with her colleagues and has been successful in developing them. They include face-mask detection, speect to text and text to speech and news website development as well. She had interned in a travel based company as a Business Development Executive and also as a part time content writer. She is currently interning at a reputed IT company. **Email:** maithreyi.suresh30@gmail.com



**N Kumaran** is an Assistant professor working in SCSVMV University, Kanchipuram. He has been working since July 2008 until today. He has an experience of over 13 years in the field of teaching and is really passionate about it. He has got his Ph.D from National Institute of Technology, Trichy in the field of Video Analysis and a doctorate in Philosophy. He has worked in a number of machine learning projects mainly focusing in the field of Image Analysis. He has also published his project papers in reputed international journals. He has also attended and conducted a number of international conferences and seminars.