

# SYSTEM TO IDENTIFY USER EMOTIONS AND COMMUNICATE WITH USER TO TACKLE THE DEPRESSION USING IONIC 4

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**Abstract** - *The world is changing rapidly with technology. Technology is improving the world very rapidly. But on the other hand, it also increases the stress on human mind. The stress of trying to learn new thing after so much short time, the stress caused by daily routine is much more. The technology is connecting people through devices but on the other hand it lessens the necessity to be together. Which makes one to feel lonely and depressed. Which increases the need of artificial assistant.*

*This paper provides a solution as a system which will recognize the facial expression of user and chat with them accordingly. This system uses faceapi.js to recognize facial expressions and to chat with user it uses dialogflow integrations. This two APIs will be implemented in ionic framework so that the platform dependency will decrease. The result states that the system can be implemented using ionic framework with expression recognition accuracy of around 90 percent with strong expressions. The chatbot implementation needs to be improved and trained properly.*

**Key Words:** Chatbot, Dialogflow, faceapi, face Expression recognition, Ionic framework, Face detection

## 1. INTRODUCTION

From the start of the 20th century, technology is advancing vastly. The improvements in technology is creating life much easier but it is also creating a big impact on people. People are feeling freer since the internet and other entertaining aspects have come. But on the other hand, the level of depression is getting higher and higher in daily life. And now, it has become more tough to express and deal with those adverse emotions. In this technological era, smartphones can help people to spot their depression level using some algorithms and notify them [26]. This paper shows a way to create an app that will help the user to overcome their depression by suggesting to them the ways to tackle it. The app is made using the Ionic framework and has a feature that will detect the user's emotions using their face. Here an open-source face-emotion detector can be used inside an ionic app. For the handling of all other parts after the detection, the Dialogflow integration is used. The main challenge was to combine these 3 independent technologies and create an app that will help the user to overcome their depression.

## 2. RELATED WORK

Related Work is divided into the three parts.

1. Mental Health Using Mobile Apps: Mental health apps are becoming more popular recently. In this time one can use apps to help them become less depressed. Apps like WoeBot, Wysa, Youper, Tess [25] are available if user wants to handle their depression but they do not contain ability to detect user's face expressions. These apps can only treat the depression but cannot detect it [2].

2. Depression Detection in Systems: The important thing which is to considered is that the depression detection is very difficult. And a person's mood is always variable and is much harder to predict. The previous work in this field is done by professionals. Vinod Bharat presented some data mining techniques for this purpose [31]. Nilesh Wani and LS Malphedwar also proposed an image processing technique [30] for web-based images.

3. Face Expression Recognition: Many organizations are implementing facial expression recognition system so that they will be able to detect user's current mood while using their product. Google's API and Microsoft Azure API are one of the main APIs which can be used to implement and use such functionalities. Microsoft's Azure and Google's API were compared by Salik Ram Khanal and team [30] using a dataset of 980 images with many poses of the face. Both API had to decide which of the 8 emotions (Anger, Afraid, Disgust, Happiness, Neutral, Sadness, Surprise) the image contain. The results were that Microsoft Azure was better in straight face images but face detection was better in Google. Microsoft has a true-positive value of up to 60% and google has 45.25%.

## 3. METHODOLOGY

The Methodology is to use faceapi.js an open source library to detect the faces and implement face expression recognition. The chatbot should be implemented using dialogflow Api. The basics should be taught to the chatbot using dialogflow. Sentiment analysis of the user's replies is to be done using angular sentiment package. The users face input and sentiment analysis of user replies is done and if the user's face expression and sentiment analysis is resulted in 'Happy', the system recognizes that user is happy and will rest.

Implementation is done as follows-

### 3.1 Face-Api implementation

Face-api is implemented in ionic framework using angular programming language. The shard files are used to work with image processing in real time. Since the recognition should work in real time it should be done using async function. The main challenge to implement is that the ionic framework should be able to access the camera of the system and proper version of APIs should be chosen to program with ionic framework.

### 3.2 Chatbot Implementation

Chatbot is implemented in the system using diaogflow integration. It is done using api-ai-javascript package of angular. The learning of chatbot should be done in dialogflow with training facility.

### 3.3 Sentiment analysis

Sentiment analysis of user resopponses is done using angular sentiment package. Each response of user is processed using sentiment package and the result is checked.

### 3.4 Depression Handling

When the user is detected feeling 'sad' or 'disgusted' the system triggers the chatbot. The chatbot will chat with user and give response accordingly. The system also gives suggestions to the user. The suggestions are available as 'knowledge' in dialogflow. The suggestions are triggered using intents created within dialogflow.

## 4. RESULTS AND DISCUSSIONS

The results from the system are as follows:

Faceapi.js is useful when it comes to the detection of facial expression. The screenshot of expression recognition is taken and shown as follows.



Figure 1. Working of faceapi.

The accuracy of expressions depends upon the strength of expressions. But the main challenge in that the expressions of a person are constantly changing so the detection is done when confidence is greater than 0.75.

The chatbot integration can be done with Dialogflow API. The main concern in this step is that, with latest change in the dialogflow version i.e. Dialogflow v2 the method to implement it should be managed properly.

The sentiment analysis within this system works with good accuracy.

## 5. CONCLUSION AND FUTURE SCOPE

Using this system, the user can detect their expressions and through that the chatbot can chat with them and suggest them many things. The system works efficiently and does not need huge number of calculations. System works with nice speed. The main thing to improve in this system is that the chatbot needs to be trained thoroughly. The chatbot is a free-flow based chatbot hence the flow of the chatting should be controlled maintained precisely. Which needs much more time to train a system. But when a system is trained properly the system can be much more powerful in future.

The system can be improved with some additional functionalities. Functionalities can be like maintained history of user's mood. This data can be used to predict the mood of user

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