DEPRESSION DETECTION SYSTEM

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Abstract: Depression is a most common severe mental disturbance health disorder causing high societal costs. In clinical practice rating for depression depends almost on self-questionnaires and clinical patient history report opinion. In recent years, the awareness has generated for automatic detection of depression from the facial expressions and voice recognition. Some queries are raised that which features are more responsible for depression from image and voice and which classifiers gives good results. By identifying proper features from image and voice recognition system even one can save the life of a patient. A system has been proposed which captures frontal face videos of patients, extracts the facial features from each frame and analyses these facial features to detect signs of depression in them. This system will be trained with of frontal face images of happy, sad and nor mal faces. The presence of these features in the video frames will be analyzed to predict depression in the patients. The most important form of nonverbal communications is facial expressions of a person. This system mainly uses different image processing techniques for face detection, feature extraction and classification of these features as depressed or non-depressed. Based on the level of depression features the student will be classified as depressed or not. Along with detecting depression from facial expressions a voice detection system is also used simultaneously for efficient working of the overall system. Voice recognition system carries crucial information about recognition and translation of spoken language into text by computers.

IndexTerms **- Component, formatting,style,styling,insert.**

I. INTRODUCTION

We propose the system where patient's mood will be recorded through image processing and voice or speech through the Desktop application. Speech, which can serve as one of the most convenient means of communication, contains not only semantic information but also emotional characteristics and the state of the speaker. We propose the system where doctor will diagnose the depressed patient by using the calculated result of depression through windows desktop app. Our system will analyse the mood (image) and speech of patient and give the result to the system. Then system will calculate the depression percentage and diagnose accordingly which will help the doctor.

Behaviour of a depressed person shows relative change in terms of image and speech pattern. This motivates our system to provide a working and efficient system for effective depression treatment is limited by current diagnostic methods, which depend excessively on the experience of the clinicians and on the cooperation of the patient, risking a range of objective biases. Therefore, it is particularly important to look for new objective and convenient methods that assist clinicians in their diagnosis. Our project not only will detect the percentage depression of the patient, but also it will help the doctor to decide the treatment based on depression percentage.

II. MOTIVATION

Depression is a common mood disorder that is characterized by sadness, loss of interest, feelings of guilt or low self-worth, and poor concentration. It can be long-lasting or recurrent and can have a significant impact on individuals and their families, and even on society as whole. Main purpose of the system for effective depression treatment is limited by current diagnostic methods, which depend excessively on the experience of the clinicians and on the cooperation of the patient, risking a range of objective biases. Therefore, it is particularly important to look for new objective and convenient methods that assist clinicians in their diagnosis of depression. With the development of machine learning and affective sensing technology, we are approaching on the automatic detection of depression using speech by natural language processing. A wide range of features have been explored for the automatic classification of depressed speech.

III. SYSTEM ARCHITECTURE

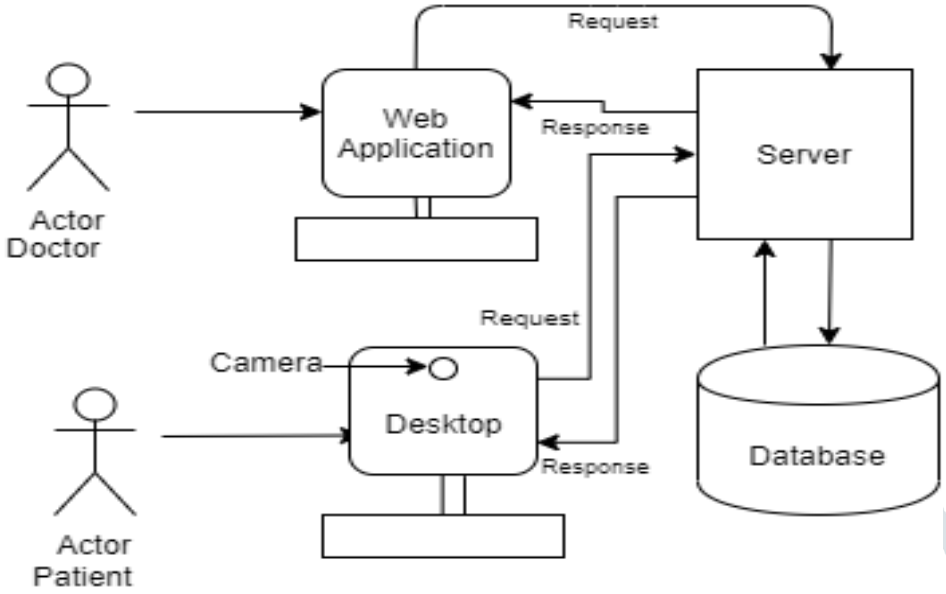

Fig 6.1 System Architecture

The architecture of the system shows two actors Doctor and Patient. Along with them the system consists of a web application for the doctors to access the system and the desktop application for the patient's use. The desktop has a camera which will take the patient's facial images and a microphone to record his voice. The web app and the desktop app are connected to the database via the server. The web app and the desktop app send data to the server where it is processed and this processed data is sent back to the apps as a response to the requests they were sending earlier.

IV. ALGORITHM USED

6.1 Haar-Cascade:

Object Detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones in their paper, "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. Here we will work with face detection. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it. For this, haar features shown in below image are used. They are just like our convolutional kernel. Each feature is a single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black rectangle.

Piece of Code:

```
//Detect Mouth
// it is detected from lower part of cropped face image

CropArea = new Rectangle(0, faceCrop.Height / 2, faceCrop.Width, faceCrop.Height /
2); bmp = new Bitmap(faceCrop.Width, faceCrop.Height / 2);
bmp = faceCrop.Clone(CropArea,
faceCrop.PixelFormat); Image<Bgr, byte> mouthpic =
new Image<Bgr, byte>(bmp);
Image<Gray, byte> grayframemouth = mouthpic.Convert<Gray, byte>();
var mouth2 = grayframemouth.DetectHaarCascade(mouth, 1.4, 4,
        HAAR_DETECTION_TYPE.SCALE_IMAGE |
HAAR_DETECTION_TYPE.FIND_BIGGEST_OBJECT, new Size(grayframemouth.Width / 4, grayframemouth.Height /
4))[0]; foreach (var mou in mouth2)
{
    CropArea = new Rectangle(mou.rect.X, mou.rect.Y, mou.rect.Width, mou.rect.Height);
    MouthImgC = mouthpic.Copy(CropArea);
    pictureBox7.Image = MouthImgC.Bitmap;
}

//detect smile
var smile2 = grayframemouth.DetectHaarCascade(smile, 1.4, 4, HAAR_DETECTION_TYPE.SCALE_IMAGE | HAAR
```

```
{
    smileflag = 1;
```

```
    label2.Text = "Smiling";
    smilecnt++;
}
```

6.2 Naïve Bayes'

It is a classification technique based on Bayes' Theorem with an assumption of independence among predictors. In simple terms, a Naive Bayes classifier assumes Naive Bayes model is easy to build and particularly useful for very large data sets. Along with simplicity, Naive Bayes is known to outperform even highly sophisticated classification methods.

Piece of Code:

```
void recognizer_SpeechRecognized(object sender, SpeechRecognizedEventArgs e)
{
        txtVoice.Text = e.Result.Text;
        DataTable dt = dataset.Tables[1];
        List<Document> _trainCorpus = new List<Document>();
        BayesClassifier.Classifier m_Classifier = new
        BayesClassifier.Classifier(); for (int i = 0; i < dt.Rows.Count; i++)
        {
                _trainCorpus.Add(newDocument(dt.Rows[i]["Type"].ToString(), dt.Rows[i]["Sentence"].ToString()));
                //m_Classifier. (dt.Rows[i]["Name"].ToString(), new System.IO.StreamReader(file));
         }
}
```

V. RESULT EVALUATION

Here doctor will be able to diagnose the patient by referring the generated reports. The web cam will continuously monitor the facial expressions of patient and the speech will be recorded through speech recognition desktop app.

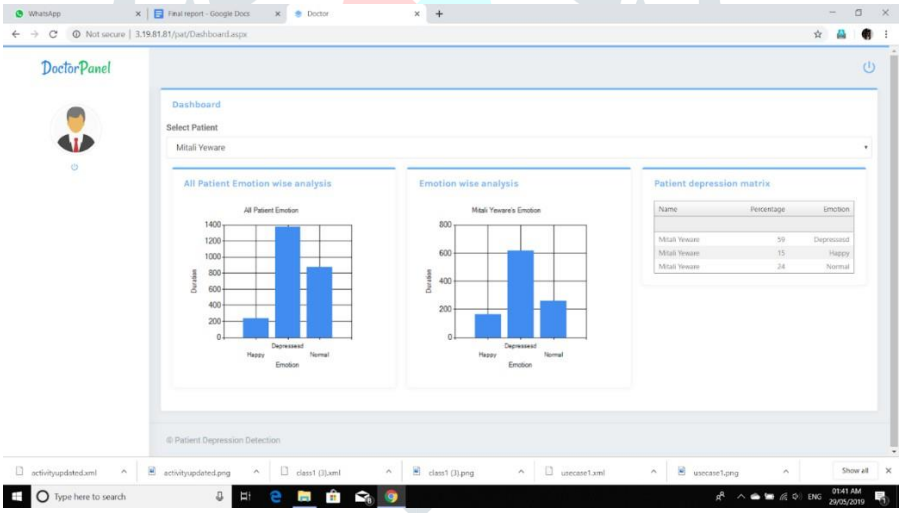

Fig 5.1 Result Analysis

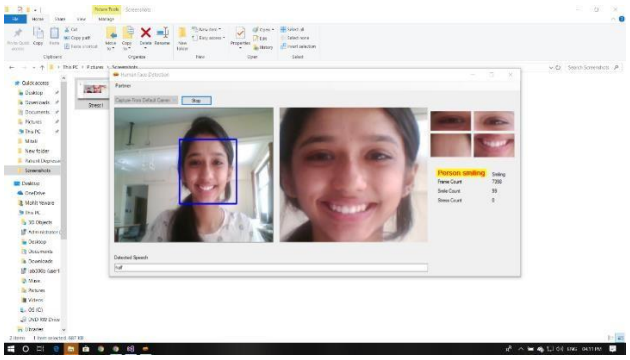

Fig 5.2 Smile State

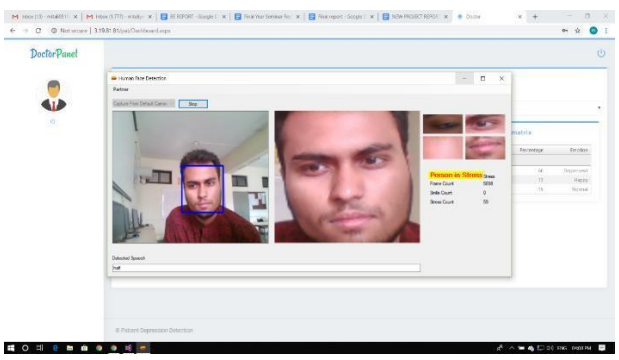

Fig 5.3 Stress State

VI. CONCLUSION

Hence, we conclude that new technologies emerge to solve old problems. Accuracy id speech detection is totally depending on microphone which is used and image processing applies on facial expression to detect the emotions. We need to give good training data set so that system will work efficiently.

Through facial expression detection using image processing and by voice recognition of the patient the system can detect depression which will help the doctor in diagnosis of patient. Our project not only will detect the percentage depression of the patient, but also it will help the doctor to decide the treatment based on depression percentage. Provides convenient methods that assist doctors in their diagnosis of depression. Depression is a severe mental health disorder with high societal costs. Thus, to provide good service to patients and all lives in society. It provides good service to patients and ultimately all lives in society by detecting depression percentage and providing suitable treatment to every patient. In this system, with the help of Image Processing and Facial Recognition algorithm, we are analyzing moods of an employee through a live video and further segmenting it into picture frames.

VII. LITERATURE SURVEY

1. **"Stress and Anxiety Detection using Facial Cues from Videos"**

In this paper Giannakakis, Pediatitis, Monousos, Kazantzaki, Chiarugi and Marias proposed the framework for the detection and analysis of stress, anxiety and emotional states through video-recorded facial cues. In this work, they proposed a model based on the mid-level features of the images that combines the techniques of Active Appearance Models (AAM), Generalized Procrustes Analysis (GPA) and Camera based Photoplethysmography (PPG).

2. **"Emotional Recognition for Various Facial Emotional Extraction"**

In this paper Kalaivani, Sathyapriya, and Anitha proposed the method-ology for the detection and analysis of stress, anxiety and emotional states using Image Pre-processing, Mouth Region Segmentation and Boundary extraction. In this work, they proposed a model based on the mid-level features of the images that combines the techniques of Edge based Segmentation, Morphological Operations and Viola Jones Algorithm.

3. **"Android based health care monitoring system"**

In the earlier methods, the doctors need to be present physically to check the depression. In the earlier case the history of the patient cannot be displayed, only current data is displayed. The application just needs to be installed in the customer site with IT environment. Main purpose of our application is to provide the healthy environment to the patient.

VIII. ACKNOWLEDGMENT

It gives us great pleasure in presenting the preliminary project report on "Depression Detection System". I would like to take this opportunity to thank my internal guide for giving me all the help and guidance I needed. I am really grateful to them for their kind support. Their valuable suggestions were very helpful. I am also grateful to HOD, for his indispensable support and suggestions.

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IX. REFERENCES

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