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Stress Detection in it Professional by Image Processing and Machine Learning

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Abstract: *The design aims to observe the emotion of the IT professionals and assess their stress position using Machine learning and Image processing ways. Stress affects the professionals and their socio- profitable mode and the stress detection systems helps to notice the stress situations and play a major part to reduce it. Automatic discovery of stress minimizes the chance of health problems and enhance the weal of the society. This design is an upgraded interpretation of the old stress detection systems and comprises of live discovery of physical as well as internal stress situations of workers periodically. Stress detection tool is a vital social donation that enhances the approach to life of people. The tools or software that helps in achieving the results always mark significance in the life of professionals. Currently because IT diligence square measure setting a relief peep within the request by transferal new technologies and wares within the request. During this study, the stress situations in staff also are noticed to lift the bar high. Although their square measure several associations United Nations agency give cerebral state connected schemes for his or her staff still the problem is much from operation. This project substantially focuses on managing stress and making the working terrain healthy and robotic for the workers and to get the stylish out of them during working hours*

Key Word: *Image Processing; Face detection; Emotion detection; Deep Neural Networks; Chatterbot.*

I.INTRODUCTION

As World Health Organization (WHO) says, Stress may be a cerebral state problem moving the continuance of one in four choosers. Human stress results in internal likewise as socio- financial issues, lack of translucency in work, poor operating relationship, depression and ultimately commitment of self-murder in severe cases. This demands counselling to be given for the stressed-out people to manage up against stress. Complete stress turning down isn't possible; still preventative manner helps to beat the stress. Presently, solely medical and physiological advisers will substantiate whether or not one is beneath depressed state (stressed) or not. One in every of the normal methodology to notice stress is rested on form.This methodology, hugely depends on the answers given by the people, folks are going to be unsteady to mention whether or not they are fair stressed or traditional. Stress detection is mentioned in varied literatures because it may be a vital social donation that enhances the approach to life of people. Currently because IT diligence square measure setting an auxiliary peep within the request by transferal new technologies and produce within the market. During this study, the stress situations in staff also are noticed to lift the bar high. Although their square measure several associations United Nations agency give mental state associated schemes for their staff still the problem is much from administration.

II.METHODOLOGY

The proposed stress detection system performs based on the analysis of the facial expression. A camera is used to capture the near front sight of the employee while he is working in front of the computer. Captured video is divided into sections of equivalent length and set of similar number of image frames are extracted from each part correspondingly and are examined. The image detection includes the computation of the variation in the place of the eyebrow from its mean position. The displacement of eyebrow from its place is considered by analyzing the image for the eyebrow co-ordinates. If the employee is found stressed in the successive sections of time intervals which was previously divided, it employs the technique of deep learning to decide the stress detection with the obtained results.

The extreme left top of the binary image is scanned by the stress detection module to capture the eyebrow's coordinates. Using the acquired eyebrow co-ordinates, the offline displacement calculation sub-module calculates the shifting of the eyebrow, which is then followed by the variance calculation of the displacement. The classifier sub-module is used to identify the presence of emotion after being trained offline. The level of tension involved is ultimately decided by the coordinated choice of individual frames.

Module Description

The major modules in this project are face detection, facial emotion detection, chatterbot and text emotion detection. Face detection is possible by using caffe model which is based on the single shot multibox detector and use restnet-10 architecture as its backbone.In order to detect facial emotion from the captured face a model called emotion detection is used. This model is trained under mobile net which is designed to be used in mobile applications, and it is TensorFlow's first mobile

computer vision model.

Python's ChatterBot package makes it simple to create automated responses to user input. ChatterBot builds chat bots and automates user discussions by utilising a variety of machine learning algorithms to generate various types of responses.The library saves both the text that was entered by the user and the text that the statement was in response to each time a user submits a statement. The quantity of responses that ChatterBot can provide and the precision of each response in regard to the input statement both grow as it gets more information.The programme chooses the response that comes the closest to matching the input by first looking for the known statement that comes the closest to matching the input, and then selecting a response from the list of known responses to that statement.

The Python module Text2Emotion will let you extract the emotions from the text. It processes any textual data, recognizes the emotion embedded in it, and provides the output in the form of a dictionary. It is well suited with 5 basic emotion categories such as Happy, Angry, Sad, Surprise, and Fear.

Technology

The project is developed using the deep learning technology. The deep neural networks that uses the KNN classifiers help in the emotion detection.

K-NN Classifier: Regression analysis and classification both use K-Nearest Neighbour (KNN). It is a supervised learning algorithm that determines if a person requires treatment or not. The dependent variable is categorised by KNN based on how similar it is to independent variables, which are to a similar instance from the previously collected data. A supervised machine learning algorithm, K-Nearest Neighbours (k-NN) learns from a labelled training set by taking in the training data (X) and its labels (Y), and then learns to map the input (X) to the intended output (Y).Undoubtedly the simplest machine learning algorithm is the k-NN. The model only uses the training data; that is, it learns the whole training set and outputs the class with the majority of the nearest 'k' neighbours determined using some distance metric.

CAFFE Model: Caffe was developed with the goals of scalability, open-source machine learning development, expressive architecture, and seamless community support. Caffe framework's speed, community support, expressive architecture, and flexible code make it a popular choice for developing Deep Learning models. Caffe's face detection algorithm offers a number of benefits, including precise results, multiple face detections, quick processing, enhanced security, etc.

ChatterBot: The conversational dialogue engine Chatterbot was developed in Python and is ML-based. Based on databases of previous talks, it generates answers. It is created to be language-neutral and can train any language. A chatterbot without any training, will never know how to communicate in the beginning. As the user enters a statement, the chatterbot library saves this text and the text for which it got response. The accuracy increases as it receives more text input. Once it is trained, the application chooses the closes matching response for an input text and displays for the user statement.

Deep Neural Networks: Deep learning is one of the machine learning methods based on artificial neural networks. Deep neural networks, Deep belief networks, convolutional neural networks etc. are some of the deep learning architectures applied in the fields such as computer vision, speech recognition, natural language processing, board game programming and medical image analysis. Deep learning uses multiple layers to extract the high-level features from the raw data input. Deep neural networks are feed forward networks that forwards the data from the input layer to the output layer without any loop backs. The training parameters such as size, learning rate and initial weights are to be considered for a DNN.

System Requirements

The requirements for implementing this project is listed below:

Hardware requirements

- Processor : Intel core i3 7th generation
- Computer : 32 bit or 64 bit
- Memory : 4 GB RAM (Minimum)
- Hard disk drive : 500 GB
- Webcamera : 0.9 MP

Software requirements

- Operating System : Microsoft Windows 7 / 8 / 10.
- Platform : Anaconda Navigator
- Coding Language :Python
- IDE : Spyder
- Libraries :ChatterBot, Text2Emotion

Development Methods

The two parts of this project are facial emotion detection from real-time video and the text emotion detection from chat bot. **Real-time Video:** The system reads the real time video feed using camera. OpenCV is used for video capture through webcam. The captured video will be used to detect the faces in the screen. Using the caffe model, face detection is done.For the purpose of face detection, system uses caffe model with tensorflow library. The dataset and caffe model which use the ResNet network for 300x300 dimension images are loaded to dnn object. Once the face is detected, with the help of emotion detection

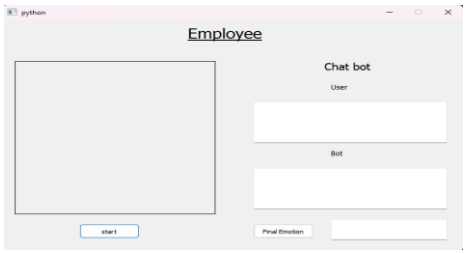
models, the emotion on the face is understood.The tensorflow based model Emotion_Detection.h5 is used as classifier of the emotions. From the library, the text value of the emotion is read and shown as output.

Chatterbot: Using a chatterbot, a set of questions are asked to the user. Based on the answers to those questions, with the help of text2emotion library, the current emotion is detected.Once the UI window is loaded, the chatbot needs to be trained. We use ChatterBotCorpusTrainer() of chatterbot library to do the training. Then we start to read text from user. Based on the training, the responses will be given by the chatbot. The trained chatbot will analyse the message from the user with the help of text2emotion library. Based on the frequency of the emotions, the most detected emotion is displayed as the final emotion.

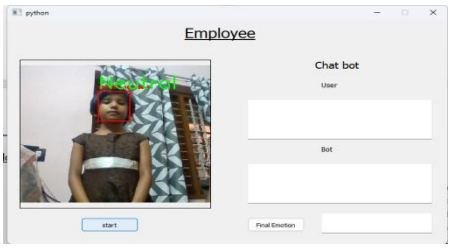
III.RESULT

The system is developed using Python language using Spyder IDE for face detection. The real time video will be analysed to capture the face of the person and a rectangular box will be displayed as the border of the face. With the help of the model EmotionDetection.h5, the emotion of the face will be detected. The current emotion of the user will be displayed above the rectangular box.

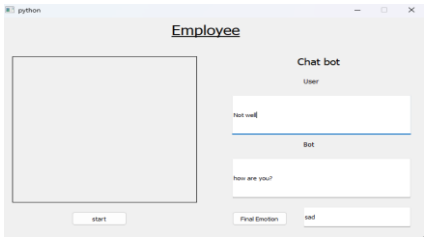
A Chatterbot is also used to get the emotion from the text. A Q&A session will be conducted, and based on the answers, the emotion detection will be done. Various libraries will be used to understand the emotion from text. The emotions will be happy, sad, angry, neutral, fear, surprise etc. Stress Detection System enables employees with coping up with their issues leading to stress by preventative stress management solutions.



The start button below the frame in left side of the window is to start the webcam. The face detection happens as soon as the camera starts. The face will have a red frame and a label indicating the emotion is shown above the frame. Few screenshots showing different emotions are shown below.



The chatterbot shown on the right side of the output window, does a conversation with the user and recognizes the emotion from the text. When we click the final emotion, the overall emotion of the conversation will be shown.



IV.CONCLUSION

For many professions, work-related stress is frequent. Although some degree of stress is a typical aspect of the job, excessive stress or high levels of stress over an extended period of time can seriously harm a person's physical and mental health. Being conscious of your own levels of stress as a worker is already a crucial step in the direction of disease prevention and increased productivity. By connecting stress patterns to daily activities, our method can help people become more aware of the development and causes of their stress.

When the authenticated user logs in for this project, a video is automatically captured based on a set time interval. The user's stress is determined from the captured images using certain standard conversion and image processing techniques. The device will then analyse the stress levels using machine learning techniques to produce more effective results. The application also contains a chat bot, which analyses the conversation with the user and observe the emotions of the text to determine the stress level.

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