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STRESS DETECTION IN IT PROFESSIONALS

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ABSTRACT

The main aim of this paper is to determine stress in IT employees based on the facial expressions. By leveraging facial expressions captured through the system camera, emotions and moods of users can be detected. Through the system camera, these expressions may be exported from a live stream. In the areas of computer vision and machine learning (ML), where robots are trained to recognize a wide range of emotions or lethal emotions, there are numerous investigations now underway. Understanding machines opens up creative approaches to spot lethal feelings. Using Convolutional Neural Network (CNN) models with Keras is a comparable strategy. Music and mortality are strongly related concepts. Our suggested system develops an emotion-based music player that conducts in-the-moment emotion detection and plays YouTube songs in accordance with the discovered emotion. It takes input in the form of image and gives output in the form of emotion and suitable song is played directly from the YouTube depending on the emotion. Stress of the IT employees are determined in the form of the facial emotions like happy, sad, anger, surprise etc and a song from the you tube is played based on the users emotion. User's pleasure is one of the key advantages of integrating emotion detection. The music player can effectively read the user's emotional state thanks to the real-time emotion detection features, creating a more engaging and personalized music experience.

Keywords — Machine learning, Convolutional Neural Network(CNN) , Keras.

1. INTRODUCTION

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A general classification of human emotions includes: fear, contempt, rage, surprise, sadness, happiness, and neutrality. This category of emotions can include a wide range of other feelings, including scorn (which is a variety of disgust) and cheerful (which is a variation of glad). These feelings are quite understated. Very little facial muscle movement occurs, making it difficult to distinguish between variations because even a minor variation might cause a change in expression.Stress is detected in the form of the emotions. Many it professionals sufferfrom a stress disorder due to their continuous work which is full of tensions.

Music plays an key role to keep people stress free, means of mood regulation, to change their moods from sad to happy , to overcome from the depression. Additionally,as emotions are highly context-dependent, various people's displays of the same emotion may differ, even across the same person. Even if the lips and eyes, which show the most emotion, are the only parts of the face that receive attention, how these gestures are extracted and classified is still a crucial issue. For these tasks, neural networks and machine learning have been applied with positive results. People frequently utilize music as a tool for mood control, specifically to lift their spirits, boost their energy, or soothe tension and stress.

Additionally, listening to the appropriate music at the appropriate moment may enhance mental wellness and helps us to getrelief from the mental stress. Therefore, music and human emotions are closely related to each other. Only the fixed songs that are already part of the dataset and won'tbe particularly useful to the user in the near future will be played under the current system. Any songs that need to be added manually must be included to the dataset. Therefore, it remains a manual project.

We therefore developed a model that will beuseful in the coming days. We will use YouTube site URLs rather than the dataset to obtain the songs based on the related expression. The songs could be the most recent, popular, seen, or liked music, among other categories. So, while returning a good music, it can be useful for the user's emotional song. We are utilising Keras and Convolutional Neural Network to identify the emotion.

A convolutional neural network is a deep learning architecture that can take in aninput image, rank various features and objects within the image, and distinguish between them. CNNs are a subclass of Deep Neural Networks that are frequently used for visual image analysis. CNNs can identify and categorise features from images. Their uses include natural language processing, image

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categorization, image analysis for medical purposes, and image and video recognition. It has a number of layers, including fullyconnected, convolutional, and groupinglayers. To extract features from the input image, convolutional layers apply filters. To reduce computation, Clustering layers down sample the image. Fully connected layers create the final predections. In the current existing system there are many flaws like inclusion of unnecessary features, limited song selection, unable to overcome negative emotions, manual data set updates, privacy concerns etc. So the existing system require some changes and updates which can be discussed in this paper.

2. LITERATURE SURVEY

Numerous music players have been created with capabilities like fast forward, reverse, variable playback speed (seek and time compression), local playback, and streaming playback with multicast streamsas a result of the ever-increasingimprovements in multimedia and technology. The user still has to manually browse through the playlist of songs to choose songs based on his current mood and behaviour, even though these functions serve his fundamental needs.

2.1 Detection and recognition of text fromnatural processing language

Authors: Dhruvi D., Prof Hardik S. Jayswal,and Gosai Himangini J. Gohil

Publication: November, 2018

https://ieeexplore.ieee.org/document/8884205

Summary: Natural language processing (NLP) is discussed in this article as a method for extracting emotions and recognition from text. It emphasises how difficult it is to effectively discern emotions from writing as opposed to face expressions. The classification of emotions including happiness, sadness, surprise.

2.2 Facial expression based music playerreview

Authors: Preema J.S, RajaShree , Sahana M,Savitri H, Shruthi S.J

Publication: 2018

https://www.ijert.org/review-on-facial-expression-based- music-player

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Summary: Researchers in this subject are interested in creating methods to decipher facial expressions utilising Viola-Jones and multiclass SVM (Support Vector Machine).

2.3 An Image Edge Computing and Convolutional Neural Network approach in to Face Emotion Recognition

Authors: Mamoun Alazab and AlirezaJolfaei. Publication: October, 2019

https://ieeexplore.ieee.org/document/8884205

Summary: In order to understand facial expressions more accurately than the method employing natural language processing, researchers in this subject areinterested in creating algorithms that use CNN and image edge computing.

2.4 Deep learning for facial expressionrecognition

Authors: Wafa Mellouk Publication: August, 2020

Summary: This paper provides in creating methods to decipher, encode, and extract these characteristics from facialexpressions in order to improve computer prediction. Deep learning has been remarkably successful and its various architectures are now being used to improve performance.

2.5 Using CNN and keras forrecognition of facial expressions.

Authors: Ashish AdholiyaPublication: January,2021

https://bbrc.in/wpcontent/uploads/2021/05/BBRC_Vol14_No_05_Special- Issue_10.pdf

Summary: The development of a deep convolutional neural network model utilising tf.keras to create and train a deep learning model is detailed in this study. Using open CV and one of its classifiersfor creating the border box around the face to detect the right expression, the goal is to categorise facial images into one of theseven face detection classifiers.

2.6 Emotion Recognition based MusicPlayer

Authors: T V Rashma, Sheena KPublication: 2021

https://ijisrt.com/assets/upload/files/IJISRT21MAR268.pdf

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Summary: The development of methods to interpret the Music Play system based on facial expression detection using CNN is of interest to researchers in this sector. Thesong will play using the method described here. The dataset includes the playlist.

2.7 Facial Emotion Detection andRecognition

Authors: Radhey ShyamPublication: 2022

Summary: facial expressions using CNN. In this model, they employed multiple datasets, with 70% of the data being used for training and the remaining 30% being used for testing giving the model highly accurate results when compared to other models.

3. EXISTING SYSTEM

There are numerous techniques for recognising Stress through emotions in existing systems. SVM [Support Vector Machines], PCA [Principal Component Analysis], LDA [Linear Discriminant Analysis], Kernel techniques, CNN [Conventional Neural Network], Viola Jonesalgorithm, etc. are utilised in the detection of emotions. The biggest drawback of the current approach is that it occasionally detects all the unneeded objects that are not intended for emotion detection. The song will play from the suggested playlist from their dataset and/or from the PyQt5 package when the emotion has been detected. The dataset has to be updated in order to include the most recent songs that the user will find useful.

One of the main drawbacks of the current system is that there are no override emotions like melancholy in it, and sometimes it takesa while to build the playlist after detecting the emotion. To update the dataset under thecurrent system, the user must perform manual effort.

3.1 LIMITATIONS OF SYSTEM

The Inclusion of UnnecessaryFeatures: The current systems mayidentify unimportant details or componentsthat are unrelated to emotion recognition, producing unreliable results. This mayaffect how accurately and consistentlypeople can recognise emotions.

Limited Song Selection: For music selection, the current algorithms frequentlyuse pre-existing datasets or small song libraries. This limits the users' access to a wide selection of new music

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options.Manually updating the dataset necessitates human involvement and work.

Unable to overcome Negative Emotions: Some current systems do not successfully deal with negative emotions like sadness. The system's capacity to offer suitable music selections that can improve the user's mood in such emotional states is therefore limited.

Generation of time consuming play list: Playlist generation can be time- consuming in the current systems because it must be done after the user's emotions have been identified. Users may become dissatisfied as a result of this delay, which might obstruct the music experience's natural flow.

Calculation time: Current systems may take a while to perform the calculations necessary for emotion recognition and music selection, which causes delays in real-time recommendations. The responsiveness of the system and the user experience may be impacted.

Dependence on manual dataset updates: To update the dataset with the newest songs, the existing systems frequently need manual input from users. This manual process can be laborious and may leave only a small or out-of-date selection of music.

Privacy concerns: The system highlights the need for strong data security measures by storing and controlling the user's facial data as well as other personal information. To prevent unauthorised access, data breaches, or the misuse of personal information, adequate security measures must be in place.

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4. PROPOSED SYSTEM

The Proposed system makes it easier for us to depict how the user and the music interact. The system's goal is to use the camera to accurately capture the face. a convolutional neural network that forecasts emotions based on inputs or visuals that have been collected. After obtaining the feeling, the song will be pulled from the YouTube website based on the emotion. The following music will play based on the feeling if it appears repeatedly. We don't use any music dataset in this.by using this procedure we can detect stress in IT professionals in the form of the emotions and corresponding song is played from youtube which helps the user to overcomes from stress and sadness.

4.1 ADVANTAGES OF PROPOSED SYSTEM

If same emotion is detected for second time different song will play from the you tube which is different from the previous one.

Overcome from stress and sadness: It will play a song which helps to overcome from stress and sadness.

Automatic music player: The music will play automatically from the you tube.

Stress Detection and relief: Stress can be determined with the help of the emotion detection and appropriate song that is played from the YouTube relieves from the stress by listening to music.

Customized Music Choice: The technology effectively predicts the user's emotions in real-time by utilising facial expression detection. This makes it possible to choose music more specifically based on the emotions that are being identified, ensuring that the music matches the user's tastes and present mood.

No Reliance on Music Datasets: The suggested system uses real-time emotion recognition to choose music from YouTube, in contrast to conventional music recommendation systems that depend on pre-existing music datasets. Without the necessity for a specific music dataset, this enables a more flexible and varied music collection.

Emotion Recognition in Real Time: Based on the visual inputs that the camera collects, the

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system forecasts emotions using a convolutional neural network. This enables quick and precise emotion recognition, guaranteeing that the music played is appropriate for the user's emotional state at that particular time.

5. SYSTEM ARCHITECTURE

System model as shown in the figure 1 adopts the image capture through live streaming captured through the web cam. The process entails detection of stress based on the emotion and playing a suitable song according to the emotions.

The components of Architecture Diagramare:

Live image capturing: Live image capture entails accessing the camera feedand obtaining frames in real-time. This may be performed using the cv2.VideoCapture() function from OpenCV. By initializing the video capture object and repeatedly reading frames from the camera, you may constructa loop that captures live video.

Face detection: A machine learning-basedtechnique known as Haar Cascade can be used to find faces in the captured frames. A Haar Cascade classifier designed for facedetection is included in OpenCV. Using the detectMultiScale() method, you may apply the pre-trained cascade classifier to each frame to identify faces after loading it using cv2.CascadeClassifier().

Applying CNN for Facial Expression Detection: A Convolutional Neural Network is a Deep Learning algorithm that can take in an input image, rank the relevance of distinct items inside the image, and distinguish between them. Utilising the probabilities for each of the seven classes, the output is produced. The anticipated classis the one that has the greatest likelihood. The sentiment of the taken image will most likely be the class with the highest likelihood.

Playing emotion related song from youtube:

a. Create a playlist or song that corresponds to each emotion that is identified. You could, for instance, develop a dictionary where the word "happy" is linked to the URL or ID of a YouTube video or playlist ofupbeat music.

b. As the frames are analysed, keep note ofthe emotions that were recognised. You can use the emotion that was detected to choosea song if it persists for a predetermined amount of time.

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c. Determine whether the newly discovered emotion differs from the one that was previously discovered. Retrieve the playlistor song URL from your mapping if it is different.

d. Based on the obtained URL or ID, use the YouTube APIs or appropriate libraries to search for and play the requested song or playlist. There are Python libraries that can be used to download or play YouTube videos, such as pytube Play the chosen music using the proper player or library.

A camera is utilized to record live video of the user. The images are extracted is recorded using a module called CV2 (Open CV), which is used for computer vision. The user's face is the object that the real- time object identification method Haar Cascade finds in the photos that the CV2 module has retrieved. After recognizing the objects in the pictures, Convolutional Neural Network is used to identify the emotions on the faces .The emotion that was detected can be associated with one of the following feelings: happy, sad, surprised, neutral, fearful, disgusted, or angry. These feelings typically take the shape of strings. For these terms, we add additional words like "mood latest songs in telugu" to createa searchable sentence. Then songs from the YouTube website will play. The following song will play if the same emotion keeps occurring repeatedly and is different from the previous song.

Description of Algorithm: Here we haveused CNN algorithm

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning method that can take in an input image, give priority to distinct characteristics and objects in the image, and distinguish one from the other. CNNs are a subclass of Deep Neural Networks that are frequently used for visual image analysis. CNNs can identify and categorise features from images. Their uses include medical image analysis, image classification, video and image recognition, computer vision, and natural language processing. CNN uses the term "convolution" to refer to a mathematical procedure where two functions are multiplied to create a third function that expresses how the shape of one function is changed by the other.In plain terms, two matrices-capable photos are multiplied to provide an output that is utilised to extract features from the image. Convolutional neural networks differ from conventional neural networks by performing better with inputs such as images, speech, or audio signals.

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• **Inside Convolutional neural networks:** Deep learning techniques rely heavily on artificial neural networks (ANNs). Recurrent neural networks (RNNs), which take input in the form of sequential or time series data, are one type of ANN. It is appropriate for applications involving speech recognition, language translation, image captioning, and natural language processing (NLP).

Another neural network that can find important information in both time series and picture data is the CNN. It is therefore very useful for image-related tasks including pattern recognition, object categorization, and image identification. A CNN uses concepts from linear algebra, such as matrix multiplication, to find patterns in an image. CNNs may also categorise signal and audio data.The structure of a CNN is comparable to the connection structure of the human brain. Similar to how the brain has billions of neurons, CNNs also have neurons, but they are structured differently. In actuality, a CNN's neurons are set up similarly to the frontal lobe of the brain, which processes visual stimuli. This configuration guaranteesthat the full visual field is covered, avoiding the issue with typical neural networks'piecemeal image processing that requires images to be given to them in low-resolution chunks. A CNN performs better with image inputs and voice or audio signal inputs compared to the earlier networks.

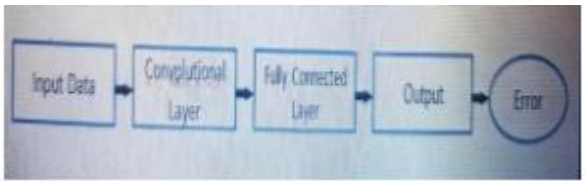

Fig 2: Layers of CNN

Three layers make up a deep learning CNN: a convolutional layer, a pooling layer, and a fully connected (FC) layer. Convolutional layer comes first, followed by FC layer. The complexity of the CNN grows from the convolutional layer to the FC layer.

Layer of Convolution: The Convolutional layer, the central building block of a CNN,is where most computations take place.Afterthe first convolutional layer, another one canbe added. A kernel or filter inside this layer moves over the image's receptive fields during the convolution process to determine whether a feature is present.The kernel traverses the entire image over a number of iterations. A dotproduct between the input pixels and the filter is computed at the endof each iteration. The result of connecting all the dots is a feature map or convolved feature. In this layer,

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the image is ultimately transformed into numerical values, enabling CNN to analyse the image and extract pertinent patterns from it.

• Pooling layer: The pooling layer sweeps a kernelor filter across the input image similarly to the convolutional layer. The pooling layer, in contrast to the convolutional layer, minimises the number of input parameters and causes some information loss. Positively, this layer lessens complexity and increases the effectiveness of the CNN. It has two poolingoperations, they are

Max Pooling: Max pooling is the most popular kind of pooling. The maximum value is chosen and kept within a pooling window (often 2x2 or 3x3), while the remaining numbers are deleted. This aids in capturing each window's most salientaspects.

Average pooling: It computes the average value within each window rather than the maximum. This may be advantageous in circumstances when maintaining averagevalues is sought.

Fully connected layer: Using the features extracted from the preceding layers, picture categorization in the CNN takes place in the FClayer. Fully connected here indicates that every activation unit or node of the subsequent layer is connected to every input or node from the preceding layer.

Forward propagation: The process of receiving input data, processing it, andproducing an output.

Backward propagation: Calculate errorsand update the network's parameters .

CNN does not have all of its levels fully connected since doing so would make the network unreasonably dense.

6. IMPLEMENTATION

6.1 Image Capturing:

In this project, photos are captured using awebcam.

6.1.1 Preprocessing of Image

The Acquired Image is first processed usingOpen CV's Haar Cascade classifier.

6.2 CNN model

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A Convolutional Neural Network is a Deep Learning algorithm that can take in an input image, rank the relevance of distinct items inside the image, and distinguish between them. Utilising the probabilitiesfor each of the seven classes, the output is produced.
The anticipated class is the one that has the greatest likelihood.The sentiment of the taken image will most likely be the class with the highest likelihood.

6.3. Playback of music

6.3.1 How can the music be played?

The emotion is identified and then matched to one of the terms below. Surprise, Joy, Sadness, Angry, Neutral. These feelings typically take the shape of strings. For these terms, we add other words like "mood latest songs in telugu" to create a searchable sentence. An example would be "happy mood latestsongs in telugu" if the word "happy" was identified.

6.3.2 Creating YouTube links for searches

The following URL is produced when wesearch for

anything on YouTube: Search results for "sequence ofwords" can be found at www.youtube.com.

For instance, if "happy mood songs in telugu" is the search term, the link to be accessed is https://www.youtube.com/results?search_query=happy+mood+songs+in+telugu

6.3.3 Obtaining Videos

Once the YouTube link has been created, it may be searched. Each video on YouTube has a distinct id, which is preceded by the string "watch?v". So, using Python's regularexpression module, we can locate them. Theoutcomes are given back as a list

6.3.4 Music Playing

By using the ID of the first video, we can create a link to play the video. The followingwill be the link to the YouTube video http://www.youtube.com/watch?v=<

video id

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6.3.5 Combining Music player andregular expression:

In order for the deep learning model to recognise the mood, we must first capture the image. When searching YouTube, we use that phrase. Get a list of the video IDs after searching. Play the opening music for aset amount of time. After that, stop the video and take another picture. The next song from the list of video ids will be played if the expression is the same as the previous one. If the expression is different from the last one, the first song from the appropriate mood video will be played

7. OUTPUT SCREENS

CASE 1 : Recognition of "Happy" emotionand playing a suitable song from You tube.

Input: Detection Happy emotion

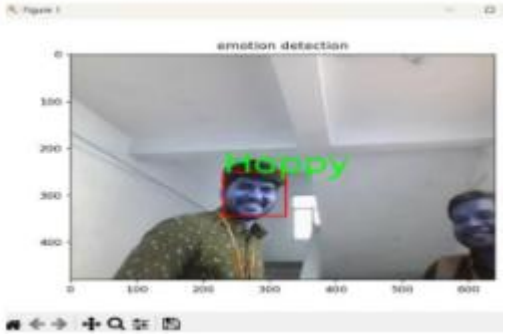

Fig 3: Happy Emotion

Output: Played an happy song from youtube.

Fig 4: Happy song from you tube.

CASE 2 : Recognition of happy emotion second time and playing a song from youtube

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according to the mood which is different from the previous song.

Input: Recognition of happy emotion for second time.

Fig 5: detection of happy emotion 2nd time

Output: Played a different song from youtube compared to the previous song.

Fig 6: Happy song from you tube.

CASE 3: Recognition of "Sad" emotion and playing suitable sad song.

Input: Recognition of sad emotion.

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Fig: 7 sad emotion.

Output: Played sad song from the you tube

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Fig: 8 Sadness overcome song from you tube.

Case 4: Recognition of neutral emotion (no expression).if Neutral emotion is recognizedyou tube won't play any songs.

Input: Neutral emotion is recognized.

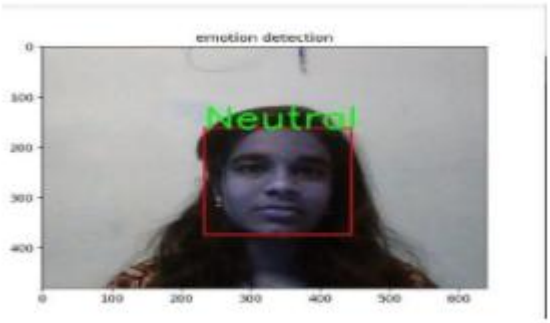

Fig: 9 Recognition of Neutral emotion

Output: You tube won't play any song.

Case 5: Recognition of surprise emotion andplaying a suitable song from You tube.

Input: Recognition of surprise emotion.

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Fig: 10 Surprise emotion.

Output: Playing of surprise song from youtube.

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Fig 11: Surprise related songs from you tube.

8. CONCLUSION

In conclusion, human face expressions— such as joyful, sad, shocked, furious, and neutral—are classified using convolutional neural networks. Using a webcam to capture photos and Open CV's Haar Cascade Classifier to process them, real-time expression recognition is also possible. Finally, a high accuracy and recognition rate.Music from YouTube is played using the YouTube site. Users stress can be identified in the form of the emotions and images are captured via live stream and recognized in the rectangular boxes and then emotion is detected and relatable song from the you tube is played directly based on the emotions. Stress is detected in the form of the emotions and corresponding song according to the emotion is directly played from the you tube.

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