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Mood-Up: Emotion Based Recommendation System with Face and Speech Recognition

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Abstract
Mood-Up is an emotion detection system that identifies the current mood of the user and attempts to modify/alter the mood by giving the user some things to do based on the recognized emotion. The project aims to build a system that would try to give the users emotion-based recommendations that would help them light up their mood for good. HAAR feature-based cascade classifiers have been used along with OpenCV in Python to recognize faces and evaluate expressions and mood. The face detection is done using the HAAR Cascades. The core to the program is the recommendation system. It is a simple conditional system that would use the different emotions as keywords to present user with various options he/she can choose. The system recognizes if the user is sad, angry or happy and based on the classification, the recommendation system presents options. The idea behind Mood-Up is to help the user and change his mood for good and therefore the system is made very interactive. The use of Pyttsx module allows the program to talk to the user interactively. To make it interactive on both sides, Mood-Up utilizes the power of speech recognition and eliminates typing process completely. Everything the user needs to give in as input or the choices he/she makes are all voice oriented. The program identifies what the user is saying and proceeds with the recommendations.

Keywords: Mood detection; Face Recognition; HAAR-Classifier; OpenCV; HCI (Human Computer Interaction); Artificial Intelligence

1. Introduction
The main purpose of the project proposed in this paper is basically to detect the emotion that a human is feeling based on a picture and coming up with a solution to help make the person feel better if they were in a negative mood and if in a positive one how to enhance that same. To begin with, emotion of the face is detected with HAAR classifiers. Detection performed in real time of face and interpreting different facial expressions of happiness, anger or aggression, sadness, fear, surprise etc. is based on facial characteristics and their activities. The essential features of face are studied for detection of face and expectation of expressions or emotions of face. To determine the various facial expressions, the alterations in each facial characteristic are used. For detection and classification of distinct classes of facial expressions, machine learning algorithms are used by training of distinct set of pictures. The proposed algorithm employs open source computer vision (OpenCV) and Machine learning using python.

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Figure 1: Step Model of Project

What the project requires is a large database of different faces depicting different emotions. The project makes use of its own database with thousands of images and organized them in a folder named dataset within there are 7 different subfolders (that are going to be your several classes) named anger, disgust, fear, happy, neutral, sad, surprise and other emotions which contains the images of a particular expression. To perform this task, we must find the face on each image, convert it to grayscale, cut and then save the picture to the dataset. HAAR filter from OpenCV has been used to automate face finding. A HAAR Cascade is fundamentally a classifier which is used to detect the object for which it has been trained for, from the source. The manner in which the exercise is done by HAAR Cascade is by superimposing the positive image over a few negative images. The training is generally done on a server and on a variety of stages. To obtain better results one must use high-level value images and increasing the amount of stages for which the classifier is skilled. OpenCV provides a training method or pre-trained models. After the emotion has been detected using the above-mentioned method, we try to talk to the subject. Based on the inference made on the emotion felt, we pose a few things to do for the subject to find out the We find the keywords in the responses from the subject that are mapped in the pre-defined list that we have created. The list helps us provide accurate solutions to the subject's emotion. Suppose a keyword "angry" or "failure" or "rejection" is come across, the system will understand it and provide options for motivational quotes or songs that will help lift the mood of the person. At the moment we are focusing on emotion detection based on HAAR classifiers and we are narrowing our focus down to the 3 main emotions namely "Happiness", "Sadness" and "Anger"

2. Related Work

[1] Daniela Girardi, Filippo Lanubile, Nicole Novielli. (2017).Emotion Detection Using Noninvasive Low Cost Sensors. University of Bari, Aldo Moro"d. This exploration paper plans to discover in the event that it is conceivable to dependably perceive passionate valence and excitement by utilizing non obtrusive ease sensors (EEG, GSR, and EMG) with the goal that these sensors could gather biometrics. With the assistance of music recordings from the DEAP multimodal dataset, they could effectively land at the end. They could successfully achieve a portrayal execution commensurate to the results nitty gritty in the main assessment that we deficiently copy here, even in a cross-subject course of action setting that forgoes the prerequisite for individual planning and tuning of collection models. Existing systems generally speaking grasp multi-terminals sensors that could be expensive or clumsy to be used, everything considered, conditions. In this assessment, they investigate whether they can reliably see high versus low energetic valence and energy by relying upon non intrusive straightforwardness sensors. Biomedical apparatus compartments are also used for getting mental measures from various sensors. Cerebrum related measures, for instance, electroencephalography (EEG) and skin-related measures, for instance, galvanic skin response (GSR) and electromyography (EMG) are among the most notable and extensively grasped physiological measures for impact acknowledgment, in like manner in mix with heartbeat, blood volume, and breath estimations. They found that the fringe sensor setting of the primary assessment furthermore included idea of features got from breath, blood weight and eye glimmering rate in blend in with GSR and EMG. Their models were prepared to consider features isolated from the signs recorded for all of the subjects included. This makes their technique sensible and energetic concerning target application circumstance, patients with debilitated movability and wisdom, for which getting ready and aligning classifiers are not attainable. Looking at between the three sensors (EMG, EEG, GSR), the commitment of EMG is immaterial in both energy and valence acknowledgment. This is on the other hand with past evidence prescribing that the insightful force of EMG reduces when anodes are determined to the arm rather than over the

face, as in past assessments. They have at long last landed at the end that feeling acknowledgment with minimal effort noninvasive sensors produce results better in contrast with costly and obtrusive sensors.

[2] Ajay B, Anirudh C, Karthik Joshi, Keshava B, Mrs. Asha.(2017).Emotion detection using machine learning. Department of Information Science and Engineering, NIE Institute of Technology, Mysore, Karnataka, India. In this examination paper, they use the TensorFlow library and the Inception exhibition and apply trade learning for a particular dataset to retrain the model. They at that point separate the facial emotions, for example, delight, issue, shock and wonder. The structure can separate only the photos it is set up for essentially like individuals, seeing something they have never watched and thus they won't have the ability to remember it. It will describe the photos in the loads of rate. They actualized Tensor Board overviews to make it more straightforward to grasp, examine, and update the retraining. They could then think of chart and estimations, for instance, how the loads or precision varied in the midst of planning. The task of feeling affirmation is particularly inconvenient for two reasons: (1) There doesn't exist a far reaching database of getting ready pictures and (2) orchestrating sentiments can be problematic depending upon whether the information picture is static or in an advancement plot into an outward appearance. The last issue is particularly inconvenient for nonstop recognizable proof where outward appearances change dynamically. Subsequently they intend to actualize this progressively applications in the field of medication, showcasing and diversion.
[3] Prof. D.S.Thosar, Varsha Gothe, Priyanka Bhorkade, Varsha Sanap.(2018). Review on Mood Detection using Image Processing and Chatbot using Artificial Intelligence. PRES"s SVIT, Nasik, Maharashtra, India. The proposed structure will display chatbot which is just a PC program. The discourse by methods for sound-related or abstract procedures is coordinated by this PC program which nothing other than chatbot. The bot converses with individual so it never impacts individual to understand that it's extremely the PC that is the opposite end user. There will be a customized interface for jokes and tunes as indicated by the customers' perspective. The system will be prepared to perceive pressure and on recognizing the constrain some inspirational proclamations to show up on the screen. What's more, besides structure will prepared to give a couple interfaces with site pages of inspirational talk. The data give by system will bolster the perspective which impact the customer to work successfully to and prompts overhaul in execution. The count and progressions which were used in proposed system will be HAAR course figuring and man-made thinking. The aura will be distinguished on outward appearance premise by picture getting ready using HAAR course figuring. Execution of delegates' working in MNCs can be watched using the proposed system. The system will give the Company's HR to screen the particular laborer's a chance to attitude and, on that reason, prepared to picks its execution. The proposed structure can be particularly useful in making pie traces, reference outline, etc. upon specialist examination result. Mentality will plainly impact the work in positive and moreover negative manner and changes in work can be resolved with the help of specialist examination result. Using the proposed system, the customer and chairman structure for control can similarly be delivered.

[4] Paweł Tarnowski, Marcin Kołodziej, Andrzej Majkowski, Remigiusz J. Rak.(2017). Emotion recognition using facial expressions. Warsaw University of Technology, Warsaw, Poland. In this examination paper ,they have shown the results of affirmation of seven energetic states (impartial, joy, hopelessness, surprise, shock, dread, sicken) considering outward appearances. Coefficients delineating segments of outward appearances, enrolled for six subjects, were used as features. The features have been figured for three-dimensional face appear. The gathering of features was performed using k-NN classifier and MLP neural framework. Their result was gotten for MLP classifier and "typical" division of data for all customers (without subject). Tests were finished under comparative conditions and at a settled situation of a customer in association with the Kinect unit. Certainly, the request accuracy was influenced by the way where customers play specific outward appearances, Microsoft Kinect was utilized for 3D stand up to showing transcendently because of its ease and straightforwardness of errand. Kinect has small separating objectives, yet a by and large high pace of picture enrolling. It has an infrared maker and two cameras. One of the cameras record indisputable light, while

substitute works in infrared and is used for evaluating the profound. Infrared shafts reflected from the customer's body grant making a 3D model of a face.

[5] Spiros V. Ioannou, Amaryllis T. Raouzaiou, Vasilis A. Tzouvaras, Theofilos P. Mailis, Kostas C. Karpouzis, Stefanos D. Kollias.(2005). Emotion recognition through facial expression analysis based on a neurofuzzy network. Image, Video and Multimedia Systems Laboratory, National Technical University of Athens, Zografou 15773, Greece, School of Electrical and Computer Engineering. This paper delineates a feeling acknowledgment system, which joins mental revelations about feeling depiction with assessment and evaluation of outward appearances. The execution of the proposed structure has been inquired about with preliminary real data. Even more especially, a neurofuzzy run-based structure has been first made and used to mastermind outward appearances using an endless 2D feeling space, getting high rates in portrayal and clustering of data to quadrants of the inclination depiction space. To improve these rates for a specific customer, the fundamental course of action of rules that got them from the previous data was then balanced through a learning technique of the neurofuzzy structure, so as to get unique expressivity cases. Anyway, they plan on extending the framework subject to joined facial and movement assessment. These can give the best approach to make systems that merge examination and association of outward appearances, for giving progressively expressive and welcoming affiliations. Furthermore, progression of administer based framework affirmation gives the probability to solidify the results procured inside the arrangement of the ERMIS adventure with current learning advancements, for example in executing a MPEG-4 visual way of thinking for framework system.

[6] Sevinc Kurt, Kelechi Kingsley Osueke. (2014). The Effects of Color on the Moods of College Students. Cyprus International University, Nicosia Zedrock and Herman Architecture, Delta State, Nigeria. This assessment intends to locate the psychological effects of tints on individuals, using the understudies' affiliation complex in a school grounds. This structure was picked as a result of its sumptuousness in concealing variances. The investigation strategy is study, and surveys were pulled in up and appropriated to an even extent of understudies, including both all inclusive and neighborhood understudies; student and graduate. Studies have been assembled and separated to find the effects particular tints had on understudies' perspectives in different spaces of the understudies' affiliation complex. This investigation would add to see progressively about tones and how they impact our slants and thusly to choose better decisions and augmentation the usage of spaces while picking tints for different spaces to suit the purpose behind which they are arranged.

[7] Dhwani Mehta, Mohammad Faridul Haque Siddiqui, and Ahmad Y. Javaid. (2018). Facial Emotion Recognition: A Survey and Real-World User Experiences in Mixed Reality. Multidisciplinary Digital Publishing Institute (MDPI) Extensive possibilities of applications have made emotion recognition ineluctable and challenging in the field of computer science. The usage of non-verbal prompts, for instance, signals, body improvement, and outward appearances pass on the tendency and the contribution to the customer. This control of Human Computer Interaction places reliance on the algorithmic quality and the affectability of the sensor to improve the affirmation. Sensors accept a basic occupation in definite area by giving an stunning data, from now on growing the capability and the faithful nature of the system. Customized affirmation of human emotions would help in demonstrating social information in the machines. This paper shows a brief examination of the various procedures and the frameworks of feeling affirmation. The investigation covers a smaller review of the databases that are considered as instructive assortments for computations recognizing the emotions by outward appearances. A short time later, mixed reality device Microsoft HoloLens (MHL) is introduced for watching feeling affirmation in Augmented Reality (AR). A short introduction of its sensors, their application in feeling affirmation and some key outcomes of feeling affirmation using MHL are shown. The paper by then closes by taking a gander at eventual outcomes of feeling affirmation by the MHL and a predictable webcam.

[8] Paul Viola, Michael Jones (2001). Rapid Object Detection using a Boosted Cascade of Simple Features. Mitsubishi Electric Research Labs Compaq CRL 201 Broadway, 8th FL One Cambridge Center Cambridge,

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MA 02142. The paper depicts visual item identification which will enable us to process pictures truly and accomplish high location rates. A prologue to another picture portrayal known as the "Fundamental Image" which lets the detector‟s highlights to be resolved rapidly. There exists a learning calculation, in view of AdaBoost, this works by grabbing scarcely any basic visual highlights from a bigger set and delivers very proficient classifiers. Finally a strategy for consolidating continuously progressively complex classifiers in a "course" which grants foundation locales of the picture to be immediately dismissed while it spends more calculation on competent item like areas. The course has the ability that gives the item explicit focal point of-consideration component which gives factual confirmations that disposed of locales are unlikely to contain the object of intrigue. In the face location area, the framework yields recognition rates that are tantamount to the best framework utilized beforehand. The classifier when utilized continuously applications works at 15 casings for each second without falling back on any picture differencing or skin shading recognition

3. Methodology

The project started with the face detection prototype first. Making the program detect the face of the user was the initial step. On successfully achieving the expected result, we realized that we were unable to give a total arrangement of use targets, detailed input, processing, or yield prerequisites in the underlying stage with different angles of the face. A user might not always be exactly looking at the screen. After this we took different angles of faces too in consideration. Another prototype is fabricated dependent on requirements, and again the cycle comes back to assessment. The cycle begins by testing, trailed by structure or reconsidering a mock up, and testing the mock-up, then back. After achieving face detection, mood detection prototyping had to be followed. We started with only one expression first (Happy). On successfully achieving it, the other two moods were added and tested till the required results were achieved. After achieving mood detection, suggestion module had to be made. A prototype for suggestion for expression happy was first made and tested. On getting the desired results, same was done for the other two expressions. Thus, achieving the desired product.

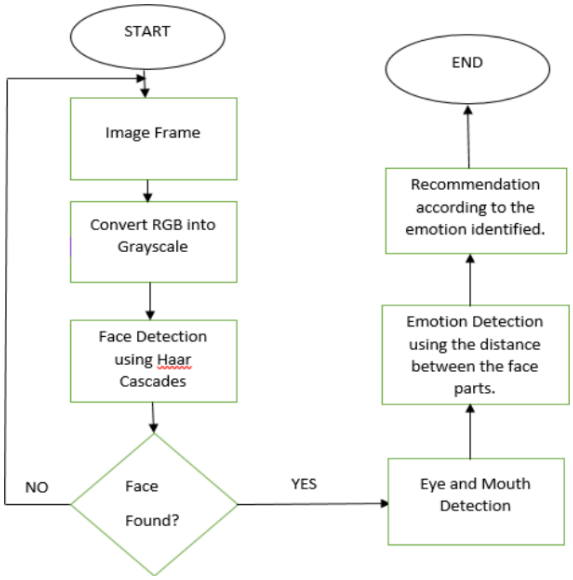

Figure 2: Process Flow of Model

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3.1 Face Detection

HAAR Classifier, we will detect the face of the client. The image frame will get converted into Grey Scale using the luminosity algorithm. For the same we will be using OpenCV and laptop's Webcam. OpenCV, it is a cross-platform library which can be used to develop real-time computer vision applications. The focus lies predominantly on image processing, video capture and analysis including features like face detection and object detection. In this project we will be using it in correspondence with the HAAR classifier.

3.2 Mood Detection

Detection of emotions can be obtained by extracting the feature of the face. We take into the consideration histograms in order to compute the distance between the two eyebrows, eye and eyebrow, eye (left side) and nose, eye (right side) and nose and then identify accordingly. This will be done using our trained models. Currently in this project, we are focusing on three emotions that are happy, sad and angry. In the future, we wish to use different permutation and combinations to incorporate more emotions into our project.
Gap entire picture into three element locales: eye area, mouth district, and assistant district. A few data are removed from every district: geometric and shape data.

Table 1: Eye Area

Features	Description	Size
X_{e1}	Distance between two eye brow	1 x 1
X_{e2}	Distance between eye and brow	1 x 1
X_{e3}	Distance between nose and eye(left side)	1 x 1
X_{e4}	Distance between nose and eye(right side)	1 x 1
X_{e5}	Error between eye and template	4 x 1

Table 2: Mouth Area

Features	Description	Size
X_{m1}	Width of mouth/Height of mouth	1 x 1
X_{m2}	Distance between nose and mouth	1 x 1
X_{m3}	Error between mouth and template	6 x 1

Table 3: Assistant Area

Features	Description	Size
X_{a1}	Existence of winkles between eyes	1 x 1
X_{a2}	Existence of winkles in left cheek	1 x 1
X_{a3}	Existence of winkles in right cheek	1 x 1

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3.3 Recommendation System:

Mood-Up is not only a mood detection program but also builds recommendation system as a core functionality. The recommendation system is the most important aspect of Mood-Up as it attempts to bring change in the mood of the user using the software. It is a simple conditional based system that provides the user with different choices he/she can use to change their mood. The recommendation system begins it work when the mood of the person is identified. It checks which mood the user is in right now and it starts to respond the user giving the user different choices. The user can select any of the choice and to make it more convenient for the user, the whole process is based on voice conversation. The user just has to say the option from the list and the program will use voice recognition to identify what the user wants to do and it provides the required service. Here's a straightforward perspective on how suggestion-based framework functions –

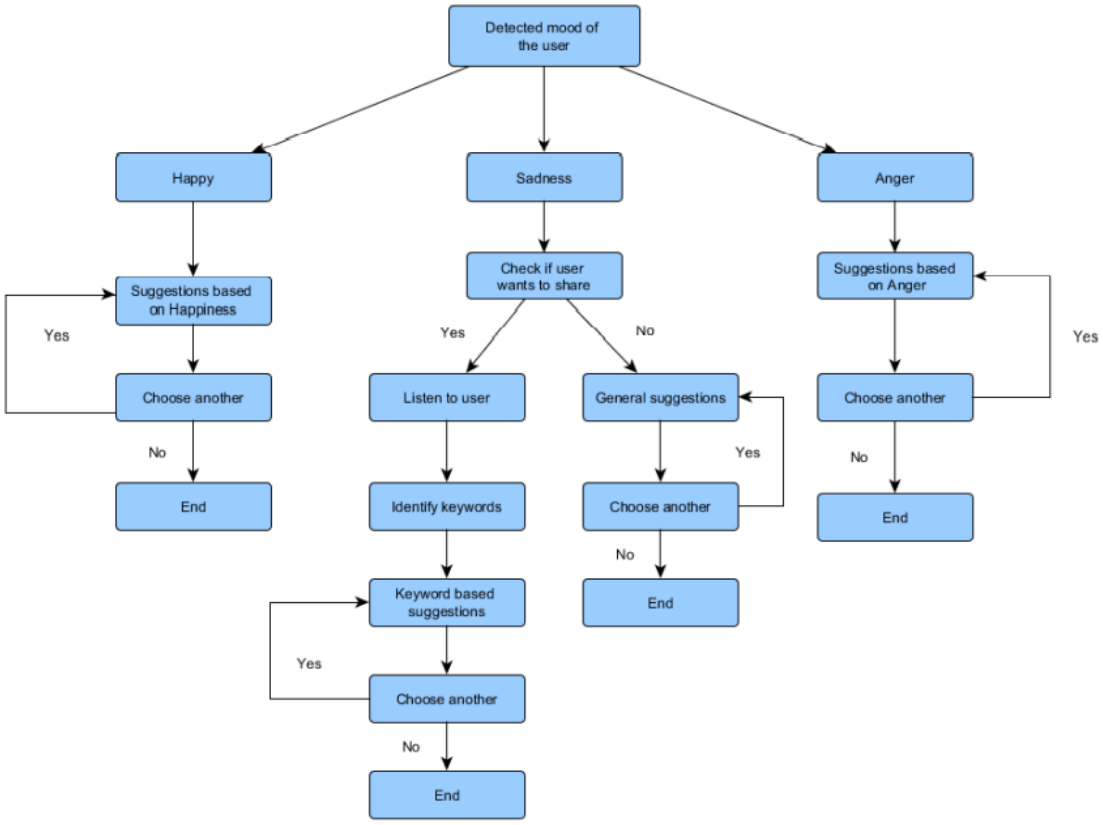

Figure 3: Suggestion Framework

3.3 Requirements and Design:

As already mentioned, the purpose of the software is to detect facial expressions, store the information and use it for the benefit of the user. To capture the facial expression a web cam is required which sends the image to the code, which detects the expression using the trained models and then give an output and uses the information for the user's benefit. Certain trained models are required for the processing and comparing of the input data from the webcam to get the right output. Article Detection utilizing HAAR include based course classifiers is a fruitful thing area strategy. It is an AI based approach where a course work is prepared from an arrangement of positive and negative pictures. It is then used to recognize things in various pictures.

4. Conclusion

Mood-Up has two main components of functioning, the first involves a face detection and the second component is the mood classifier. We have successfully performed these two operations for three emotions, namely: Happy, Sadness and Angry. Such a system can prove beneficial in current scenario where people need to be helped or urged to perform more activities to ensure overall mental stability and good health. Mood-Up can provide a small but useful service in today's fast-track world where people don't have time to comprehend as well as analyze their emotions and how to navigate them. In a technology enabled world which causes lives to be filled with a hectic schedule it is technology itself that allows users to understand and deal with their feelings and emotions. The Face Detection algorithm and HAAR feature classification allows the system to derive insights into a person's emotions at that particular point in time. a simple conditional system that would use the different emotions as keywords to present user with various options he/she can choose. The system recognizes if the user is sad, angry or happy and based on the classification, the recommendation system presents options.

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