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AN ACCURATE HUMAN EMOTION RECOGNITION FRAMEWORK USING MACHINE LEARNING

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ABSTRACT

In advance phase of life, artificial intelligence plays a vital role to facilitate the end users by different aspects. From human body, emotion detection is one of those features that is involved in most of the application and action is performed accordingly. An accurate emotion detection is still challenge for AI approaches. This research paper presents how speech features are used to detect and recognize the emotions that human is trying to express in their speech. With the help of "Gaussian-Mixture-Model (GMM)", First the feature is extracted using Mel-Frequency-Cestrum-Coefficients from the speech directly. In experiments, multiple parameters of MFCCs are evaluated by using the GMM method. While the implementation, we used Berlin-Emotional-Database considering variety of emotions including "Anger", "Disgust", "Fear", "Happy", "Neutral" and "Sad". We also consider the gender based parameters, and detect the perspective emotions including "Anger", "Disgust", "Fear", "Happy", "Neutral" and "Sad". The experimental results compared with existing methods hidden Markov-Model with the MFCC, delta-MFCC and speech energy; consequences showed that our proposed approach is more accurate as compare to existing state-of-the-art methods, and attained 94.45% accuracy level.

Keywords: *Gender-Recognition, Machine Learning, Face Recognition, Emotion Detection.*

1. INTRODUCTION

In the past few years, the work and research in the intelligent-healthcare has been improved a lot. We can use the Machine-Learning [1] algorithm for them who are not able to convey their emotions or messages, it might be the best option to restore the communication. It's difficult to understand the emotions of the patient. The detection of emotions of the patient is the first step to understand the feelings of the patient. Brain-Imaging technologies [2] enables the scientists or researchers the detect the activities of the brain during the processing phase of emotions like Facial-Expression [3], Voice or Speech, Body-Posture, etc. It's a difficult task for the brain to hide the neural activity [4] when a human is emotional, so we can say theoretically it's a reliable way to detect or recognize the emotions. In literature, we noticed that the Physiological Signal Based emotion [5-12] (Cutaneo galvanic, electrocardiograph [13], electromyograph, etc.) neural provides the better features and the knowledge for the detection and recognition for the emotions because of the higher rate of efficiency and specificity of different type of emotions. One of the most using technique is "Electroencephalograph" (EEG) [14-16] and some other functional magnetic resource imaging (FMRI) [17], they have been using to record the activity of neural system related to the emotions. These studies proved that they are very beneficial for detecting the emotions and then recognizing them and they have a lot of lot of potential toward the emotion's detection and their recognition."

- ✓ We mostly qualify the accuracy of several FNIRS classification-schemes [18] for the detection and the recognition.
- ✓ We also analyze the several possible factors that contributes towards the data instability and accuracy of instability.
- ✓ We mostly propose and evaluate the novel-feature selection method for the FNIRS emotions reorganization mitigate the intersession accuracy instability.

1.1 Artificial Intelligence

Among the most useful Computer-Science branches, AI is one of the most important one. It plays an important role in training the machines and giving them self-intelligence to perform tasks automatically, it will reduce the human efforts as well as the task that will be performed

by machine will be more efficient and more accurate. In the past many years, it has been the essential part of industry and that industry in technology. The main problem of AI includes programming the computers for the certain-traits such as:

Table 1: Branches of Artificial Intelligence

Knowledge	Reasoning	Problem solving
Perception	Learning	Planning

The Engineering of knowledge is the core part of the research of the AI, machine can only perform well and accurate if they have proper and accurate information of the task they are going to perform automatically. The access to objects, properties, categories and the relation among all of them to apply or implement the knowledge or we can say the Knowledge-Engineering. Applying the problem-solving techniques and common-sense algorithms in machine is such a difficult task. Machine-Learning is also the core part of the AI. It helped to train the dataset so we can use the dataset to predict the task that is required to performed.

- ✓ Classify the Gender on the base of speech recognition.
- ✓ Identify, detect and recognize the emotions.

2. PRIMARY CHALLENGES FOR DEEP LEARNING

2.1 Moving objects

It would be so difficult to detect if it's a face or some other object if the target is moving. So, if we can't even detect the object then how we will be able to detect the emotions from the object. Machine detected the other objects as a face and have tried to recognize its emotions, obviously this will not be able to recognize the emotions. And if it recognizes the emotions then the prediction will be totally wrong, there's a way to face this challenge and is explained in [19].

2.2 Augmentation of data

In the machine Learning we have used the algorithms to train our data set, this training may require a video with different frames per second, image and video both from different angles or with different backgrounds, with different genders, races and etc. The public dataset was available but that has not worked as we wished. So here are few ways to overcome this challenge.

- ✓ Own dataset.
- ✓ Combine the dataset.

2.3 Occlusion of face

Face occlusion means some object blocking the machine from detecting or recognizing the emotions from face. Sometimes due to this machine isn't able to even detect the face and ignore it by considering it some other object. There's a popular method formalization technique used to overcome it, is available at [18] as shown in fig.1.

Figure 1: Examples Of Face Formalization Results

2.4 Issue of light

Sometimes low light can cause the failure of face detection or emotions detections, so developers had to find a solution, it's not a good way to use flash light or something like that so they implemented the algorithms known as illumination normalization algorithms explained in [20-24].

2.5 Identify the feature of face

Emotions detection and recognitions works by identifying the face, nose, ears and etc. if it can't be able to extract these features due to some reasons then how can it predict it accurate. Let me explain this with an example, what if algorithm is designed to detect two eyes with specific distance and what if someone has more distance this will not work, so they have suggested an algorithm (Part Based Algorithm) that developers used to improve the accuracy of identifying the facial features, explained in [25-32].

2.6 Recognize the incomplete emotions

In most emotions reorganization algorithms main focus is on recognizing the peak high-intensity and usually ignores the lower intensity expressions, this could lead to predict the wrong emotion as shown in Figure 2, so for solving this problem developer implemented algorithm which is known as peak piloted deep network [33].

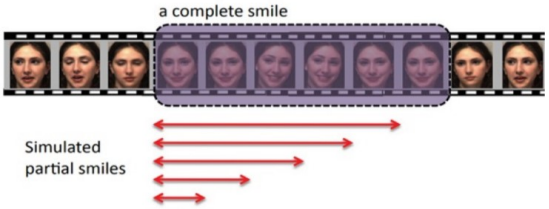

Figure 2: *Several Stages Of An Incomplete Smile*

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2.7 Cultural difference

In fact, all the people in the world has same emotions but every culture has its own way of expressing the emotions by using various face expressions as shown in Figure 3. so, it might be a big issue and it's not possible to train the dataset according to all various culture's expressions.

Figure 3: *People From The West And The East Convey Emotions Differently. For Brazilians, A Broad Smile Indicates Happiness. Japanese Express The Same Emotion With A Subtle Smile.*

2.8 Noise

Noise can be occurred while recognizing the emotions using the speech or image or video as shown in Figure 4, noise reduction or the noise cancellation is discussed here [34-38], if there's a noise in the speech then the speech would never be clear. Noise can be of different type, so of each type there's a solution.

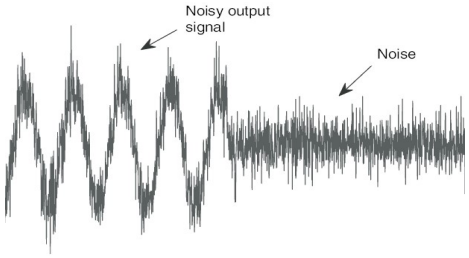

Figure 4: *How Noise Changes The Frequency*

2.9 Hardware

The performance of the machine and Machine Learning algorithms which are used for the capturing of image and predicting the results depends on the hardware, if a hardware is of low capacity obviously then it will take a lots of time so the algorithms must be able to run on low hardware in this way we can improve the performance. But hardware performs an important role in Machine learning. [39].

2.10 End User

The system which they have designed for the purpose of recognizing the emotions from the live image/Video and the speech must be user friendly if it's not easy or friendly for the end user than there might be chances of wrong use of machine or system. The inputs from the end users means a lot and plays a very important in any successful system. Importance of end user is explained here [40].

2.11 Accuracy

In order get the more accurate results or predictions we need to create a dataset that is more accurate and its accuracy must be as maximum as possible. And also, for getting an accurate results other things also involves like camera which we have been using for live image/video, microphone for getting speech, the hardware on which application is running.

Table 1: Center Table Captions Above The Tables.

Sr. No.	Challenges	Description	Ref.
1	Moving objects	It's difficult to detect or recognize the emotion from the object who's moving	[1] [10]
2	Augmentation of data	We've to create our own dataset or combine the multiple datasets.	[16]
3	Occlusion of face	Some objects hiding the face, like keeping hand in front of face.	[12] [13]
4	Issue of light	Low light can cause not to detect the face and recognize the emotions.	[6] [3]
5	Identify the features	People have different face shapes, might be difficult to extract	[4, 21]
6	Recognize the incomplete emotions	Low intensity expression can be ignored, because of the focus on high intensity.	[22]
7	Cultural difference	People of different cultures have different ways of expressing emotions	[14]
8	Noise	If there's noise in speech, it would be difficult to extract features	[34]

		from speech.	[22]
9	Hardware	Require high performance hardware to run the ML algorithms smoothly.	[23]
10	End User	Design the system user friendly, so any non-technical person can operate it.	[24]

3. RELATED WORK

In this article, we have read around about 50 articles that was related to topic of our article, so below the line summaries are given from which you can read each article that we have studied and discussed in a précised way to give you an idea how emotion detection and reorganization works. During the communication this context can be in any form, it can be text, speech or video but the main aim of this technique [41] is improve the communication, sometimes due to the language barrier or some other reasons it's a difficult task to detect or recognize the emotions so that we can identify the emotions so that it is make sure that the message and emotions are understanding other person is valid and true.

We can detect the text from the images or videos [42] and this text that we extracted from any source that can be an image or a video we can use this to detect and recognize the emotions the person is trying to express the emotion. But this can be simple text, a text form a mobile message, text from an article or it can be any source that provides is a text. In past few year, the famous UBER used this technique to detect the emotions of the customer if the customer is in hurry or worried then user designed a special algorithm for them that charges them fare as compared to other who's emotions are normal or neutral. So, this technology can be used to use text for the detection and the recognition of the emotions.

We can detect the emotions from the video. So, first we have talked how can we detect the emotions of a person from the real-time-video [43] than we have talked about what was the benefits of doing this or why we should do this or what are pros of the thing if we apply it in real time. So, here's the answer how does it works. We can detect the text form the video that can be in the form of subtitles or we can take live images from the video after detecting the text or live images from the images we can apply the classification or use the dataset to predict the emotions in this current video that is streaming. On the other hands, it has many advantages for technical as well as business purpose. For example, if a person is watching like what kind of emotions he's interested in and we can add some more videos in the suggestion list or if we have noticed that the emotions of user is watching through the video might not be good for them we can block that kind of content or video for him or stop showing such kind of video in his feed. Or we will advertise some advertisements according to the interested emotions of the user.

The voice of user, so we can use that speech to improve the communication between the persons [44]. Who are communicating, in this way that communication can be so clear, that can help later to understand the actual feeling of the person, so he behaved well as possible, this technique has mostly been used in police stations from the starting day to understand the emotions of the who's reporting for the crime or it can also be used for the lie detection methods. If a similar physiological knowledge is employed then the SV Machines with the classification's accuracy of the eighty-five.81 percent performs the most effective, closely follow by Regression-Tree at eighty-three.5%, K-Nearest Neighbor at seventy-five.16% and theorem Network at seventy-four.03%. Performance of the K-Nearest Neighbor 's and the theorem network algorithm is often improving victimization informative-options". Find the emotions from the EEG explained at [45].

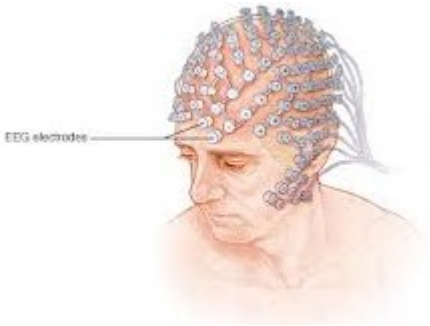

Figure 1 :Electroencephalography (Eeg)

KNN is important in every of foremost wide used technique for the classification of electroencephalogram knowledge related to specifically (494 A.T. Shoaib et al per Downey and the Russell's, Rt is basically employed in the medical field to for instance, classifies electroencephalogram knowledge. powerfully supports the 'SVM' and suggests this for the accurately classification of electroencephalogram knowledge. The author claims that the SVM will show the high level of an agreement on

electroencephalogram knowledge classifications [58-68].

These 5 techniques that was found for being employed in the most of empirical study that we've found and it were thought of to be an appropriate for classifications of electroencephalogram knowledge related to specifically affective or emotional state supported achieved classification's accuracy." This machine has some kind of cables which are connected to your brain as shown in Figure 5.

Feeling or have an effect on detection from text. feeling detection is a component of the broader space of affectional Computing with aims to change computers acknowledge and categorical emotions. Feeling/Emotion detection and analysis has been wide researched in neurobiology, science and behavior science, as they're a crucial part of attribute.

In linguistics, the detection of feeling states of an individual by examining the text document that is written by a them will have several applications in numerous fields, like in e-learning surroundings or suicide interference. Discussed at [46]. For this reason, we have a tendency to determine to develop a survey regarding feeling detection systems from text and build it offered to man of science community. during this survey, we have a tendency to classify the foremost relevant feeling detection works in accordance with the emotional model and also the approach used. Relating to the search strategy employed in the survey, we've got hunted for all of papers associated with feeling detection from text in numerous analysis databases like Scopus1 or IEEE Xplore2. Later on, we've got reviewed the papers obtained of those databases and have designated the simplest papers that use lexical approach or machine learning approach in their feeling detection systems. the choice criterion used is predicated on the connectedness of every add the sector of affectional Computing.

Degree of the communications and the range of the communication's strategies are growing quickly. Such medium that is net-chat mistreatment varied instants electronic communication shoppers. These communications give a superb platform to Perform analysis Informal's communications. Discussed and explained at [47]. This such analysis space that is gained abundant interests recently is that the of tagging the feeling content in the informal language. There square measure many vital applications of such tagging. The analysis reportable herein was motivated by a chat-mining research we have a tendency to conducted at the command of the Interlink intelligence network. The employment of feeling detection in interface style is presently a vicinity of active analysis. The approach centers on the replica of speech from the matter messages logged from a second electronic communication shopper. The remainder of this paper details our analysis within the detection of feeling in chat information.

Sentiment analysis has principally targeted on detection the sound judgment or linguistics orientation of a unit of text instead of particular feeling. Automatic feeling detection on Twitter presents a special set of challenges as result of tweets exhibit a novel set of characteristics that aren't shared by alternative styles of text." How to detect emotions from tweets explained at [48]. Because of the length limitation, language accustomed specific emotions in tweets differs considerably from that found in longer documents. despite the fact that user's area unit restricted to post solely a hundred and forty characters per tweet, it's not uncommon to seek out a tweet containing quite one feeling. The feeling word "Happy" in Example nine isn't accustomed describe however the speaker feels regarding the tune however is instead accustomed characterize the emotive quality or emotive property of the tune. The common apply of victimization feeling word hashtags to retrieve self-annotated examples as ground truth to create feeling classifiers, a way referred to as "Distant supervision", is vulnerable to this weakness."

Any level of statistics couldn't be performed with not even smart sensors, and once it involves facial feeling strength recognition, aside from very high qualities sensors, there is necessity for the economical algorithm to acknowledge emotion's intensity in the real time discussed at [49]. Parts like behaviors, voices, postures, vocal intensities, and the feeling intensities of person depiction feeling, once joint, facilitate in the measurement and the recognize varied emotion. Spontaneous face expressions of Associate in Nursing feeling indicates the behavior of the face that happened once someone displays the involuntary feeling, with not previous designing or other intentions.

In these studies, girls are superior predictors of emotions than men. within the third space, many studies have conducted, supported the 5-basic emotion, to search out major error's patterns and the effects of the emotional intensity in the diseases like dementia praecox, Autisms, and Borderline follies. feeling recognitions are being place to the service in various real-Life application wherever a human emotion is a cue to the roaring operation of those systems.

Despite exceptional achievements in corporeal Machine-interface, and the popularity of patient Emotions that remained vial challenge. Feeling recognitions may be critical part of their interactions and therefore this commencement towards the perceive emotions of patient.

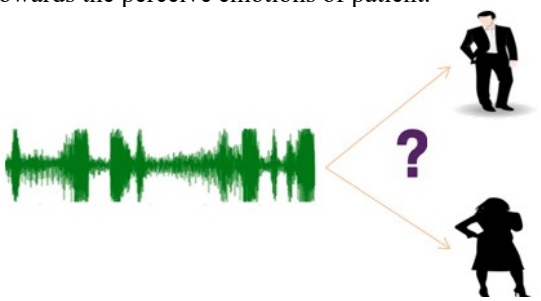

Figure 2: Gender Recognition Through Speech

Emotions-related neural activity is tough to cover and is so in theory a lot of reliability that's for feeling recognitions. Details discussion is at [50]. And further, compare to (Physiological Signal Based) feeling recognition, neural activity provides higher info for feeling recognitions because of its higher-specificity that's for various kinds of Emotions. And gender can be recognized from speech as shown in Figure 6. Studies had proved that the good potentials of the 'Neural Signal Based' feeling recognitions have a tendency to quantify correctness instability of many fNRS classifications schemes for feeling recognitions once victimization coaching knowledge collected three weeks earlier. we have a tendency to propose and assess a completely unique feature choice technique for fNIRS feeling recognition to mitigate intersession accuracy instability.

Computer science might be the branch of applied science that have a goal to make intelligence machine. Starting the good judgments, and the reasoning and the 'Problem Solving Power' in machines may be the toughest and boring task. Nowadays, folks share a plenty of contents on the social-media within the kinds of the pictures - be this personal, or daily scenes, or theirs's opinions represented within kind of cartoons or analyzing the content like from social-media website and/or (photo-sharing websites) like (flicker and twitter, Tumblr and etc.).

It might be helpful to grasp the feeling from picture which shows to mechanically guess emotional-tags on them - like happy, scared, etc. Explained and discussed at [51]. As a part of project have a tendency to aim to guess the emotional class a picture can fall in from five classes – (love), (happy), (violence), (fear), and (unhappiness). There exists associate degree affectional gap in feeling linguistics Image-Retrieval between the low-level options and therefore the emotional-content of picture reflective a specific sentiment, almost like the well-known linguistics gap. Use of Neural Networks on seeing the information to perform the sentiment-analysis of pictures collected from (Twitter) and (Tumblr). Robust images sentiment-analysis mistreatment more trained and domain-transferred-deep Network by the (You et al).

Figure 3 : Types Of Emotions

Experiments with the handcrafted-options like L * a * b color's house options, GIIST and the salience options on 'Flickr' vogue information, 'wikipaintings' and the 'AVA' vogue information.

As we all know a bit of concerning human emotions however, they acted and the way they depend on human behavior. thus, once reading this text we've got return to grasp concerning the algorithms, structures, current feeling detection devices and lots of additional. By exploitation this device, we are able to management situations supported info we've got provided. Moreover, a still comparatively new field of research in brain laptop interaction tries to detects emotions exploitation EEG.

Accuracy has not performed by exploitation. This device however we've got return to grasp concerning close to hundreds of human behavior. There are various types of emotions as showed in Figure 7.

We then filtered and method the signals so as to urge feeling connected options and activities that have applied additional machine learning techniques to classify emotional behavior into low or high and positive or negative things. thus, finally

we've got to explore and compared 2 machine learning issues to urge and clear classification regarding emotional behavior supported EEG information exploitation EEH device. We have a tendency to thought of 2 techniques one is linear and second is vector analysis. Details at [52].

We have presented the results of the induced classifiers that square measures and ready to provide North American nation info concerning high or low and positive or negative behavior. In result the info we've got from EEG device is much decent than the info from another device between emotional states. moreover, we have evidenced it's potential to coach thriving classifiers with not a full info concerning emotional states of human.

As we all know the subject of this text, we are able to simply perceive the fabric associated with this text. that the suicide cases square measure rising day by day that in result officers and a few developers have applied some techniques to classify suicide notes to induce a lot of and clear data of victim. The success of suicide interference plays major role in developing such issue. Detail discussion at [53] They investigate the cases through tongue method and a lot of specifically through data processing with the assistance of computing and completely different kind of emotions detectors that in result they need come back to understand a lot of regarding within which approach they're going and what has really happened. we have a tendency to shows fine grained programmed feeling detections advantages from classifier-optimization and the combined Lexicon-semantic-feature illustration.

Figure 4 : Graph For Emotion's Ratio

Orthography improvement would possibly indicate strength of machine to noisy input-text. We've a to conclude that tongue process technique has future application doable for the 'Suicide' interference. They use the dataset discharged within-the 'Framework' of a shared-tasks on the feeling's classification in suicidal-notes, that aimed to form a for good on the market resource facilitating future analysis. every note was annotated by a minimum of 3 annotators World Health Organization was questioned to gauge all the-sentences. The sentence that may well be-annotated with none, one or many of labels examination of the coaching information showed that almost all of the 'Emotions' was powerfully "lexicalized" for example some words square measure generally related to them Some suicide notes contain several orthography errors. However, once applying this informatics-module on information with-the several orthography mistake that they were fail to address extreme surface-variation and the consequently disappoint during the early-stage of study.

This has never been a straightforward factor for corporations to work out. For one factor, emotions are inherently tough to browse. for one more, there's typically a disconnect between what folks say they feel and what they really fell. plenty of corporation's use focus teams and surveys to know however folks feel. Full details at [54]. Now, emotional AI technology will facilitate businesses capture the emotional reactions in real time by coding facial expressions, analyzing voice patterns, observance eye movements, and measure medical specialty immersion levels, for instance. the final word outcome may be a far better understanding of their customers and even their workers. owing to the subjective nature of emotions, emotional AI is particularly susceptible to bias. for example, a smile may mean one factor in Germany and another in Japan. Confusing these meanings will lead businesses to create wrong selections [55].

Imagine a Japanese traveler needing help whereas visiting a store in Berlin. If the look used to feel recognition to order that customers to support, the employee may mistake their smile a signal of politeness back home as a sign that they didn't require aid. once AI is employed to measure worker emotions, it will have serious impacts on however work is allotted. for instance, workers typically assume they're within the right role, however upon making an attempt new comes may realize their skills are higher aligned elsewhere. Some corporations are already permitting workers to do completely different roles once a month to check what jobs they like most. Some ratios for emotions are shown in Figure 8.

A feeling could be a "mental" and the "Physiological" condition that is the personal and the private; it can involve the plenty of "Behaviors", "Actions", "Thoughts" and "Feelings". The latest task that is relevant to study is largely speaking characterized into 3: reality detections, Facial-feature-extractions and Feelings-Classification. the amount of analysis administrated in every of those classes is kind of large and notable. Given a picture, sleuthing the presence of a personality's face could be a advanced task because of the doable variations of the face choosing a comfortable set of feature-points that represents

vital-characteristics of external body-part and that might be mined simply is that the main-challenge a productive facial-feature-extraction approaches have to answer it. The example systems for feeling recognitions are split in three stages: face-detection, feature-extraction and feeling-classification. when tracing faces with utilization of a face-detection rule, the data within the "symmetry" and "formation" of face that is combined with the image-process-techniques were accustomed method that increased face-region to see the feature-location.

Table 2: Important And Noticeable Points From The Related Work

Ref.	Proposed Model	Characteristics	Used Technology	Limitations
[1]	Automatic Emotions Classification.	It detects the emotions from any dialog documents or video	Lexical Features. Dialog Act Feature. Contextual Feature.	It can't work on the face, text. It only works on the objects who's in dialog format.
[2]	Emotions detection from text.	It detects the emotions from only the text formats.	Keyword Spotting Technique Lexical Affinity Method Hybrid Methods	This can't detect emotions from the video, picture or some other media except text.
[3]	Authentic Emotion Detection in Real-Time Video	It detects the emotions from the real time video, like online video call or video on YouTube.	Generative Bayesian Networks classifiers	This can't detect the emotions from the speech or text it requires the real time video.
[4]	Real life emotions detection on Human-Human call center dialogs	This is used in call centers or police departments to detect the emotions of other person on call.	Lexical cues Paralinguistic cues	This only works on call center on just live call, what if we want to work on a download video or speech or text file.
[5]	Emotion Recognition Using EEG	Method that monitor the brain signals and from that signals predict which emotion person is feeling.	K-Nearest Neighbor Regression Tree Bayesian Network Support Vector Machine Artificial Neural Network	What if there's an issue with EEG machine and it's expensive and a technical person is required for EEG machine.
[6]	Emotion detection from text and speech: a survey	Just a experiment or a survey to check if recognizing the emotions from the text give accurate results.	Keyword Spotting Technique	Accuracy is very less, only work for small purposes. It's not an efficient way for emotions reorganization.
[7]	Emotions in Internet Chat	This can be used in the live chatting apps to detect the emotions of other person by their texting.	Using Speech Phonemes	What if the person isn't writing what is he/she feeling during the chat?
[8]	Exploring Fine-Grained Emotion Detection in Tweets	This is mostly used to check the emotions of the user while posting some tweets so an action can be taken.	Bayes Net SVM-SMO J48 KNN	This only works on twitter and only text tweets what if someone tweets a video.
[9]	Recognition of Emotion Intensities	How strong the emotion of a person is, sometime a person can feel emotions, so detect which one is intense.	Iterated Closest Point (ICP), PCA K-means clustering with back-propagation	If the emotions are not intense, then using is waste of time.
[10]	Gender with Emotion Recognition	A gender can be detected from the speech only.	Hidden Markov Model Multi Support Vector Machine	There might be a issue in the micro phone, so machine can be confused.
[11]	Sentiment Analysis and Fine Tuning of Images.	Predict the emotional tags and analyses content	VGG-ImageNet Method. SVM Classifier. ESIR Low-Level	No accuracies in results because of not using some proposed

		from website images also provides sentiment analysis.	Feature. RESNET Method.	techniques and also exists effective gap
[12]	Self-Reported Emotional States	An approach to detecting emotion from EEG measured with Low-cast and present their subjects from annotated sounds.	EPOC Headset. IADS library. LDA Method.	Sometimes it produces low accuracy among subjects due different degree of emotional response.
[13]	Combining and Pruning in Suicide Notes	Detecting suicide notes using SVM and proposed final results for prevention.	NLP Method. Trigrams Feature Lemmas Tags SVM Classifier	It is apparent that some notes are much more frequent from each other with high frequency.
[14]	AI Interruptions and Risks	To determine problems and interruption accurately about emotions by using AI.	AI algorithms is used Affectiva's Auto AI.	Discrepancies and not better for tracking emotions, inherently difficult to read.
[15]	Six Universal Emotion.	It works on eyes, mouth and face for feature extraction.	Sobel Method is used. Roberts Method is used. Dilated Technique.	Sobel mask can't identify eyes coordinate.

4. PROPOSED METHODOLOGY

In this section, we have discussed how the emotions detection works or what's the design and architecture of the system. The current model was working well, but it has some issues that can be improved, and by improving this model the result can be more accurate and perfect. The current model found the problem in the voice, so they improved the voice by reducing the noise while recording the voice.

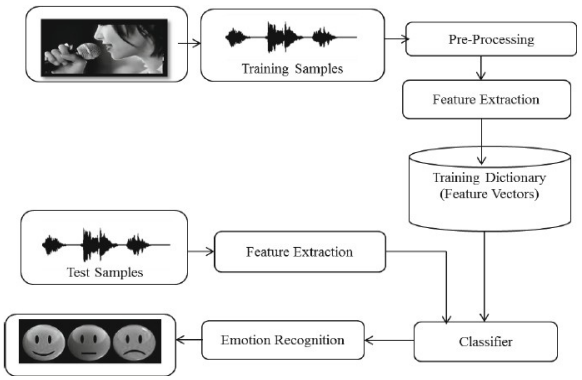

Figure 5: Architecture of proposed model

4.1. Problems statement

The current design as shown in Figure 9 solved the problem of noise during getting the live voice from the user. But other than voice there are some other problems.

- Language barrier
- Mic issues.
- Speech volume
- Large dataset
- More time for training set
- Difficult to make sure

So, the problems that explained above are improved and can increase the overall efficiency of system.

Example:

We have tried to use this previous model to detect the emotions of a person, what if there's a language and your model can't understand the language what will you do? So, let's consider it for a second, we created a dataset that supports all the possible but there'll be a lot of expenses to maintain it and create it. And obviously it will take a lot of time to train the model because models contain all most every possible so the it is obvious that the dataset

will be too large to work efficient. So, here we also consider we have a heavy system but what a person have a different type of pronunciation, so we also have to train our model according to every possible accent and pronunciation.

4.2. Proposed Model

The model we're proposing is shown in Figure 10. It is actually divided into two inputs. First one is voice and the other one is image. Just in case we find any issue in the voice and we can use image as an alternate. Using image is not a primary or main reason to add this feature, in this model we have used both voice as well as speech. It might take some time, but the result will be more accurate than only using voice for recognition

4.3. Proposed System Architecture

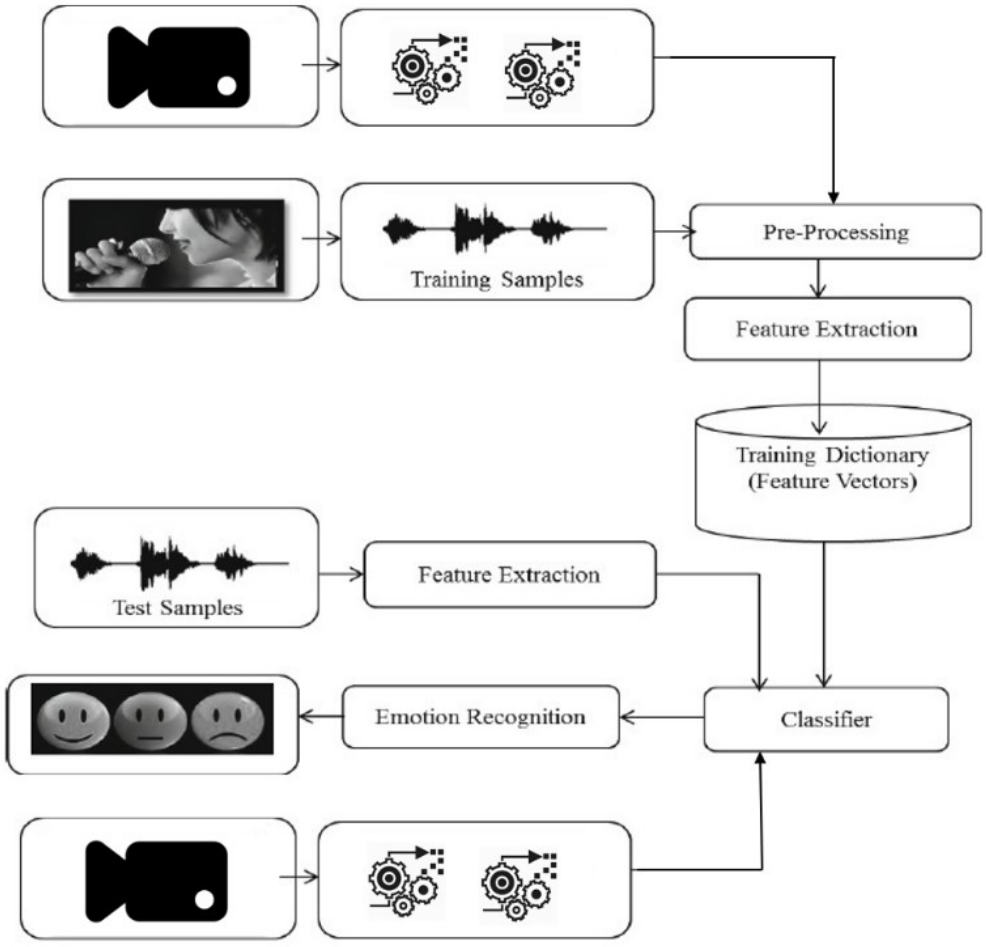

Figure 6: Architecture of our proposed Model

4.4. MEL-Frequency Cepstral Coefficients

MFCC is derived from the type of cepstral representation of an audio-clip.

- ✓ Take Fourier-transform of a signal.
- ✓ Then map powers of spectrums obtained from above onto Mel-Scale, using the triangular-overlapping-windows.
- ✓ Take log of power at the each of Mel-frequencies.
- ✓ Take a discrete cosine-transform of lists of the Mel-LOG POWERS, LIKE IF IT WAS THE SIGNAL.
- ✓ The MFCC is amplitudes of resulting-spectrum.

4.5 Hidden Markov Model (HMM)

The Hidden-Markov-Model can consider as a simplification of Mixture-Model where all hidden 'variables', which can control mixture components to be Selected for each observation, are anyhow related through the Markov-Process rather than the independent of each-other. Lately, Hidden-Markov-Model has been generalized to pair wise Markov-Models and the triplets Markov-Models which allows the considerations of the more complex data-structures and modeling of the nonstationary-data.

4.6 Multi Support Vector Machine (SVM):

In Machine-Learning, Support-Vector-Machines mostly, Supervised-Learning-Models with the associated Learning ML algorithms that are used to analyze the data that commonly used for the classifications and regression's analysis [56-64]. Specified set of the training-examples, each is marked as the belongings to the one or other of the two categories., an SVM Training-Algorithm builds the model that can assign new examples to the one category. or other, making it a no probabilistic Binary-Linear-Classifier. The SVM model is representation of example as points in the space, mapped. so that examples of separated categories are mostly divided by the clear gap that is the wide as much as possible. New-Examples are mostly then mapped, Into the same space and the predicted to belongs to category-based on which the "Hidden-Markov" model is especially used for the applications in the reinforcement of learning and the temporal pattern-recognition as the "Speech", "Handwriting", "Gesture" recognition, part of speech "Tagging", "musical" scores following partial-discharges and the "Bio-Informatics".

4.7 Image from RBG to Grayscale.

In order to work on the image, the image should be in the grayscale form so that we can extract the pixels from different sections easily.

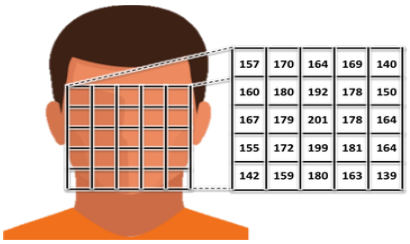

Figure 7: How Face Is Divided Into Different Portion To Get Pixels From Each Portion

The Photo is first converted into the grayscale then it is divided into some sections as shown in Figure 11 and it depends on the algorithm.

Execution Steps

In this section, the steps that are involved in the detection and the recognition of the emotions are explained in easy words shown in Figure 12. First the user will start speaking, the mic will be used to get the voice of the speaker as well as the live image of the user will be captured.

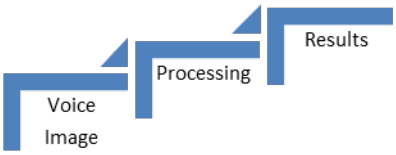

Figure 8: Steps Involves In Our Proposed Model

Then the algorithms will be applied to the voice as well as on the live image that was captured then from the speech some words that have detected and then it'll be matched in the trained dictionary to predict the emotions, similarly the captured image will be converted into the grayscale image and the pixel's ratios will be captured and then they will be compared to the pixel's ratio in the dataset. In such case both speech and image get different results then in that case the result will has more accuracy percentage will be used as a final result.

5. DISCUSSION AND RECOMMENDATION

5.1. Discussion

For the detection and the recognition of the emotions, there are several ways like from facial, from speech, from text, from real time video and there's many others ways. But for any of these methods we need Machine learning to perform that task. Machine Learning has thousands of methods to do this, some of them are discussed here. It's difficult to understand the emotions of the patient.

The detection of emotions of patient is the first step to understand the feelings of the patient. Brain-Imaging technologies enables the scientists or researchers the detect the activities of the brain during the processing phase of emotions like Facial-Expression, Voice or Speech, Body-Posture, etc. It's a difficult task for the brain to hide the neural activity when a human is emotional, so we can say theoretically it's a reliable way to detect or recognize the emotions.

We mostly qualify the accuracy of several FNIRS classification-schemes for the detection and the recognition when we have been using in training data that is collected nearly 3 weeks ago and we have also analyzed the several possible factors that contributes towards the data instability and accuracy of instability We mostly propose and evaluate the novel-feature selection method for the FNIRS emotions. Above we have talked the methods of Emotion's detection and recognition and here we talked about:

- ✓ Why we need them?
- ✓ Which is best?
- ✓ Benefits of using method?

Let's talk about Emotion Detection & recognition from "Text" this method is mostly uses in criminal departments to detect the emotions from like suicide note or some threat letters [65-69]. This can use be used to detect the emotion on the social media accounts or while chatting.

Similarly, the next option we have is through "Face Features" this can be used in recognizing the emotions directly from the face without even asking the person to write something or show expression just take a pic or record the video while talking and that it.

We have used this technique in the real time videos let's take an example, there's a website who want to suggest the viewer some videos but on the basis of his emotions so, this technique can be used there and detect the emotions from the video someone is currently viewing and on the basis of this suggest him/ her some new videos. This model is using the only voice to recognize the emotions and then apply some Machine Learning Algorithms on it to clear the Voice/Speech or change the frequency of speech for the better prediction [70-73].

The user speaks something then through the microphone speech is captured and then the features are extracted and compared with the dataset and then the machine learning algorithms works and do the prediction. The accuracy of the prediction depends on some factor.

- ✓ Dataset
- ✓ Algorithm for prediction
- ✓ Quality of speech

In order get the more accurate results or predictions we need to create a dataset that is accurate and its accuracy must be as maximum as possible. And the algorithm which we are going to use must be suitable to the requirement. In the machine Learning we use the algorithms to train our data set. The public dataset is available but that has not worked as we wanted and to improve the quality of the speech we may use some algorithms to change the frequency of the speech [74].

5.2. Recommendation

Let's discuss why are we using this model, why we actually needed this improvement, what are the benefits of using the emotions detection and recognition. In this model we are only introducing the idea of getting and applying the grayscale layer on it and then getting the pixel's ratios from it, we are only adding on step while the remaining models are same that was using in the previous model.

The main reason of this proposed model is that the previous model was not much accurate as this is because that model only worked on speech so there are more chances that the result will not much accurately and there is lot of reasons of this some of them are explained in the 3.3 section. So, we have introduced the idea of using live captured image to improve the accuracy we are going to use only image but we have also used speech. So then which one will have the more accuracy, it will be the final result. In case they are both case then we can say the accuracy might be hundred percent. It might take some more time but the results will worth the time, because if we only use the speech then we have to do a lot of work on accuracy because there can be language barrier, noise issues

or accent problems. So instead of working on all this and getting the low accuracy is not worth the efforts so, it's a good idea to work on both voice as well as live captured image.

6. CONCLUSION

The previous model was good enough to find and recognize the emotions but the main issue was that was not giving accurate results, because it was facing the issues that are explained in 3.3 section, So we introduced an idea of getting image from the live camera sometimes if we get any fault in the voice this can be any issue as discussed in the 3.3 section so, it's a good idea to having a plan b, so in that case we get any issue in the speech obviously the rate of emotions recognition of the image processing will be more so similarly in case of low light we don't get a clear image we'll use result that has more percentage. Main purpose of introducing this idea was getting more accurate results if there are any issues in voice or images. First the voice will be captured then the live image and in the end filters or layers will be applied to the voice and the image to get the better results than the results will be compared to the dataset to predict the most suitable answer.

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