Analysis of impact of emotion on the student's performance

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Abstract : Due to the privatization and liberalization youths live in a fast and changing modern life and correlates to stress, work, load and stress are the part of today's life on the other side emotions and stress are strongly related to each other. Younger students are facing a rapid change in lifestyle while concern with society and academic challenges. In this paper we focus on the academic performance of the students and stress impact on there performance. We aimed to classify the happiness, sadness, natural , aggressive and depressive emotional stage of student and analyzed the performance in respective stage in examination. As per target we use speech as input and SVM (support vector machine) as classifier, Our result show that emotions and performance are strongly bounded to each other. We obtain the effects on performance at an average rate of 20 to 30 %. .

IndexTerms - **Emotion detection, Stress, SVM, classifier, performance analysis**

I. INTRODUCTION

From the past few decades 'impact of stress on human life' is becoming a research area for the researchers. In this area, number of factors can be taken as a study points. The main factor increasing stress is 'competition'. Some communities had been shown the impact of emotion on the performance. In our research we are going to prove that stress is responsible for poor performance of student in academics. Our main target objective is to studying real time input, and basic nature of features in speech under different emotional situations, we used data from three subjects. The real input from a microphone, we recorded voice of different student subjects. The subjects were Indians and they spoke English in different emotional states. A microphone is used to record the speech and was kept distance from mouth to microphone is 15cms. This experiment were conducted in an ordinary classroom having an area of 25 m2.

We have use the classification method for classification of different emotions. To extracts features from recorded speech segment, we used MATLAB functions. While working we have taken real database of the student during the examination period. According to speech frequencies we determine the categories as Happy, Sad and Natural. We have use the SVM classifier and obtain the result as 'when student are without stress performance increases and with stress performance decreases'. That is if person with positive emotions, then his task will achieve 20 to 30 % better result with high speed and opposite to this person with negative emotions will move towards the failure or will get a reduced rate in his performance about the task. Accuracy of system achieved more than 90% for depressive stress and aggressive stress the result proved that in the examination period performance of student's increases in excited and decreases in a depressive state.

The advantage of our model is there is no need of sophisticated speech recognizer for speech recording. We can do this by simple microphones or mobile recorder also. In the next section we will have a look on little literature on the basis of research in this area.

II. LITERATURE REVIEW:

In paper [1] Ze-Jing Chuang and Chung-Hsien uses a 33 combination of acoustic features are used for the research purpose and the Support Vector Machines is adopted for classification. In this research , researcher extract the features from both 'speech and text' and different six types of emotions such as happiness ,sadness, anger, fear, surprise and disgust. Result shows that SVM classifier gives the accuracy better than other two individual approaches they used in research. Researcher also noticed that intonation patterns for natural and sad emotions are more stable than that of other emotions.
In [2], the authors wrote about the nature of different stages in the education system and their relation with the emotional state of the students. As like our model, he also observed that academic or professional circumstances affect on the health of the person, and hence performance can get affected.

Author of paper[3] specify the speech emotion as important paralinguistic element of speech communication , and he focus on the investigation of the emotion states in an adaptive/personalized approach. In paper [4],we can observe the analysis of different emotion using the audio and video combination. In this paper researcher uses the facial expression as well as speech as a input to determine the emotional state of persons. This includes four stages as happiness, sadness, anger and natural stage. As like

paper [1] this approach is also based on PCA and SVM . He observe that sadness emotion confused with the natural state about(13%).

Paper[5] is also targeted the student emotions and there performance. Paper started with the study of emotion where, we can see that researcher said that emotions are the fundamental antecedents of success. In this paper three types of emotions are consider as-enjoyment , anxiety and boredom. Model framework is based on 'Control-Value Theory' of emotions. There results shows that success was positively related to enjoyment and negatively related to anxiety and boredom.

Important aspects interpersonal and interpersonal relationship, moods, adaptability and stress management skills are mentioned in [6] . as per the paper this are important aspect which may cause a effect on the student's academic performance. Research model theme was based on descriptive and explanatory. Drawback of this model is its accuracy (only 40%) and hence many scientist moved toward the regression model.

Authors of paper[7] enhanced their work toward the relationship between EI(emotional intelligence) and student scolatic achievements. There model was design with regression based. Results shows that positive emotional effects can actually help in improving students academic standing.

Authors of [8] , presented a review on 'impact of emotional intelligence on academic achievement of college students. In this paper authors examines the relationship between the level of emotional intelligence and academic achievement of the student. His survey found that students with higher level of emotions are better able to cope with situations.

Authors of [9] consider speech as a center to represent the features of audio data. On the basis of features obtained,they tried to classify the emotions in the speech. In the result, the researcher stated hierarchical sparse coding (HSC) scheme give the feature classification set of audio signals.

There are different frequency ranges and each frequency work with own specification. The frequencies can be divided in to HF,LF, UVF etc. We taken the reference of frequency table from KTH report 2008 .

Table 1: Frequency range -[From 2008-KTH report*]

	Frequencies	Vocal significance (general)
0	20-40 Hz -	Not vocal -
1	40-80 Hz -	Not vocal -
2	80-160 Hz	Male fundamental F0
3	160-320 Hz	Female fundamental F0
4	320-640 Hz	First formant F1
5	640-1250 Hz	F1-F2
6	1.25-2.5 kHz	F2-F3
7	2.5-5 kHz	F3-F5
8	5-10 kHz	Distinct modes; audible to most
9	10-20 kHz	Lumped modes; audible to some

Above table 1 shows the various frequency ranges and there significance. From the literature review we noticed that work with 'emotion detection' like happy, sad and others are in progress but there is lack of scientific analysis system for the students where we can determine the performance of the students in various emotional condition and compute the impact on performance. Hence we get motivated to design such system for the student. In the next section we will have a look on dataset selection and features consider for analysis in case of our proposed model.

III. CORPUS SELECTIONS

Indian dataset is formed using 50 students called as the subject of the age group 19-25.Subjects 19–25. Subjects consist of males and females. We recorded the voice using the sound recorder installed in the system and microphones attached to that system. While the data recording we make sure that only two frequencies that is low and high required for classification as depressive or aggressive type of stress. In our research student talk in different mood according to that we majorly classify it, and the energy parameter is calculated using short term signal energy.

For the classification we have consider some features of the speech signal. Brief summary of the features are given in following table 2. All the features are obtain from the speech signal in (.wav) format of audio recorded and real voice of the students.

The important frequency is the fundamental frequency. There are several methods for detecting F0. According to the method of calculation, they can be divided into: F0 detection in time domain, F0 detection in frequency domain and F0 detection from cepstral coefficients. In most methods, the one-sided autocorrelation function is used, allowing us to determine the position of the first peak (from the eng. Pitch extraction). The fundamental frequency is the 'lowest frequency of object'

Table 2: Features set for the proposed approach

Features	Label
Energy	E
Fundamental Frequency	Fo
Standard Deviation	Sd
Mean	Mo
Minimum speech frequency	Fmin
Maximum frequency in speech	Fmax
Cepstrum	C0

IV. USEFUL MATHEMATICAL COMPUTATIONS:

The energy parameter is calculated using the short-term signal energy which is defined in the following equation eq (1).

$$E = \frac{1}{N} \sum_{n}^{N-1} [x(n)]^2$$

Where, N-number of samples are represented

n - particular sample.

Overlap between two adjacent frames to ensure stationary between frames.

$$w(n) = 0.54 + 0.46 \left\lfloor (\frac{1}{2}N - n)\frac{2\prod}{N} \right\rfloor \qquad (2)$$
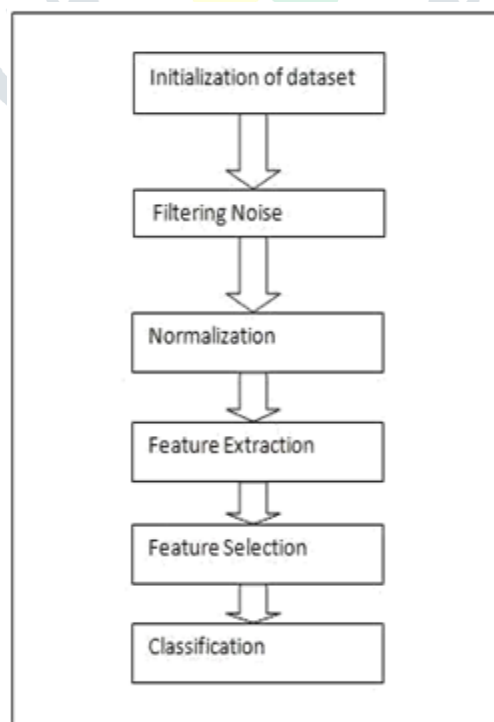
V. MODEL IMPLEMENTATION:

Block Diagram:

Figure1 : Block diagram of proposed model

A speech signal contains energy i.e. high level or at low level. In zero crossing speech this energy plays an important role. First we need to frame the audio signal.
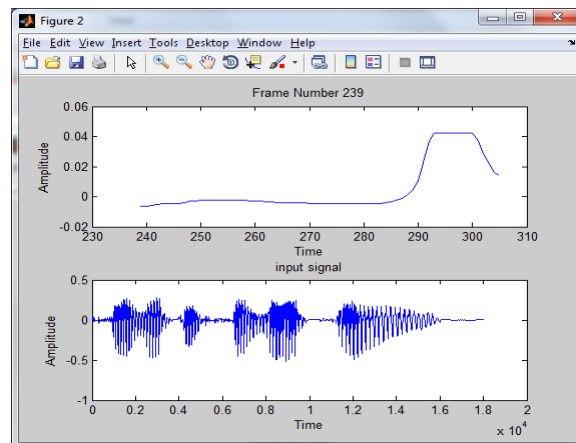

Figure 2: Framing of speech signal

After normalization of emotional speech signal, it is divided into segments to form their meaningful units. Generally ,these units represent emotion in a speech signal. The next step is the extraction of relevant features. These emotional speech features can be classified into different categories. One classification is long term features and short term features. The short term features are the short time period characteristics like formants, pitch and energy. And long term features are the statistical approach to digitized speech signal. Some of the frequently used long term features are mean and standard deviation. The larger the feature used the more improved will be the classification process.

VI. RESULT:

From the Table 3 it is clear that when students are stress free then they appear in Normal state. Due to this in normal state result get increase many times. But when a student in depression or in any stress then they lack their performance.

Sr.No	N	A	S/B	H
1	-2	-7	-10	11
2	2	-7	-21	20
3	3	-1	0	19
4	4	-2	-8	5
5	-3	-11	-15	8
6	7	-4	-4	20
7	3	-8	-13	7
8	6	-11	3	8
9	-6	-4	5	9
10	1	3	-8	21

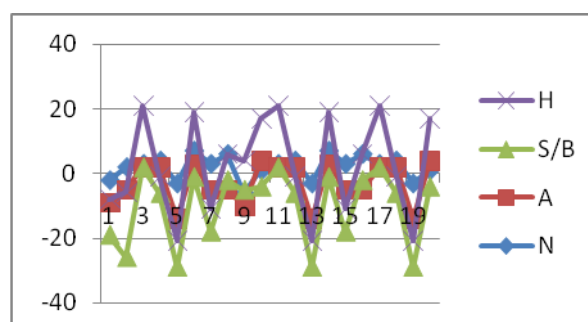Table 3. Analysis of performance in different emotions.

Figure 3: Performance analysis of proposed approach

In below figure we have shown result achievement of two input types of audio signals. In first test type we have tested recorded wave file and then compare with standard speech database for better result. The standard recordings were taken in an anechoic

chamber with high quality recording equipment. In addition to the sound electro-glottograms were recoded. The speech material about 800 sentences. The complete database was evaluated in a perception test regarding the recognisability of emotions and their naturalness.
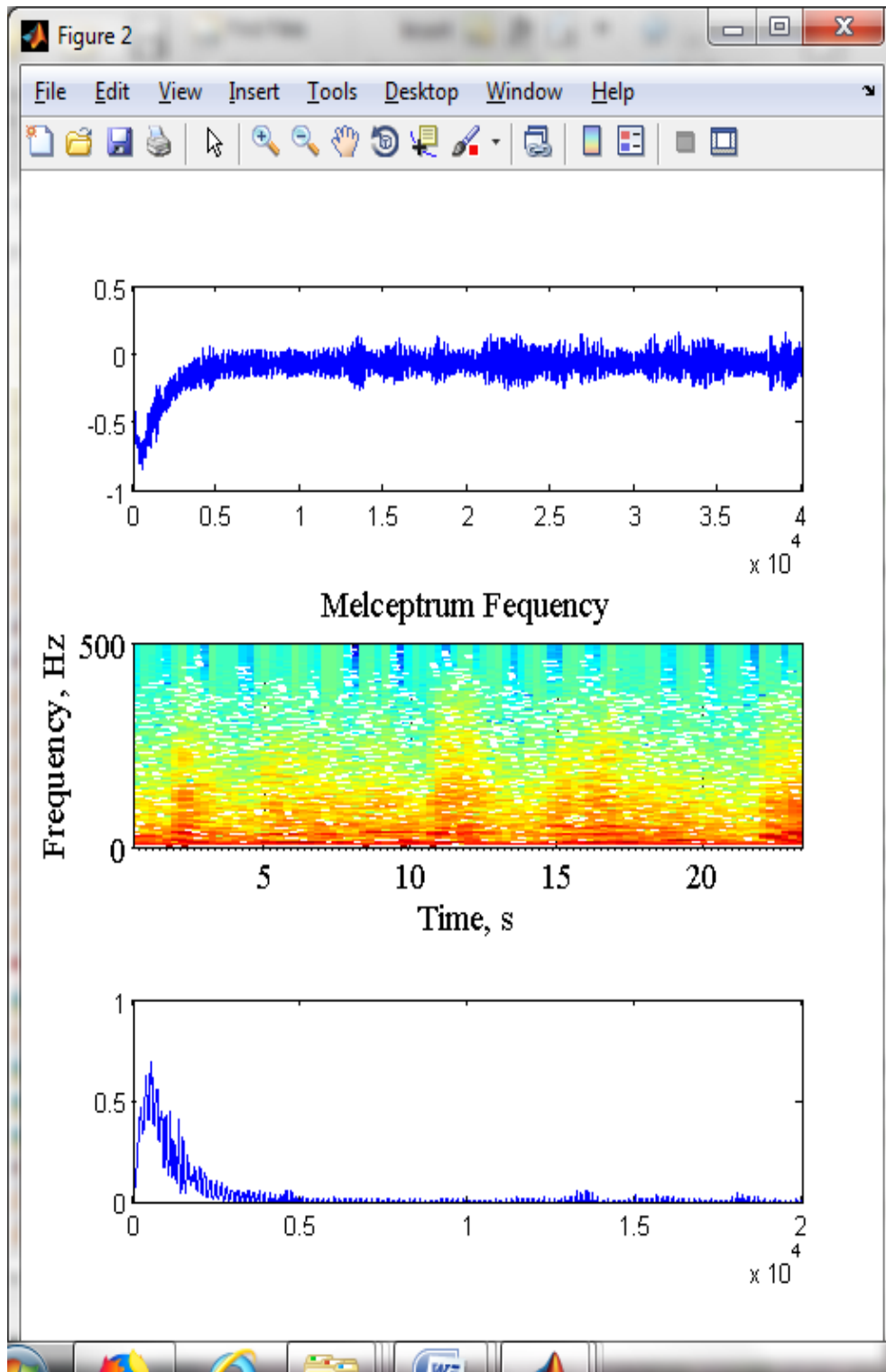

Figure 4. Result achievement of two input types of audio signals.

VII. CONCLUSION

Emotions involve subjective experiences that vary between individuals. Different students can experience different emotions, in different and same situation also. For example, one student may be excited when doing today's homework assignment in mathematics, whereas another student feels frustrated. These individual differences can relate to culture, ethnicity, gender, school

membership and class membership. For example, research has shown that average test anxiety is relatively high in students from some. East Asian and Arab countries, as compared with students from western countries. it has also been shown that average test anxiety is higher in than in male students.

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