

# Sentimental analysis and real time speech emotion analysis

Shruti Kunapuli<sup>1</sup>, S.Aruna Deepthi<sup>2</sup>  
<sup>1,2</sup>Vasavi college of Engineering

**Abstract-** Sentimental analysis is used in our day to day activities. When we are using online shopping, analysis is done automatically and products which interest us are automatically suggested for us. This is all possible because of various algorithms in ANN, Machine learning, deep learning etc. The Market research is done and this is applicable in all fields. In this paper emphasis is given on sentimental analysis, types and an application in speech is implemented. SVM is a nonlinear model, uses a concept of hyper planes in order to classify data. Internet has unstructured data and hence sentimental analysis is used to make data structured and gives feedback on all products. A method which promises to improve this both accurately and quickly is real time speech emotion analyser using machine learning is proposed in this paper.

**Keywords-** ANN, SVM, MFSS, Bayes

## I. INTRODUCTION TO SENTIMENTAL ANALYSIS

Opinions are subjective and centrally describe a perceptive we hold on a certain activities. They are key influencers of our behaviour and the decision we make while purchasing an article. The process of extracting emotions from a group of words which help us understand, analyse the tone of the opinion casted by a person. It includes obtaining: (1) Polarity: If the text is positive, negative or neutral. (2) Subject: The actual context of the text. (3) Information about the opinion holder. There is copious amount of data in the form of Blogs, reviews, forums and other social media platforms and Used to analyse product reviews, market analysis and ways to enhance PR.

Opinions can broadly be classified into two categories: (1) Regular: giving a review on a product directly. For example, "Product A is bad". (2) Comparative: comparing two or more products to give review. For example, "Product A is better than Product B"

### A. Classification of sentimental analysis

Based on levels of detail

- Coarse-grained: Analysis performed on document or sentence level. In document level analysis the entire document is skimmed and looked for overall polarity of the text-Positive, Negative or neutral. While, in sentence level analysis the entire text is classified into subjective or objective opinion.
- Fine-grained: Analysis is performed on a sub-sentence level. Here the sentence is divided into phrases and analysed. This type of analysis provides information like: who posted the text, what the person wants to convey and the reason of their feedback.

### i. Aspect-based Sentiment analysis:

To analyse a single feature of the products. For example, "Camera quality of Phone A is bad" this is a negative feedback on a feature camera.

#### A. Techniques to perform sentiment analysis

There are many ways to analyse sentiments of a text. Two basic methods are as follows:

### i. Algorithmic approach

It is a rule based approach where the data extraction is done putting a set of rules in mind like breaking the sentence in words, segregating into positives and negatives, counting number of positives and negatives and decides the degree of the text. This technique has many disadvantages like the accuracy of the result is less because it does not evaluate the context, complexity of the system increases if more rules are added to the model.

### ii. Automatic approach

No manual work is required in this process. A model is created to predict the sentiment of the text.

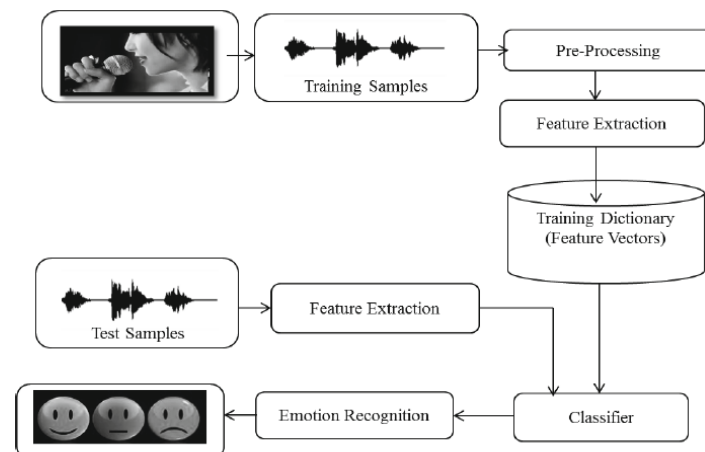


Fig. 1: Real time speech motion analyzer

Real time speech motion analyzer generally follows three steps: Training, feature extraction and classification. The output of the model is tested by parameters like Accuracy, Precision and Recall.

### B. Advantages of Sentimental analysis

70% of data in the internet is unstructured and cannot be used by companies to take insights. Sentimental analysis helps to convert the data to a structured format. It helps in processing and giving feedback on a real time basis to improve the product quality.

II. REAL TIME SPEECH EMOTION ANALYSER

Customer support is one the most important division in any company. It provides information about customer satisfaction. Recent survey suggests 30 percent of the customers switch to Competitor Company with one negative interaction so, this must be given importance.

Real time analysis of customer feedback not only helps the company to improve their performance but, it fastens the customer support system by taking immediate action rather than waiting for yearend feedback surveys. This approach is customer centric and provides reduction in cost.

A. PROPOSED METHOD

A method which promises to improve this both accurately and quickly is real time speech emotion analyser using machine learning. Steps involved in speech emotion recognition are as shown in figure 1.

Step One - Speech input and pre-processing

Speech input is of two types training and testing. Training data can be taken from various sources like RAVDEES and SAVE they are datasets which consist of popular actors and actresses voices in eight different emotions like: Neutral, Happy, Sad, Angry, Calm, Fearful, Disgusted and Surprised. These are taken as training data for the classifier. Test data is the real time customer voice which is recorded and processed for analysis. Pre-processing is an essential part of speech analysis to helps in building a robust and efficient model.

Step Two- Feature extraction

A process extracting desired data from large voluminous data set by analysing the features. This helps in reducing the data size, taking only relevant data for building the model and avoids over fitting. In speech analysis this is done by pattern recognition in both time and frequency domain. The pattern recogniser is used to match 1) energy value of the signal 2) Zero crossing rate and 3) entropy of the signal 4)Pitch etc. For example, an angry person's speech has high pitch and high variance in energy and this decrease as the person becomes less tempered.

Feature extraction can be done by a library is python called LibRosa in python. It is an open source tool which helps in retrieving the features and information from the speech signal Output.

Step Three- Classification

In this part of the process decisions are made based on the output of feature extraction. There is disparate number of classifier models used for speech analysis. Three best and contrasting models are Naive Bayes, ANN (artificial neural network) and SVM (support vector machine). All the classifiers are multiclass and can classify speech data meticulously. Naive Bayes is the simplest model of all which works on the principle of Bayesian theory. It classifies data on the basis of probabilities which is

$$P(A|B) = P(B|A) * P(A)/P(B).$$

SVM is a nonlinear model uses a concept of hyper planes in order to classify data. In speech analysis this model primarily focuses on one feature that is MFCC (Mel Frequency Cepstral Coefficients) which requires a lot of data to train when compared to naive Bayes.

ANN is function based model which separates emotional states using nonlinear functions. The architecture of ANN has an input, output layer which is linked by one or more hidden layers. Errors are corrected by a well-defined algorithm called as backward propagation algorithm.

Step Four- Emotion recognition

Index of emotions from the machine learning model consists of 10 female and male set as follows:

- female\_angry, female\_calm, female\_fearful,
- female\_happy, female\_sad, male\_angry, male\_calm, male\_fearful,
- male\_happy, male\_sad.

III. RESULTS

- i. output of step 1 :Input speech signal classified into three categories U-unvoiced signals which are periodic low energy signals, V-voiced signals which are quasi periodic high energy signals and S-silent signals which have no signal data.

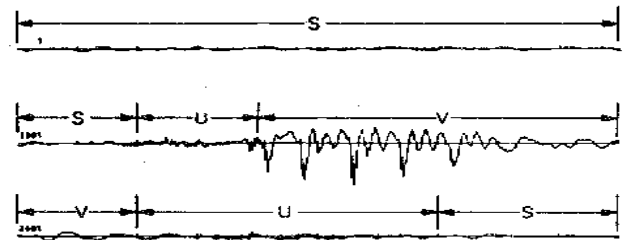


Fig.2: output of speech signals

They are classified by using a predefined threshold point.

- ii. Output of step two:

	127	128	129	0
	0.255648	0.255648	0.255701	angry
	0.218348	0.223208	0.224450	fearful
	0.057186	0.039764	0.021314	angry
	0.088886	0.098216	0.090357	sad
	0.287766	0.252755	0.243608	happy
	0.327999	0.301280	0.300456	calm
	0.149145	0.130382	0.120786	neutral
	0.192630	0.195298	0.187149	happy
	0.222267	0.185138	0.151496	sad
	0.219472	0.205900	0.201549	surprised

Fig.3: output of extracted features

Extracted features of the speech data is as follows

iii. Output of step three:

Accuracy percentages of ANN, SVM and Naive Bayes are as follows:

iv. Output of step four:

Output of speech analyser will be as follows: Accuracy of

Classifier	Recognition Accuracy %
ANN	89
SVM	86.6
Naive Bayes	83.5

Table1: Accuracy of ANN, SVM and Naive Bayes

the model is 89% for predicting emotions using pre trained data. above figure is the snapshot of results when highest accuracy rate was achieved during validation of data.

#### IV. CONCLUSION

In this paper introduction, types and various techniques of sentimental analysis have been presented along with an application of sentimental analysis on real time problem. Building and Implementing model on speech emotion analysis is a tedious task because of heterogeneity in features and input data.

#### V. REFERENCES

- [1]. <https://github.com/MITESHPUTHRANNEU/Speech-Emotion-Analyzer>
- [2]. <https://pdfs.semanticscholar.org/9e84/e0e14bf68c2be693bc9aad7d553502e2746f.pdf>
- [3]. <https://www.ijrte.org/wp-content/uploads/papers/v7i4s/E1917017519.pdf>
- [4]. <https://monkeylearn.com/sentiment-analysis/>