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BPO-Amigo: A System for Call Center

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ABSTRACT: Call centers are service centers that act as a bridge between enterprise and customers. Importance is being given to customer satisfaction and also to performance of call center agents. However, few researches are being done by taking both the customers and the call center agents as the end users. A system performing aspect-based sentiment analysis is being designed and implemented. The proposed system incorporates audio to text conversion, sentiment analysis and a separate customer-login module. It is able to represent sentiments of customers regarding any particular aspect using joint bar graphs.

KEYWORDS: Image processing, Machine learning, Sentiment analysis, Supervised learning.

I. INTRODUCTION

Today's customer service centers have a system in which the audio calls are recorded, but only few recordings are checked randomly by the team lead. During this process a lot of valuable information can be missed. Since opinions of people about the whole company or any particular aspect are provided with these calls, they are rather important and should be analyzed thoroughly. That is why we are implementing a system in which all the call recordings will be converted to text on which sentiment analysis will be performed. This system can be best implemented in any call center or customer service center.

In **[1]** In this paper, a comprehensive opinion mining system is being implemented for the call center called as customer voice center. The proposed system incorporates sentiment classification, domain knowl- edge base techniques and information extraction. SVM classifier is built depending on a variety of features to find out the sentiments and detect the attitude of caller. It helps the enterprise make a closer understand- ing of customers voice and do market positioning as well as business adjustment.

In **[2]** Aspect based sentiment analysis relies heavily on the syntactic features. However, the reviews that this task focuses on are natural and spontaneous, which poses a challenge to syntactic parsers. In this pa- per, the authors have addressed this problem by proposing a framework of adding a sentiment sentence compression step before performing the aspect-based sentiment analysis. Different from the previous sentence compression model for common news sentences, sentence compression seeks to remove the unnecessary information for sentiment analysis, thereby compressing a complicated sentiment sentence into one which is shorter and easier to parse.

In **[3]** In this paper, a software toolkit is being designed with the help of which aspect-based sentiment analysis is carried out to analyze the tweet corpora. The toolkit facilitates sentiment analysis for extracting the positive, negative and neutral aspects of the tweets on Twitter.

In **[4]** this paper, the authors have proposed a method for aspect based sentiment analysis which re- lies on classifier ensembles. Latent Dirichlet Allocation is used to model topic and natural language processing technique is used to specify de- pendencies on sentence level and determine interactions between words and aspects. To recognize the existence of polarized stance and then specifying the exact polarity of the users comments towards each as- pect an ensemble classifier based on Naive Bayes, maximum entropy and support vector machine base classifiers is formulated.

In **[5]**This paper represents a call monitoring system using big data analytics for assessing all recorded calls on certain criteria. Analysis of large amount of call records is done using Hadoop Map Reduce frame- work and algorithms like Cosine and n-grams are used for utilization of text similarity. Drawback of this system was lack of call record corpus, it is used for small call record corpus.

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II. PROPOSED SYSTEM

The proposed system consist of:

1. Speech to text conversion: Taking input as an audio file and converting it to the text using the APIs.
2. Pre-processing module: Two steps are followed in this as STREAMING and REMOVAL OF STOP WORDS.

The aspect-based sentiment analysis module aims to determine the attitude of a speaker with respect to some topic or the overall contextual polarity of a document. Nave baysian classifier used to set label to text data. The aspect category extraction includes mapping entity with its attribute whereas sentiment polarity is where extracted aspects are classified as either positive or negative using nave Bayesian algorithm which is a classification algorithm.

Suggestion of a product to customer module, customer are given a choice to select 2 top features and the product is then suggested based on the comparative analysis performed.

The rough procedure of the defined technique is as follows:

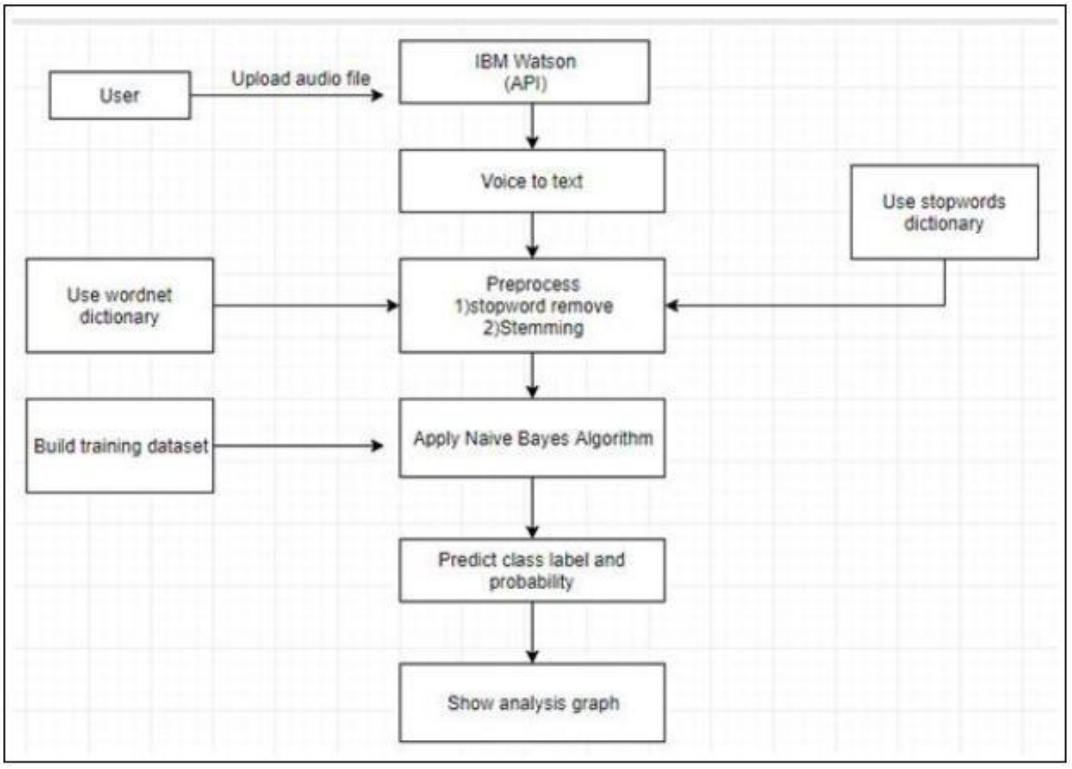

Fig.1 System Architecture

Step 1 : The input to the system is nothing but the audio files which are recorded while the customer care executive communicates with the customer.

Step 2: After this, the files are given to the Watson API for the speech to text conversion.

Step 3: In this step, the software processes the data and the stop-words are removed from it. The stop-words are nothing but the directory words provided by the user.

Step 4: In this step, Naïve Bayes algorithm is used and the probabilistic model is build. This is used to find the probability and this set is then used and the analysis graphs are shown.

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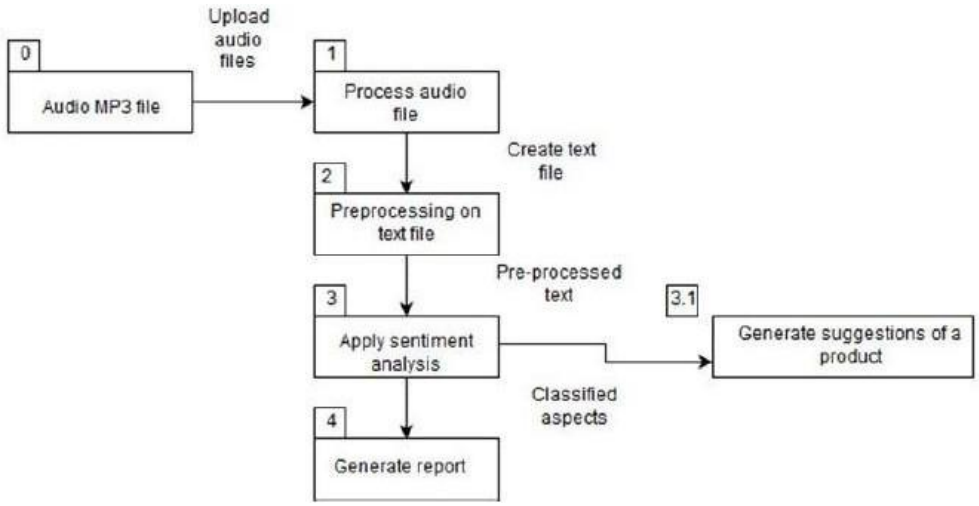

Fig. 2 Data Flow

0. In this step, the audio file is given as an input to the system.
1. In this step, the input file is taken and the output as a text file is generated and is given input to the step 2.
2. When the text file is generated, then the processing on it is done. The processing is nothing but the extraction of the keywords.
3. As the keywords are extracted, then these keywords are used for the sentiment analysis. The classification algorithm and the probabilistic algorithms are applied in the data.
4. As a result the system generates the bar graphs.

III.EXPERIMENTAL RESULTS AND DISCUSSIONS

The result analysis of the system is as shown in the figure below. The figure shows the aspects and the probability of that aspect. The probability is nothing but the how good the aspect is regarding that device or service. For an example, if we are talking about battery of a mobile phone then if the probability shown is on the higher side then the mobile must have the good battery life and user of the system can go for that product.

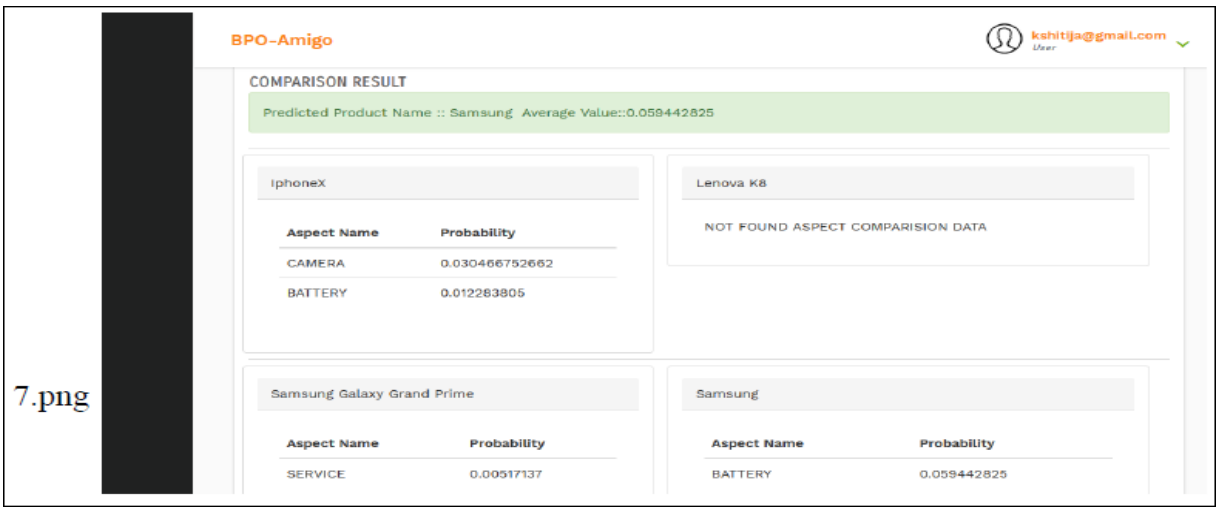

Fig.3: Dash Board

The results are not only shown in the probability format but also the bar graphs. The bar graphs are nothing but the graphical representation of the numbers on the Y-axis and the aspects on the X-axis. The bar graph result of the

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system is as shown in the figure below. The figure shows the aspects of a product on the X-axis and the values regarding it on the Y-axis. Lets consider the example of a car and the aspect as the mileage of the car. When the customer calls the call center where the system is deployed, the system collects the call recording and conver it to the text. It finds the keyword and then counts the number of the call recordings are in favour of the mileage and which are not. Then the bar graph is generated by the system. This bar graph helps the user to decide whether to buy the product or not.

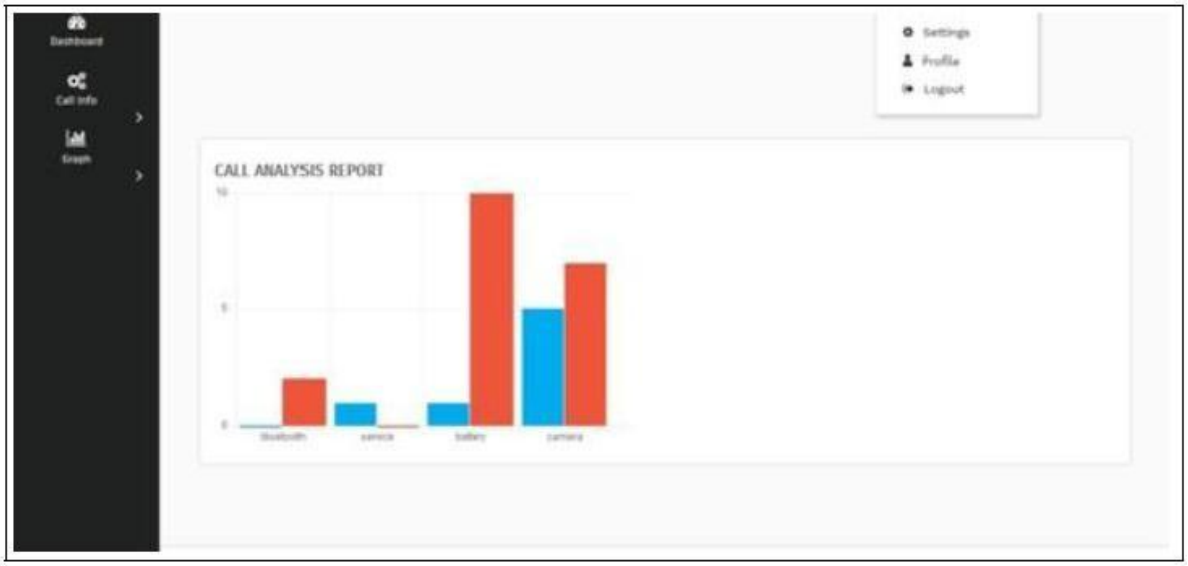

Fig.4: Graphs Statistics

IV.CONCLUSION

The Proposed System Performs the following:

- Audio To Text: The Call Recordings Are Converted Into Text Form Using Ibm Watson Speech Api.
- Preprocessing: The Converted Text Is Then Preprocessed By Filtering Out Stop Words And By Performing Stemming.
- Aspect Based Sentiment Analysis: Aspects Regarding All The At- Tributes Are Then Mapped And Classified Under Positive Or Negative Class Label.
- Bar Graph Generation: By Counting The Positive And Negative As- Pects Of Any Attributes, Bar Graph Is Generated.
- Product Suggestion: The User Can Select Features With Top Most Priority And The System Suggests A Product By Performing Analysis.

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BIOGRAPHY

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