Audio Opinion Mining and Sentiment Analysis of Customer Product or Services Reviews

Chapter · May 2020

DOI: 10.1007/978-981-15-1420-3_30

2 authors:

Archana Rane
K. K. Wagh Institute of Engineering Education and Research
9 PUBLICATIONS **7** CITATIONS
SEE PROFILE

Ankita Kshatriya
K. K. Wagh Institute of Engineering Education and Research
1 PUBLICATION **1** CITATION
SEE PROFILE

Audio Opinion Mining and Sentiment Analysis of Customer Product or Services Reviews

Archana L. Rane[1], Ankita R. Kshatriya[2]

[1,2]Department of MCA, K. K. Wagh Institute of Engineering Education and Research, Nashik, India
alrane@kkwagh.edu.in[1], ankitakshatriya008@gmail.com[2]

Abstract. Sentimental analysis evolved over last few decades is only focused on textual sentimental analysis. In Internet era, people are exchanged their opinions publicly. And it is a challenge to understand and identify the context or tone of them. Another problem is that hard to categorize when the context is not given, as they could be tag positive or negative. People can be contradictory in their statements. Most reviews will have both positive and negative comments, which is somewhat manageable by analyzing sentences one at a time. However, with the help of natural language processing and computer we can categorize it. But when peoples are given their opinion in audio format then it is quiet difficult to analyze into sentiments. In this paper, we proposed the audio opinion mining and sentiment analysis of customer products or services reviews which helps to take decision in today's business world to improve their growth of the business. Customer discrimination and sentiment analysis is performed on customer reviews collected as audio messages on customer products or services. In this paper, we proposed the audio opinion mining and sentiment analysis of customer products or services reviews which helps to take decision in today's business world to improve their growth of the business. Customer discrimination and sentiment analysis is performed on customer reviews collected as audio messages on customer products or services.

Keywords: Sentimental Analysis, Opinion Mining, Speech Recognition, Classifier

1 Introduction

Internet usage growth motivated users to comment on the customer product or the services offered in terms of reviews in writing or as audio message. These comments can be in terms of reviews, survey responses, online posts, social media communications, and healthcare related posts from marketing to customer service. New user prefers to know the existing opinions about the particular product or the services before its usage. Accuracy of customer product or services is measured only after analysis of these opinions. Natural language processing techniques are applied to systematically identify, extract, quantify, and study this subjective information. Such techniques are called as opinion mining. The usage of opinion mining on voice/audio review comments is commonly known as sentimental analysis.

The main intention of sentimental analysis is to determine the attitude of a speaker, writer, or other subject with respect to some topic or the overall contextual polarity or emotional reaction to a document, interaction, or event. The attitude may be a judgment or evaluation, affective state, or the intended emotional communication. Usage of sentimental analysis in study of human emotion or attitude, extraction of conversation on topics is more popular and lot of literature exists on it. Very less literature exists on usage of sentimental analysis in understanding the mindset of human being based on their talk.

For a machine to understand the conversation, we need to interact with the customer through mobile or telephone. This conversation is going to record in audio file, on which sentiment analysis is performed to extract data from the audio file. Sentiment analysis is the process of detecting a piece of writing for positive, negative, or neutral feelings bound to it. Humans have the innate ability to determine sentiment; however, this process is time consuming, inconsistent, and costly in a business context it's just not realistic to have people individually read tens of thousands of user customer reviews and score them for sentiment. Usage of sentimental analysis technique to determine sentiment from the huge number of user customer reviews in audio forms helps to score the sentiment consistently, easily and correctly within very less span of time. This paper proposes the audio opinion mining and sentiment analysis of customer products or services reviews which helps to take decision in today's business world to improve their growth of the business.

The organization of the paper is as follows:
Section 2 discusses the related works on sentimental analysis on audio/textual information. The proposed audio opinion mining and sentimental analysis of customer products and services are explained in Section 3. The section 4 elaborates on the experimental results obtained for the proposed technique. Section 5 concludes the paper.

2 Related Work

The related works reveals that there have been various approaches for identifying product features from unstructured customer reviews. The authors of [1] have explained the evolution of opinion mining by categorizing it into five phases. In Internet era, web application has created number of opportunities to the user to freely express their opinions in form of reviews. Gautami Tripathi and Naganna have discussed the review on opinion mining with applications and corresponding challenges [2]. Three classification algorithms are deliberated to analyze their efficiency and accordingly choose the best text classifier in opinion mining and sentiment analysis [3]. The authors of [4] have proposed to identify human intelligence and categorized book-features from online reviews which may help users in finding the books of their choice. The mobile application developed [5] that give satisfactory results based on most discussed words and made opinion about the product. The text is automatically converted into audio file to perform speaker voice recognition technique [6].

3 Proposed System "Audio Opinion Mining and Sentimental Analysis of Customer Products and Services"

Speech-To-Text(STT) and Sentiment Analysis techniques are proposed in this paper for audio opinion mining. The proposed audio opinion mining process captures the response of customers on a particular topic. Sentiment al analysis is the type of natural language processing for tracking the mood of the public about a particular product or topic. Sentimental analysis is also called as opinion mining. Sentiment analysis is the subfields of machine learning. In figure 1 show the generic work flow diagram of sentiment analysis.

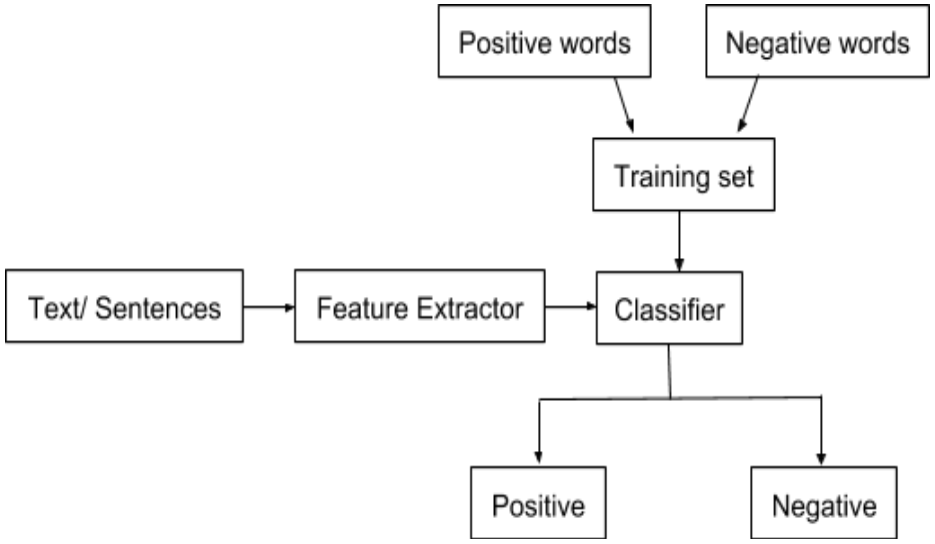

Figure 1: Generic diagram for sentiment analysis

In proposed system, we used G-suite Cloud telephony provider technology. A cloud based productivity suite that offers a wide array of features and benefits to consumers and businesses. G Suite puts all of Google's most popular apps into one package. G-suite provides services as free to use for consumers. G Suite adds enterprise features such as custom email addresses at a domain with unlimited cloud storage. G Suite ties all of Google's apps together into one place and we already use some of Google's apps every day that is our email or Gmail. G-suit includes the feature called data center which used for backup purpose. G-suit administrator may choose wide range of setting that control the privacy setting. By utilizing this technology, we have implemented our proposed techniques.

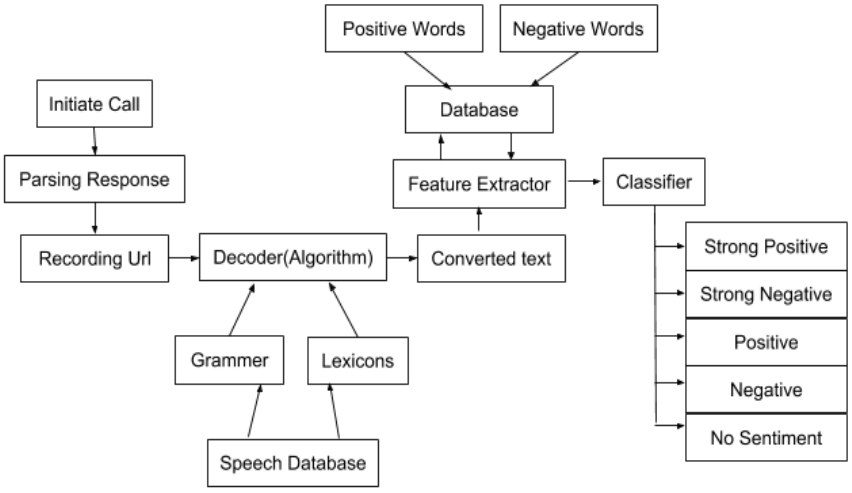

Figure 2: Data flow of proposed system

Figure 2 shows the data flow of proposed system. The system has followed the several steps and it's including the different processing components are as follows:

A. Parsing Response: determine lead delivery to a destination properly or not
B. Recording: Process which records the conversation of a telephone call
C. Decoder: Decodes the input
D. Text Extraction: Extracts all the text from the input given from the system
E. Features Extractor: remove redundant and irrelevant features so that classification of new instances are more accurate
F. Classifier: Help in good prediction accuracy and automatic detection of relevant features
G. Display the Classification Result: This module displays the lists containing positive and negative review separately and later it will be used for sentiment analysis

For implementation of the system, it has involves five steps:

1. **Click to call:** It is used to call customer. Proposed system maintains record of the entire customer including their name, city, state, mobile number in an easy to use Google sheet. The status of the call is maintained where status column in the "Master Sheet" should be kept blank for the further processing. Call is initiated from the system itself and once call is patched, all the empty status is replaced with "Call Queued". In case, where customers phone number is found to be DND then the status is automatically filled as "DND Number" and further processing is stopped.
2. **Call Recording:** process which records the conversation of a telephone call. In this system call recording is used to capture the responses of the customer. Here, once the call is patched to the customer, response is parsed. Details like call sid, date/ time, recording url is extracted from the cloud telephony providers response and stored in the "Call Logs sheet". This Recording URL can be accessed anywhere as the url is stored on the cloud so it eliminates the chances of any restriction on the recording.

3. **Speech Recognition:** ability of devices to respond to spoken commands. This system uses this technology to convert the responses of the customer which are stored in a recording url. This system uses "**liv.ai**" API for the conversion of the recording into textual format. It works after extraction of "Recording URL" which is passed to the decoder (Algorithm) which then converts the recording into text. Speech-To-Text conversion process starts by searching for the similar words in recording as well as in the "Speech Database". It further checks for the grammar as well as Lexicons in recording and accordingly frames the sentence and gives the respective text as output.
4. **Sentiment analysis**: process of identifying whether a piece of text is positive, negative or neutral. This machine learning technique identifies the polarity in the opinions expressed by the customer, where the opinions are bifurcated into positive, negative, or neutral. The proposed system uses "**MeaningCloud**" API for sentiment analysis. Sentiment analysis process starts by taking the converted text and further on passing to the feature extractor, where its task is to extract the required feature from the given text and check in the database. Database stores the positive and negative words by mining the experiment data and then storing accordingly. Here in the system, feature extractor check into the database for the positive as well as negative words and then classifier classifies the polarity of the given sentence accordingly. For the backup purpose, all the data is simultaneously stored in the firebase.
5. **Report Generation:** In general, report is a document containing information organized in a narrative, graphic, or tabular form, which is generated on requirement basis. From the sentiment data, various reports can be generated. Proposed system generates reports on monthly basis and separately according on the category like Positive, Negative, Strong Positive, Strong Negative, No sentiment respectively. This step helps to top level of management people to get idea about business in less time.

4 Experimental Data and Results

For the purpose of experimentation, we have taken Internet data. We test the data by applying testing concept and got result as shown in Figure 3 to 5.

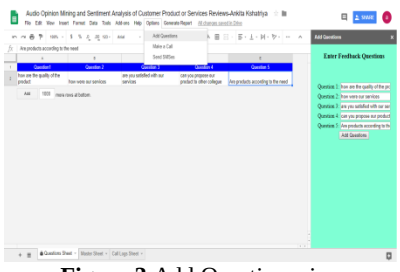

Figure 3 Add Questionnaire

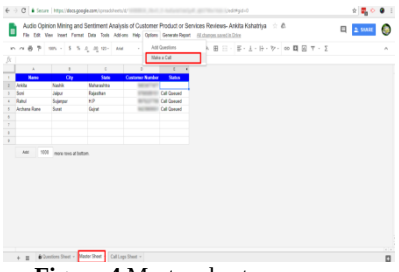

Figure 4 Master sheet

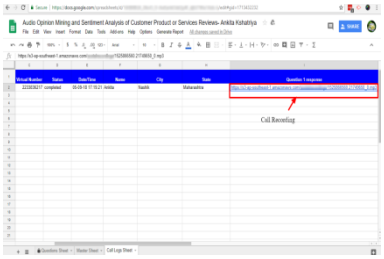

Figure 5 Call recording

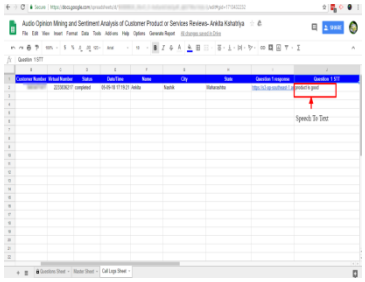

Figure 6 Speech-to-Text

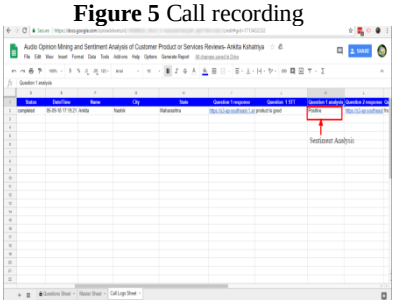

Figure 7 Analysis

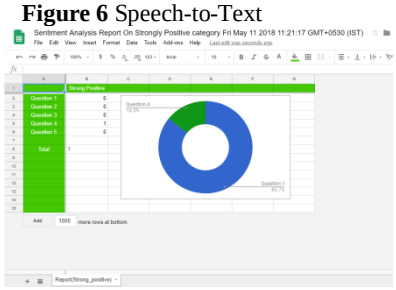

Figure 8 Strongly Positive

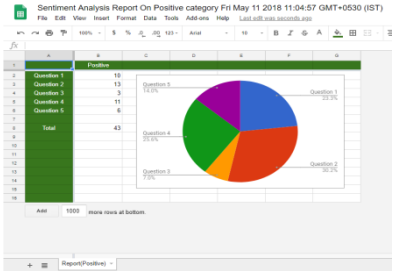

Figure 9 Positive

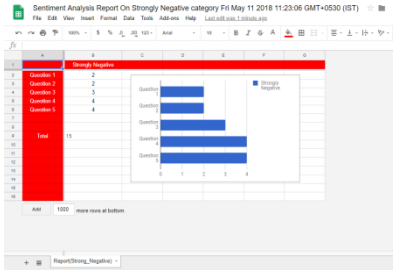

Figure 10 Strongly Negative

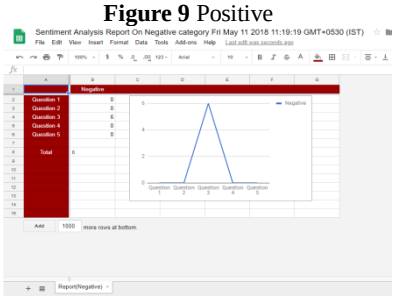

Figure 11 Negative

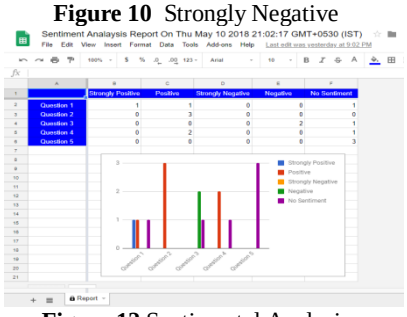

Figure 12 Sentimental Analysis

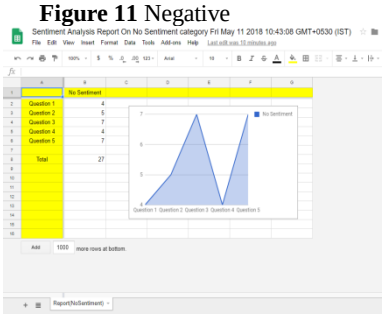

Figure 13 No Sentimental

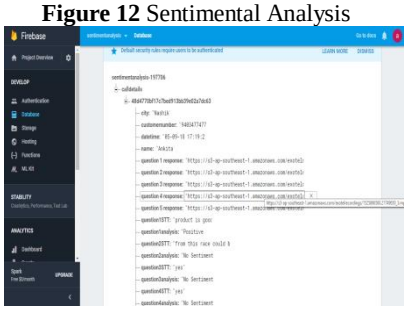

Figure 14 Backup @ Firebase

By applying the Speech-To-Text and Sentiment Analysis techniques, the result is obtained and it is shown in Figure 6 to figure 14. It is clear from the results that audio opinion mining helps to study the strength and weakness of customer reviews that helps the business person to change their strategy to give maximum satisfactions their customer.

5 Conclusion

In this paper, we have proposed audio opinion mining generalized model that initiates call to the customers for the feedback and takes their responses in the form of recording. It then extracts the text from the recording and later on analyzes the sentiments based on each question and discussed the results achieved in graphical format which helps to easily understand by any one. However, the proposed system has a static feedback flow structure where number of questions asked to the customers is fixed. The future work would be making the flow dynamic and with more accuracy along with scalability of the system.

Acknowledgement

This work was supported by UMS Tech Labs, Nashik. We are thankful to Mr. Shashank Todwal, CEO, UMS Tech Labs and his team members who provided insight and expertise that greatly assisted the project work.

References

1. Kalaiarasi Sonai Muthu Anbananthen and Ayoub Mohamed H. Elyasir, “Evolution of Opinion Mining”, Australian Journal of Basic and Applied Sciences, 7(6): 359-370, 2013 ISSN 1991-8178
2. Gautami Tripathi and Naganna S,” Opinion Mining: A Review”, International Journal of Information & Computation Technology. ISSN 0974-2239 Volume 4, Number 16 (2014), pp. 1625-1635
3. Santhosh Kumar K L, Jayanti Desai and Jharna Majumdar , “Opinion Mining and Sentiment Analysis on Online Customer Review”, IEEE International Conference on Computational Intelligence and Computing Research, 2016
4. Shahab Saquib Sohaila,Jamshed Siddiquia, Rashid Ali, “Feature extraction and analysis of onlinereviews for the recommendation of booksusing opinion mining technique”, special issue on Engineering andMaterial Sciences, Published by Elsevier GmbH. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/ licenses/by-nc-nd/4.0/) 2016
5. Jan Prichystal, “Mobile applications for customers’ reviews opinion mining”, 19th International conference Enterprise and Competitive Environment 2016, ECE 2016, 10-11 March 2016
6. Maghilnan S, Rajesh Kumar M, “Sentiment Analysis on Speaker Specific Speech Data”, International Conference on Intelligent Computing and Control (I2C2), 2017