Chapter 31
Sentiment Analysis for Health Care

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ABSTRACT

Sentiment analysis for health care deals with the diagnosis of health care related problems identified by the patients themselves. It takes the patients opinions into perspective to make policies and modifications that could directly address their problems. Sentiment analysis is used with commercial products to great effect and has outgrown to other application areas. Aspect based analysis of health care, not only recommend the services and treatments but also present their strong features for which they are preferred. Machine learning techniques are used to analyze millions of review documents and conclude them towards an efficient and accurate decision. The supervised techniques have high accuracy but are not extendable to unknown domains while unsupervised techniques have low accuracy. More work is targeted to improve the accuracy of the unsupervised techniques as they are more practical in this time of information flooding.

INTRODUCTION

In this time of technology, people share their issues online and take advice on them, just like they previously did from their friends and family. This online data can be found on various sources like blogs, forums, social media websites etc. covering a vast range of topics. There are health related blogs and forums where people discuss their health issues, symptoms, diseases, medication etc. The experience related to the health care centers visited, in the locality is also shared in terms of availability, service, environment, satisfaction, comfort etc. It is of great value to the new patients to learn from others experience about taking decisions regarding their health, medication or choosing a health care center. This information is also very important to the health care centers to identify the patients concerns and address them. Patients share this information wrapped in their own sentiments and emotions, which is the driving force of this

type of analysis. (Liu, 2010) has explained Sentiment analysis as identifying the sentiments of people about a topic and its features. The health related content available online is free and is in huge amount, therefore, it is less practical to analyze all this information manually and conclude them towards a rapid and efficient decision. Sentiment analysis techniques perform this task through automated processes with minimal or no user support.

Surveys and questionnaires have been used previously for this purpose which were expensive and time taking. The professional articles produced by experts are in small number and they do not address the problems faced by the patients or rarely consider the patients perspective. Sentiment analysis takes into account the opinions of patients expressed in millions of documents, that is spread over multiple platforms. The output of sentiment analysis can be in the form of categorization of health decisions into two classes as recommended or not recommended. By digging deeper the aspects or features of the health problem can also be extracted. The aspects of a target entity e.g. medicine can be price, taste, packaging, availability, side effect, time effective etc. This led to the foundation of Aspect-based sentiment analysis in (Liu & Hu, 2004). Aspect based sentiment analysis perform sentiment analysis at the aspect level, thus aggregating users' opinions towards each aspect of the target entity. This type of analysis is more realistic as a good medicine or treatment may not have all aspects rated good. It empowers patients to look for medication and treatment procedures that have high rating for the aspects of their concern. New studies in the field of sentiment analysis try to reveal the reasons behind sentiment orientation. Such a system will not only reveal the satisfaction level of patients but will also show the reasons behind their feelings. It will provide much targeted information as the reasons to address for improvement are also specified.

The objective of this article is to highlight the importance of opinions expressed by millions of patients regarding their illness, treatments, medication etc. The recent advancements in hardware technologies have made it possible to process the large-scale sentiment data through automatic machine learning techniques. These techniques perform heavy statistical evaluations to predict prominent semantic patterns. Utilizing this information, the health care centers and the government health ministry can make policies accordingly to address these issues that would directly impact the masses. It will empower the patients to raise voice for their own problems directly to the higher authorities without following painful procedures. Such feedback systems, based on sentiment analysis is already been used for governance, university management systems etc. The sentiment dataset possessing timestamp can be categorized based on time slots while sentiment analysis is performed at each slot separately. This type of analysis reveals a trend of public opinion over a period of time. It can be used to track the performance of a patient, instrument or health center, where the ones with dropping performance can be pointed out. Normally people are reluctant to new procedures of treatment and it can track the change in the perception of people.

BACKGROUND

Sentiment analysis (also known as opinion mining) techniques have been used successfully for commercial products over the last decade. It has gained popularity as people prefer to know about others opinions before making a decision. Sentiment analysis explores popular opinion patterns and presents it in a way that is easy to understand. In the context of health care they may lead to practices and decisions that majority of the patients used to beat their illness. Sentiment analysis has been a hot research topic and has outgrown from business intelligence for commercial products to other disciplines like social sciences, politics, geography, management sciences, health care, stock market etc. Sentiment analysis is

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