A Short Review for Mobile Applications of Sentiment Analysis on Various Domains

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1 Introduction

Sentiment analysis in recent times become a powerful complement to traditional business intelligence. Social networking gets the attention of business developers in various sectors such as marketing, health care, education and finance etc to improve their business from the people opinion shared on the different websites like facebook, twitter and other bolgs. Opinions available in the social networking sites either in the form structred or unstructured. The structuredness is found to be from questionaire and the unstructureness is from text box as free text. So it is necessary to process those unstructred text to detect what people trying to say about something by using effective machine learning techniques. Naive bayes classifier, support vector machines, rule based classifier and genetic algorithms are the best machine learning techniques which can be used to find the polarity of the reviews [7]. The polarity classification can be done at three different levels such as document level sentiment analysis, sentence level sentiment analysis and aspect level sentence analysis [19]. Based on requirement any one of these type of sentiment analysis can be used for polarity classification. Usually document level sentiment classification does not give much effect on finding the polarity of the people opinion. So either sentence level sentiment analysis or aspect level sentiment analysis can be used to identify the polarity of the opinons. Most of the work done so for on sentiment analysis at the sentence level and document level only. Sentence level sentiment analysis fails to infer congnitive and affective information associated with each sentence. So the concept level sentiment analysis overcome these issues [8]. Presently feature based sentiment analysis is also used mostly in product review, which gives more classification accuracy [13].

Sentiment analysis in the marketing field is used to analysis the product reviews, movie review contents and reviews about the services offered. It will help the business intelligence people to know the brand status of their product or services for further development. This technology is rapidly used in the field of education to help the students and to improve the infrastructure of the institutions by analyzing opinions from different people through online web portals. E-Health is becoming a growing area on various assistance to support patients and doctors using sentiment analysis techniques and tools effectively. This can also be started using in the election process to make a survey of opinionabout different candidates. So sentiment analysis techniques can be used effectively in all the fields. Our objective is to find the issues present in the different sentiment analysis applications and explore how mobile based applications can be created for those applications.

In this paper, we performed a preliminary study on how different types of sentiment analysis were used on various application areas and different machine learning techniques used on those type of sentiment analysis. Also we identified some sentiment analysis techniques which can be specially used on the education domain. The following section describes sentiment analysis used for diffrent domains.

2 Review on Applications of Sentiment Analysis

2.1 Sentiment Analysis for Product Review

Feature Based Sentiment Analysis on Customer Feedback [1] is an approach,where opinions are categorized based on product features. Here opinions are crawled from social networking sites, such as twitter, facebook and other blogs. The product features are collected either from manufactures or internet. The feature based opinion categorization is

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achieved as a four step operations. Initially using WordNet [21] the synonyms for each features of a product is collected. Since customer may use different words to comment about featuresof the product. Then with the help of POS tagging, the words of opinions are tagged as either noun or adverb or adjective etc. In this approach only nouns are assumed to be the features of a product. So it shows the explicit features of a given product. Then the words tagged as noun are compared with the features collected from manufactures. Now, nouns in the sentences, matches with features of a product collected from manufactures, are clustered as bag of related sentences. From these bags of related sentences the semantic score of adjectives and adverbs are calculated using SenticWordNet [21]. The semantic scores are then used to identify the semantic orientation of each sentence. Sentences having greater than zero semantic scores are identified as positive sentiment orientation and rest of the sentences are identified as negative sentiment orientation. In this work the accuracy is calculated by reading all reviews manually from output file. This becomes a time consuming process of analyzing reviews. This work fails to extract implicit features of the products from the opinion of customer. Our focus is to explore this work on mobile application by elimination the issues found on it.

2.2 Sentiment Analysis for E-Health

Sentic PROMs: Application of sentic computing to the development of a novel unified framework for measuring health-care quality [2] is a used to measuring health of a patient.A tool called Patient Reported Outcome Measures (PROMs) was proposed to measure the patient Health Related Quality of Life (HRQoL). This model helps the patients to evaluate their health status through both structured (fixed questionnaire) and unstructured (free text) way and also it reduces the gap between the structuredness and unstructuredness of the patient data. It produces the semantics and sentics from the patient opinionated data as output. A set of topics and the polarity associated with it is extracted from the patient data at semantic level. Hence the patient opinions are fed as input to this tool and semantics and sentics as outputs. This patient opinion mining engine is a combination of four components such as a preprocessing module, a semantic parser, the ConceptNet module and the AffectiveSpace module. The affective valence indicators present in the opinion text are interpreted by preprocessing module. Then these texts are deconstructed into concepts by semantic parser using a lexicon and create a Small Bag of Concepts (SBoC). These bags of concepts are analyzed by ConceptNet and AffectSpace tool. The ConceptNet produces semantics from each SBoC by projecting the concepts on the matrix. This matrix helps to calculate the semantic relatedness of each concept and the degree of different class. On the other hand the AffectiveSpace module produces sentics using dimensionality reduction techniques. Finally cumulative polarity of both semantics and sentics are calculated in an effective manner. This application is lacking on conducting on-field usability tests for different case-mixes and detection of spam patient reviews. We are planning to enhance this model using Principal Component Analysis (PCA) technique [22] with mobile implementation to help patients through mobile phone by the practitioners.

A Hybrid System for Online Detection of Emotional Distress [11] is a model to detect the distress through online. This model helps to identify depressed people to provide help and follow-up services from the emotions expressed in the social networking sites and other web media. Initially the emotional text contents are retrieved through some blog search engines using meta-search approach [20]. These contents are made available for further analysis with automated process. Now the contents are classified using Hand-crafted model and supervised machine learning technique called support vector machine. These classifiers generate prediction scores for each blog contents. The final score is calculated with aggregation of the scores of both classifiers. The classified data published in blog, which is reviewed by clinical psychologists. In this depression detection system some standard evaluationmeasures such as precision, recall and F-measures to evaluate the performance of affect analysis techniques.It is far way from detecting more sensitive words related to depression of a user from social networking sites. This system can be implemented as a mobile based model to help the depressed users by sending some energetic tips.

2.3 Sentiment Analysis for Education

In [3] a framework was proposed to collect the exact feedback from students.The authors discussed about different existing approaches for collecting student feedback about a lecturer using handheld devices such as clickers and mobile phones. Usually it is found that using these devices the teaching methods can be improved from student feedback. Clicker is a real time interactive technology for education to asses teaching and learning process and to solve teaching problems. In this technology the students can response to the different multiple choice questions posted on a screen using a remote transmitter which contains buttons for ‘yes’ and ‘no’ options. These results are collected instantly and tabulated for instructor to act accordingly. Another method is the use of mobile phones for getting feedback either through mobile applications or SMS. Though these methods help the instructors to know the effectiveness of a session

from the student feedback, there is a possibility for misusing the mobile phones in the classroom and breaking the transmitter. So everyone is looking for better solution which helps the instructor to get feedback of a session without disturbing the current session.

So the authors suggested that making use of social media for collecting feedback about the session from students could be a better solution that will not disturb the present teaching session. Since the social networking sites like twitter, facebook and other micro blogging sites are used as a tool for getting opinion about different products, movies, treatment and other interesting areas to make some decision for the further improvement. People share their opinions about different thing either if they get benefitted or get affected to make other to be aware of those things. So in this paper the authors proposed a new architecture for getting student feedback using sentiment analysis techniques. In this the social networking sites are used as an interface for students to give feedback about each session on a particular time slot. Then using sentiment analysis techniques such as naïve bayes, maximum entropy and support vector machine the extracted free text from those sites are analyzed and results are sent to instructor to make further decision. So the instructor act according to those feedbacks and the session can be improved in a much better way. Thus the authors concluded that the sentiment analysis system can be used in the education sector for improving teaching learning methodologies. Student feedback posted through online portal sometimes in vagueness form,so fuzzy logic techniques can be used to handle the vagueness content. Our aim is to use aspect based sentiment analysis method to analyze the emotional contents of the students and alerting lectures via their mobile phones.

In [4] an Opinion Mining Framework was designed to collect opinion about Malaysian university and it analyze the online opinionsabout various Malaysian universities. The objective of this framework is achieved by three processes such as extraction, text processing and polarity classification. The extraction process collects opinions in an unstructured text format from various online sources. In includes a set of operations such as preprocessing and tagging. Using web crawling, HTML (Hyper Text Markup Language) parsing and Part Of Speech (POS) tagging the opinionated sentences are extracted from top ranked URL's (Unified Resource Locator). These sentences are segmented using regular expression and tokenized for tagging process. Here the Brown Corpus was chosen to tag the words in the tokenization process. Then stemming and stop word removal process is performed on those words using Named Entity Recognition (NER). Thus a corpus is constructed with words relevant to education domain. So these entities are parsed manually to SentiWordNet tool to find polarity. Thus polarities of various Malaysian universities are calculated and shown in graphical pattern.This framework covers only specific geographic area, so it can be extended to all kinds of institutions available in the world.

The Implementation of Social Networking as a Tool for Improving Student Participation in the Classroom [13] is a model to create an effective classroom. Though the effectiveness of the classroom teaching can be improved in different ways, it is not possible to use feedback posted on the social networking site instantly while taking classes. The idea behind this work is to use the feedback of the students posted on the social networking sites can be viewed by the lecturers on their current teaching slides without interrupting the session. So this will enable the students to shout their real time questions to their lectures during the session. Therefore student hesitate to post the question can post their question through online social networking sites using this approach. When the queries posted by the students get increased, the lecturer will get interrupted. So time slots could be allotted for posting queries to lecturer. The anonymous feedback become can be detected and sentiment analysis techniques can be used to analysis the feedbacks automatically.

2.4 Sentiment Analysis on Mobile

Mobile Sentiment Analysis [5] proposed to evaluate the sentiment of a person through mobile applications. In this approach the sentiment analysis is performed on the mobile phones locally. Here SMS messages and social media review content seen on the mobile phones are used as the input to the system. Hence this system calculates how much positive or negative messages read on a mobile phone using sentiment analysis techniques. Here the sentiment analysis is done at sentence level. English language is considered for SMS messages to be analyzed. The sentence level sentiment analysis consists of two major tasks such as subjectivity classification and sentiment classification. The assumption was made that the sentences contains an opinion of single opinion holder. To perform these tasks of classification the naïve base classifier, regression model and support vector machines are used.

In this work the sentiment analysis was performed using the principles of the SentiCorr sentiment analysis engine. Adaptive boosting algorithm was used to perform subjectivity classification. Rule Based Estimation Model (RBEM) was used for polarity classification in which eight different rules were emerged from eight different pattern groups. This model collects patterns and its associated rule is applied that match with sentiment in the messages. After collecting the match patterns from messages those eight rules are applied in a correct order. Rule1 Setting Stops sets stops on all the left flips and stop patterns. Rule2 Removing Stops removes the stop in the continuator pattern. Rule3 positive sentiment emission calculates an emission value for each positive pattern. Rule5 amplifies sentiment amplifies the sentiment

emitted by positive or negative sentence. Rule6 Attenuating Sentiment reverses the Rule5 operations. Rule7 and Rule8 for right flipping and left flipping sentiment to ignore the patterns contains right flip and left flip. Finally the polarity of the message is calculated by adding the emission values of each element. Sentence having greater than zero polarity value become positive sentence and less than zero polarity value become negative sentence. The rest of the sentence is categorized as unknown sentences.

3 Conclusion

In this paper, preliminary study of various sentiment analysis applications and its techniques was performed. We also found that there is a scope for using sentiment analysis techniques in a much better way in the field of education to help students, faculties and management to resolve the issues through feedback posted on the web portal. Feature based sentiment analysis can be a better option to categorize sentiment contents posted by students, employees and public about a specific institution. This will help the management of those institutions to act accordingly to take the institution in a right path. It is also possible to develop a mobile based application which incorporates the discussed techniques. It will become easiest way for the student, employees and management to share their emotions and get the remedial actions instantly. Finally we conclude that feature based sentiment analysis will be a better option to improve the students quality in education domain. In the future work we are planning to apply these techniques in various domains with cloud computing implementation. And also there is a scope for improving accuracy using computational intelligence techniques.

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