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Emotion Finder: Detecting Emotions From Text, Tweets and Audio

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Abstract

With the growth of the Internet community, textual data has proven to be the main tool of communication in human-human interaction. This communication is constantly evolving towards the goal of making it as human and real as possible. One way of humanizing such interaction is to provide a framework that can recognize the emotions present in the communication or the emotions of the involved users in order to enrich user experience. The use of social networking sites is one of the approaches for putting views of user. Proposed emotion detector system takes a text document or audio and the emotion word ontology as inputs and produces the scores of six emotion classes (i.e. happy, sad, fear, surprise, anger and disgust) as the output; for twitter data as input the extracted tweets are categorized in to positive, negative and neutral tweets.

Keywords: *Human-Computer Interaction; Textual Emotion Recognition; speech analysis; twitter analysis; Emotion Word Ontology*

1. Introduction

Human emotion recognition by analyzing written documents appear challenging but many times essential due to the fact that most of the times textual expressions are not only direct using emotion words but also result from the interpretation of the meaning of concepts and interaction of concepts which are described in the text document. Emotion detection from text plays a key role in the human-computer interaction. Human emotions may be expressed in many ways like person's speech, face expression and written text known as speech, facial and text based emotion respectively. In human computer interaction, human emotion recognition from text is becoming increasingly important from an applicative point of view.

Methods being used for text based emotion detection are classified into keyword spotting technique, lexical affinity method, learning based method and hybrid approach however each method has its own limitations. A proposed architecture which contains the emotion ontology and emotion detector algorithm.

2. Existing Methods

Methods being used for text based emotion detection are classified into keyword spotting technique, lexical affinity method, learning based method and hybrid approach however each method has its own limitations.

A. Keyword Spotting Technique

The keyword spotting technique can be described as the problem of finding occurrences of keywords (love, anger, joy, sadness, surprise and fear) from a given text document. Many algorithms to analyze sentiment or emotion have been suggested in the past. In the context of emotion detection this method is based on certain predefined keywords. These emotion words are categorized into keywords such as disgusted, sad, happy, angry, fearful, surprised etc. Occurrences of these keywords can be found and based on that an emotion class is assigned to the text document.

B. Lexical Affinity Method

Detecting emotions based on related keywords is an easy to use and straightforward method. Keyword spotting technique is extended into Lexical affinity approach which assigns a probabilistic 'affinity' for a particular emotion to arbitrary words apart from picking up emotional keywords. These probabilities are part of linguistic corpora but have some disadvantages also; firstly the assigned probabilities are biased toward corpus-specific genre of texts, secondly it misses out emotional content that resides deeper than the word-level on which this technique operates e.g. keyword 'accident' having been assigned a high probability of indicating a negative emotion, would not contribute correctly to the emotional assessment of phrases like 'I met my girlfriend by accident' or 'I avoided an accident'.

C. Learning-Based Methods

Learning-based methods are being used to analyze the problem in a different manner. Initially problem was to determine sentiment from input text data but now the problem is to classify the input texts into different emotion classes. Unlike keyword-based detection methods, learning-based methods try to recognize

emotions based on previously trained classifier, which apply theories of machine learning such as support vector machines and conditional random fields, to determine that input text belongs to which emotion class.

D. Hybrid Methods

Since keyword-based technique with thesaurus and naïve learning-based method could not acquire satisfactory results, both the methods are combined to improve accuracy.

3. Limitations

From above discussion there are few limitations:

1) Ambiguity in Keyword Definitions

Keyword based emotion detection is a simple way to
detect associated emotions but the meanings of keywords could be multiple and vague, as several keywords could change their meanings according to different usages and contexts. Moreover, even the minimum set of emotion labels (without all their synonyms) could have different emotions in some extreme cases such as ironic or cynical sentences.

2) Incapability of Recognizing Sentences without Keywords

Keyword-based approaches always search for some specific set of keywords. Therefore, sentences which does not contain any keyword would imply that they do not belong to any emotion at all, which is obviously wrong e.g. “I passed my qualify exam today” and “Hooray! I passed my qualify exam today” imply the same emotion (joy), but the sentiment in former sentence without “hooray” could not get detected if “hooray” is the only keyword to find the emotion.

3) Difficulties in Determining Emotion Indicators

Learning-based approaches can determine the probabilities between features and emotions but these approaches still need keywords in the form of features. Emoticons are the most intuitive features which can be seen as author’s emotion annotations in the texts. The cascading problems would be the same as those in keyword-based methods.

4) Recognition of emotions from audio

All the previous work show detection from text but not audio.

4. Proposed System

The proposed system is based on keyword spotting technique apart from that it also uses the concept of ontology. Use of ontology makes this model more efficient than other methods in recognizing emotions from text input

Proposed framework is divided into two main components:

- Emotion Ontology
- Emotion Detector

Emotion Ontology

Ontology is an explicit specification of conceptualization. Ontologies have definitional aspects like high level schemas and aspects like entities and attributes interrelationship is between entities, domain vocabulary. It allows a programmer to specify, in an open, meaningful way the concepts and relationships that collectively characterize some domain. Emotion can be expressed as happy, surprise, sad, disgust, fear, anger and so on.

Emotion Detector

Sentiment or emotion class of the text data can be recognized with the help of proposed emotion detector algorithm. The algorithm calculates score for every emotion class of primary level available in the emotion ontology by adding the scores of its respective secondary and tertiary levels’ emotion classes.

In final step scores of all the primary level classes are compared and emotion class having maximum score will be declared as the “emotion” of the input text document.

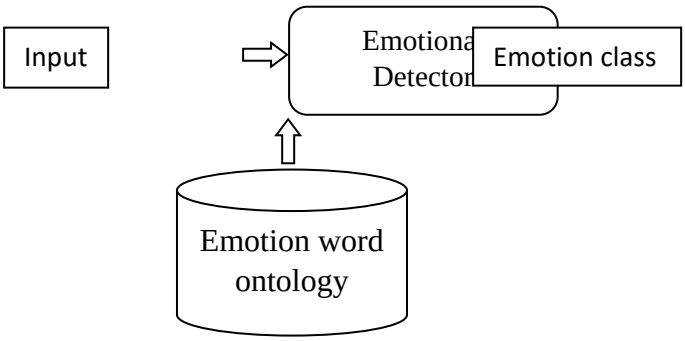

Fig 1: Proposed Architecture

5. Methodology

There are three different modules in our proposed system:

1. Text analysis from manual entry of input,
2. Twitter data analysis
3. Speech analysis

All the module mentioned above uses the same emotion algorithm

- Implement a re-usable component called Emotion Finder that accepts the text input and provides its emotion class as an output. This algorithm uses emotion word ontology and incorporates the keyword based technique.
- Re-use the above component for building the text based emotion detection tool
- Re-use the above component for building the twitter tweets analysis tool
- Design the database structure and implement the data layer operations for providing account services

6. Architecture

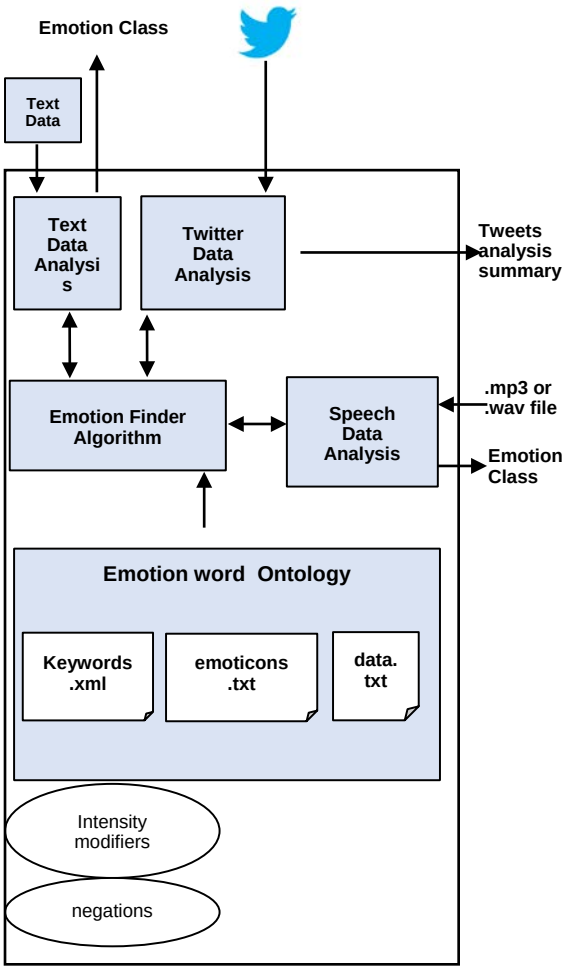

Fig 2: Architecture

7. Emotion analyzer algorithm

STEP 1: Split the paragraph into sentences
STEP 2: If the sentence contains ?!, then it is considered under surprise
STEP 3: Else split the sentences into words and search the emotion words
STEP 4: check for exclamation coefficient
for example: !!!!!!!
check for CAPS
check for emoticons
for example: :)
check for emoticon coefficient,
for example: :)))))
check for modifiers
check for negation
STEP 5: Emotion words are considered as affect word with scores of 6 classes

7. Twitter Analysis

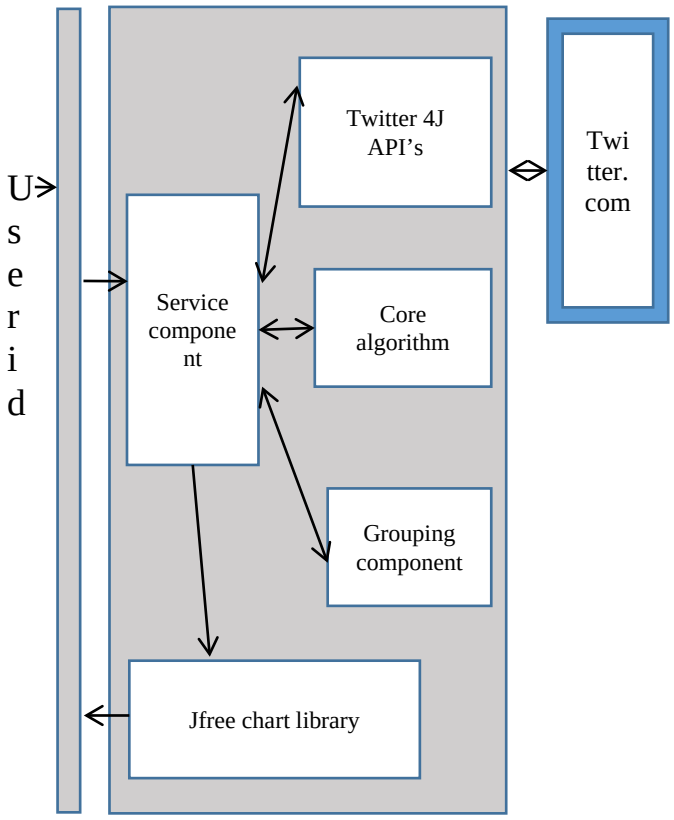

Fig. 3: Twitter design

- In this module the user id is given as the input.
- Service component uses Twitter 4J APIs to pull the twitter data (ie tweets).

- We use access token from twitter.com to access the tweets.
- Service component sends the received tweets to the algorithm.
- Grouping component classifies the analysed data into positive, negative and neutral data.
- Jfree chart library is used to display the classified output in pie chart

8. Speech Analysis

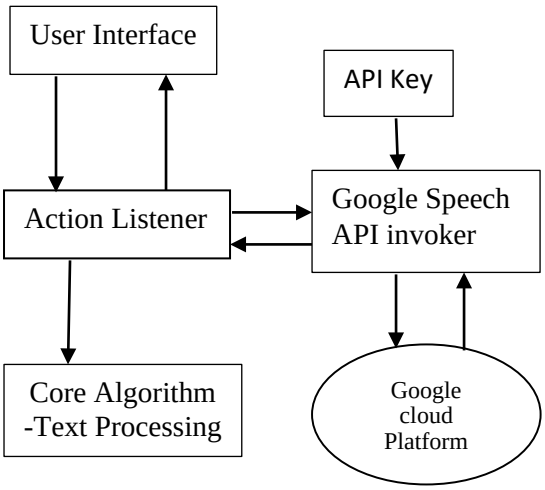

Fig. 4: Speech Analysis Design

- The input is in the form of mp3 or wav file. The user interface takes audio input from the user and sends it to Action Listener component.
- The speech is converted into text by using Google API.
- This module also uses the same emotion analysis algorithm to get the output

9. Result and Conclusion

Our proposed system handles the negative sentences with positive words, it negates the emotion score in such case. It also increases the score of emotion word if it encounters intensity modifiers like very, huge etc. Emoticons are recognized. Different tweets are classified as positive, negative and neutral. Emotions from an audio is also analysed.

In this work, we introduced a new approach for classifying emotions from textual data. We evaluated our approach on three different datasets, one consisting of manual text entry, second one being tweets and also speech

10. Acknowledgement

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11. References

[1] Shiv Naresh Shivhare, Shakun Garg, Anitesh Mishra, “EmotionFinder: Detecting Emotion From Blogs and Textual Documents”, in International Conference on Computing, Communication and Automation (ICCCA2015)

[2] R. Cowie, E. Douglas-Cowie, N. Tsapatsoulis, G. Votsis, S. Kollias, “Recognition of Emotional States in Natural human-computer interaction,” in IEEE Signal Processing Magazine, vol. 18(1), Jan. 2009

[3] C. Maaoui, A. Pruski, and F. Abdat, “Emotion recognition for human machine communication”, Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 08), IEEE Computer Society, Sep. 2008, pp. 1210-1215, doi: 10.1109/IROS.2008.4650870

[4] Chun-Chieh Liu, Ting-Hao Yang, Chang-Tai Hsieh, Von-Wun Soo,” Towards Text-based Emotion Detection: A Survey and Possible Improvements”, in International Conference on Information Management and Engineering,2009.

[5] N. Fragopanagos, J.G. Taylor, “Emotion recognition in human– computer interaction”, Department of Mathematics, King’s College, Strand, London WC2 R2LS, UK Neural Networks 18 (2005) 389–405 march 2005

[6] Nicu Sebea, Ira Cohenb, Theo Geversa, and Thomas S. Huangc “Multimodal Approaches for Emotion Recognition: A Survey”, USA

[7] D. S´anchez, M.J. Mart´ın-Bautista, I. Blanco, “Text Knowledge Mining: An Alternative to Text Data Mining” in 2008 IEEE International Conference on Data Mining Workshops.

[8] Shadi Shaheen, Wassim El-Hajj, Hazem Hajj, Shady Elbassuoni, "Emotion Recognition from Text Based on Automatically Generated Rules”, in 2014 IEEE International Conference on Data Mining Workshop.

[9] Janneke M. van der Zwaan, Inger Leemans, Erika Kuijpers†, and Isa Maks, “HEEM, a Complex Model for Mining Emotions in Historical Text”, in 2015 IEEE 11th International Conference on eScience.

[10] Ashwini V. Yeole, Prof P.y'Chavan, Prof M.C.Nikose, “Opinion Mining for Emotions Determination”, in IEEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems ICIIECS'15.

[11] Shiv Naresh Shivhare, Saritha Khethawat, “Emotion Detection from Text”, Second International Conference on Computer Science Engineering and Applications(CCSEA-2012), May 26-27, 2012, Delhi, India, ISBN: 978-1-921987-03-8.