

論文の内容の要旨

論文課題： An Analytical Approach for Affect Sensing from Text
テキストからの感情センシングのための解析的アプローチ

氏名： シェック モスタファ アル マスム

Studying the relationship between natural language and affective information as well as assessing the underpinned affective meaning of natural language are becoming crucial for improving human computer interaction. The area of such interactive applications is numerous and varied, ranging from categorizing newsgroup flame and augmenting search engine responses to analysis of public opinion trends towards a particular fact or entity and customer feedback. Text is not only an important medium to describe facts and events, but also to effectively communicate information about the writer's positive or negative sentiment underlying an opinion, or to express an affective or emotional state, such as happy, fearful, surprised, and so on. We consider sentiment assessment and emotion sensing from text as two different problems. Classifying the tone of the communication as generally positive or negative is considered as the task of sentiment assessment and recognition of particular emotion(s) being expressed is the task of emotion sensing. Therefore, the thesis first presents an analytical approach to sentiment assessment, i.e., the recognition of negative or positive valence of a sentence and then explains how a well-founded emotion model has been implemented for recognition of emotions. For the purpose of sentiment assessment from text, we perform semantic dependency analysis on the semantic verb frame(s) of each sentence, and then apply a set of rules to each dependency relation to calculate the contextual valence of the words used in the sentence. By employing a domain-independent, rule-based approach our system is able to automatically identify sentence-level sentiment. A linguistic tool called 'SenseNet' has been developed to recognize sentiments in text, and to visualize the detected sentiments. We conducted several experiments with a variety of datasets containing data from different domains. The obtained results indicate significant performance gains over existing state-of-the-art approaches. Emotions expressed in natural language are very often expressed in subtle and complex ways, presenting challenges which may not be easily addressed by simple text categorization approaches such as 'n-gram' or 'keyword identification' approaches. Numerous approaches have already been employed to "sense" affective information from text; but none of those ever employed the OCC emotion model – an influential theory of the cognitive and appraisal structure of emotion. The OCC model derives

twenty-two emotion types and two cognitive states as consequences of several cognitive variables. This thesis therefore describes how to relate cognitive variables of the emotion model to linguistic components in text, in order to achieve emotion recognition for a much larger set of emotions than handled in comparable approaches. In particular, we provide tailored rules for textural emotion recognition, which are inspired by the rules of the OCC emotion model. Hereby, we clarify how text components can be mapped to specific values of the cognitive variables of the emotion model. The resulting linguistics-based rule set for the OCC emotion types and cognitive states allow us to determine a broad class of emotions conveyed by text.

This thesis is composed of seven chapters and two appendices, which provide background to this research, describe the core methodologies, demonstrate results of this work, describe the developed applications, and enlist pseudo codes of the approach discussed. The contents of each chapter are outlined below.

- Chapter one: This part is a general introduction to the topic. Since the research topic is multi-disciplinary, first the contribution and background knowledge obtained from different knowledge domains are discussed. Then the core features of this research are pointed out.
- Chapter two: In this chapter, the current state of the art approaches for sentiment analysis from texts have been discussed by pointing to the limitations of those. Finally, our approach is explained from the viewpoint of considering the previously ignored topics for the task of sentiment analysis of text.
- Chapter three: This chapter explains the core approach of this research. How different lexical resources have been developed and then employing several rules how an input text can be considered as an analytical model have been explained with examples. Our developed application, SenseNet, assesses an input text numerically in order to know whether the input text carries a negative or positive sense. The implementation detail of SenseNet is discussed in this chapter.
- Chapter four: This chapter contains experimental results for different standard datasets for the task of sentiment analysis. Different types of system evaluation are done and the chapter concluded with a discussion on obtained results and failure analysis.
- Chapter five: Though all emotions can be seen as positive or negative, this chapter extends the idea of recognizing more fine-grained named emotions (e.g., happy, sad, anger etc.). Towards this point how a well-founded emotion model (i.e., OCC emotion model taken from Cognitive Psychology) can be implemented in linguistic realm has been discussed. This is completely a new contribution that came out of this research.

- Chapter six: Grounding the developed theories and methodologies several applications are developed. In this chapter the developed applications are discussed in terms of their architectures, functional steps and graphical user interfaces.
- Chapter seven: This chapter contains summary and conclusions of the studies in sentiment and affect sensing from text.
- Appendix A: It contains the pseudo code of the algorithm for sentiment sensing from text.
- Appendix B: It contains the detail experimental result of one of the datasets.