Textual Affect Sensing and Affective Communication

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ABSTRACT

Unlike sentiment analysis which detects positive, negative, or neutral sentences, textual affect sensing tries to detect more detailed affective or emotional states appearing in text, such as joy, sadness, anger, fear, disgust, surprise and much more. The authors describe here their following two approaches for textual affect sensing: The first one detects nine emotions using a set of rules implemented on the basis of a linguistic compositionality principle for textual affect interpretation. This process includes symbolic cue processing, detection and transformation of abbreviations, sentence parsing, and word/phrase/sentence-level analyses. The second one challenged to recognize 22 emotion types defined in the OCC (Ortony, Clore & Collins) emotion model, which is the most comprehensive emotion model and employs several cognitive variables. In this research, we have shown how these cognitive variables of the emotion model can be computed from linguistic components in text. These two approaches have exploited detailed level analyses of text in two different ways more than ever towards textual affect sensing. Applications towards affective communication are also outlined, including affective instant messaging, affective chat in 3D virtual world, affective haptic interaction, and online news classification relying on affect.

Keywords: Affective Communication, Emotions, Instant Messaging, Linguistic Compositionality, Textual Affect Sensing

1. INTRODUCTION

In addition to semantic content, affect conveyed by text plays an important role for rich and friendly communication. This is particularly true in human communication. In recent days, the percentage of human-computer and computer-mediated communications is increasing in our life. In this situation, a computer is also expected to understand the affects or emotions included in text.

With a connection to cognitive computing, we present here two approaches to textural affect sensing, which extracts author’s (or speaker’s) affective states (or emotions) from text. There are similar wordings: textual sentiment analysis (sensing) and textual affect sensing. We define here the textual sentiment analysis detects positive/negative attitudes in text, which is now widely

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used in opinion mining. On the other hand, the affect sensing here aims to detect more detailed affective or emotional states in text, such as joy, sadness, anger, fear, disgust and more.

Why we got interested in this topic is that, we were working on lifelike agents and developed a description language, MPML (Multimodal Presentation Markup Language) (Prendinger, 2004, Ishizuka, 2006) for easily producing attractive multimodal contents. To be lifelike, the agents should be affective and express their emotions. There is an emotion tag in MPML to assign one of emotional states to the agent. We noticed, however, that it is not an easy task to manually annotate an emotion every time. Thus, we started a research to recognize affect automatically from speech text.

There are several emotion models. A popular one is six basic emotions proposed by Ekman (1993). A simpler and graphical one is two-dimensional model, in which two axes are valence and arousal. This model is sometimes called Russell’s model or Lang’s model (Russell, 1980, Lang, 1979). Third one, the most comprehensive one, is the OCC (Ortony, Clore, & Collins) model with 22 emotions (Ortony, 1988). This OCC model was derived from a human cognitive appraisal structure of emotion.

In this paper, we outline our two approaches toward textual affect sensing. First one is based on “linguistic compositionality principle”(Neviarouskaya, 2010a; 2010b; 2010c). (For this approach, we have also developed a rich affective lexicon called SentifFul (Neviarouskaya, 2011)). Second one is a challenge to detect 22 OCC emotions from text through intermediate cognitive variables (Shaikh, 2008a; 2008b). Unlike previous approaches, our approaches have exploited more detailed level analyses of text.

2. RELATED WORK

There are several approaches in textual affect sensing (Shanahan, 2006), namely: 1) affective keyword spotting (Strapparava, 2007), 2) commonsense approach (Liu, 2003), 3) rule-based approach (Boucouvalas, 2003; Chaumartin, 2007), and 4) machine learning approach (Kim, 2006; Alm, 2008).

The affective keyword spotting is simple and dependent basically on defined affect-bearing words; however, it is inaccurate in many cases because it disregards syntactic and semantic information of text. The commonsense approach strongly relies on collected real-world knowledge which is sometimes encoded in a graph form. The advantage of this approach is to take account of contextual information, if a similar situation exists in the knowledge base; however, it is hard or impossible to cover all the possible situations. The machine learning approach uses large annotated corpus and is popular especially for classifying sentiments, i.e., negative/positive opinions. It is difficult, however, in the affect sensing, to formulate diverse set of features; as a result, it mostly disregards modifiers, negation and condition constructions, syntactic relations and semantic dependencies in sentences. It can be said that the machine learning approach is semantically weak and less accurate for sentence-level analysis at present, though it is promising. The rule-based approach can take into account the contextual information and work on sentence level. The performance can be improved by adding rules and extending affective lexicon. The weakness of this approach is that rules always have exceptions. Nevertheless, this is the most practical at present. However, linguistic analyses have been weak in many rule-based approaches. Our two approaches are basically rule-based ones, but have incorporated elaborated functions into their linguistic analyses.

For example, a so-called polarity shift problem occurs in the following sentences:
A Selective Sparse Coding Model with Embedded Attention Mechanism
Qingyong Li, Zhiping Shi and Zhongzhi Shi (2009). Novel Approaches in Cognitive Informatics and Natural Intelligence (pp. 78-90).
www.igi-global.com/chapter/selective-sparse-coding-model-embedded/27300?camid=4v1a