A Semantic Analyzer for Aiding Emotion Recognition in Chinese

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Abstract. In this paper we present a semantic analyzer for aiding emotion recognition in Chinese. The analyzer uses a decision tree to assign semantic dependency relations between headwords and modifiers. It is able to achieve an accuracy of 83.5%. The semantic information is combined with rules for Chinese verbs containing emotion to describe the emotion of the people in the sentence. The rules give information on how to assign emotion to agents, receivers, etc. depending on the verb in the sentence.

1 Introduction

In recent years the chances for human-computer interaction have risen greatly. From ATM to mobile phones, people are interacting and communicating with computers more and more. As such, the field of Affective Computing has been steadily growing and much research has been done on classifying and mimicking human emotion.

One of the fundamental sources of emotion is language. However, to fully understand emotion in language a full understanding of the sentence is needed. To understand the sentence, semantic analysis must be done. Semantic analysis helps to understand the roles and relations between objects, humans, etc. in the sentence.

In this paper, we propose a system for understanding emotion in Chinese verbs. The system uses semantic analysis and emotion predicates. In this way, the emotion “felt toward” and “felt by” can be known.

The paper will continue as follows, in section 2 semantic analysis is examined. Then, in section 3 the SEEN system for semantic analysis is described. Next, in section 4 the emotion predicates and how they were created are shown. In section 5 the experimental results are examined. Finally, in section 6 concluding remarks are made and future work is discussed.

2 Semantic Analysis

A dependency grammar (DG) is a grammar describing the dependency structure among words or constituents of a sentence. A dependency tree is a parse tree

D.-S. Huang, K. Li, and G.W. Irwin (Eds.): ICIC 2006, LNAI 4114, pp. 893–901, 2006.

for a dependency grammar showing the dependency structure of a sentence. [1] formulates four axioms to govern the well-formedness of dependency structures, shown below.

1. One and only one element is independent
2. All others depend directly on some element
3. No element depends directly on more than one other
4. If A depends directly on B and some element C intervenes between them (in linear order of the string), then C depends directly on A or B or some other intervening element

Generally, semantic dependency analysis builds a dependency tree with the optimal semantic relationship for the parent node (headword) and child node (dependent) between which there is a dependency link according to DG. In semantic dependency grammar, the word that is able to best represent the meaning of the headword-dependent pair is chosen as the headword. The headword of a sentence represents the main meaning of the entire sentence and the headword of a headword-dependent pair represents the main meaning of the pair. In a compound constituent the headword inherits the headword of the head sub-headword-dependent pair and headwords of other sub-headword-dependent pairs are dependent on that headword.

Normally, in the phrase structure, the sentence is broken down into its component parts of speech with an explanation of the form, function, and syntactical relationship of each part. Even though we can know the logical structure in the sentence, it is difficult to know the potential sense. Figure 1 gives the phrase structure for a Chinese sentence from the Penn Chinese Treebank [2].

Figure 2 gives an example of an annotated sentence with dependency structure and semantic relationships. The dependency structure is a tree with directed arrows as the dependency link and the main verb as the headword. The set of labeled arrows represent dependency relations from headwords to dependents. Such text annotated with semantic dependency structure can make implicit knowledge in sentences and documents more explicit, allowing a deeper understanding that can aid knowledge extraction and information retrieval. It is easy to explain agreement, or any semantic relations between words or constituents according to such word-to-word dependency links.

Figure 3 shows another representation of a semantic dependency analysis tree which preserves the phrase structure from the Penn Chinese Treebank. In this tree the bold lines denote headwords.

3 SEEN

Determining the semantic structure of sentences is strongly desired. If the semantic structure can be determined then machine translation, question and answering, etc. can be improved as they would have a greater insight on the meaning of the sentence. There has been much research on determining semantic structure