An Annotation System for Development of Chinese Discourse Corpus

Hen-Hsen Huang, Hsin-Hsi Chen
Department of Computer Science and Information Engineering,
National Taiwan University, Taipei, Taiwan
hhhuang@nlg.csie.ntu.edu.tw, hhchen@csie.ntu.edu.tw

ABSTRACT

Well-annotated discourse corpora facilitate the discourse researches. Unlike English, the Chinese discourse corpus is not widely available yet. In this paper, we present a web-based annotation system to develop a Chinese discourse corpus with much finer annotation. We first review our previous corpora from the practical point of view, then propose a flexible annotation framework, and finally demonstrate the web-based annotation system. Under the proposed annotation scheme, both the explicit and the implicit discourse relations occurring on various linguistic levels will be captured and labelled with three-level PDTB tags. Besides, the sentiment information of each instance is also annotated for advanced study.

KEYWORDS: Chinese Discourse Analysis, Corpus Annotation, Corpus Linguistics, Sentiment Analysis

KEYWORDS IN CHINESE: 中文語篇分析, 語料標記, 語料庫語言學, 情緒分析
1 Introduction

The study of discourse analysis attracts a lot of attention in recent years. The release of the well-annotated datasets such as the Rhetorical Structure Theory Discourse Treebank (RST-DT) (Carlson et al., 2002) and the Penn Discourse TreeBank (PDTB) (Prasad et al., 2008) facilitate the discourse researches. Many related subtopics such as discourse segmentation and discourse relation recognition grow rapidly. Discourse corpus becomes the essential component for the researches.

Both the RST-DT and the PDTB are annotated on Wall Street Journal articles from the Penn Discourse Treebank that are written in English. In Chinese, no discourse corpus is widely available yet. To investigate the Chinese discourse analysis, research groups independently developed the discourse corpora for their needs. We annotated two corpora based on the Sinica Treebank for Chinese discourse relation recognition (Huang and Chen, 2011; 2012). At present, Zhou and Xue (2012) are annotating the Penn Chinese Treebank with the PDTB-style scheme.

English and Chinese natives have their own written styles. Chen (1994) showed that the number of sentence terminators (period, question and exclamation marks) is a little larger than segment separators (comma and semicolon) in English. In contrast, the segment separators outnumber the sentence terminators in Chinese with the ratio 7:2 (Chen, 1994). It results in many segments in Chinese sentences. Analyses of documents randomly sampling from Sinica Chinese Treebank (Huang et al., 2000) show the distribution of the number of segments in Chinese sentences is 1 segment (12.18%), 2 segments (18.35%), 3 segments (20.15%), 4 segments (15.72%), 5 segments (12.91%), 6-10 segments (17.72%), and more than 10 segments (2.97%). Long sentences tend to have more complex structural relationships and thus make Chinese discourse annotation challenging.

For our previous two discourse annotation work (Huang and Chen, 2011; 2012), different annotation schemes were used. One corpus was annotated on the sentence level with the PDTB four-class tags. Another corpus was annotated on the clause level with the Contingency and the Comparison relations from the PDTB four-class tags. In this paper, we consider the specific written style of Chinese sentences and propose a flexible annotation scheme to develop a new Chinese discourse corpus.

In this corpus, the three level discourse relation tags from the PDTB 2.0 are fully used (Prasad et al., 2007). The discourse units can be on various levels. An argument of a discourse pair can be as short as a clause and as long as several sentences. In addition, the nested discourse pairs are annotated in our scheme. For example, the sentence (S1) is a Chinese sentence that consists of three clauses. As illustrated in Figure 1, (S1) forms a Comparison discourse pair on the top level, and it contains a nested Contingency discourse pair. We annotate not only the discourse relations, but also the sentiment information of each discourse pair and its two arguments. As shown in Figure 1, the polarity of the first clause is positive, the polarity of the fragments that consist of the last two clauses is negative, and finally the whole statement (S1) constitute a polarity of negative. Such information is valuable for the study of the correlations between discourse relation and sentiment analysis.
Constructing a well-annotated corpus with adequate amounts of data is not a trivial task. Various considerations and design processes should be involved. In this paper, we aim to share our experience of developing Chinese discourse corpora and introduce the approaches to facilitate the annotation work with a web-based system.

The rest of this paper is organized as follows. In Section 2, our previous two Chinese discourse corpora, which are annotated on the inter-sentential level and the intra-sentential level, respectively, are analyzed. Consideration and the annotation plan of the Chinese discourse corpus are described in Section 3. The design and its current status are given in Section 4. Finally, we conclude this paper in the last section.

2 Two Pilot Chinese Discourse Corpora

Two pilot Chinese discourse corpora were developed on the Sinica Treebank 3.1 (Huang et al., 2000), which is a traditional Chinese Treebank based on the Academic Sinica Balanced Corpus (Huang and Chen, 1992). To tackle the issue of Chinese discourse recognition, a moderate-sized corpus with the fundamental discourse relation was tagged as our first Chinese discourse corpus (Huang and Chen, 2011). For each article, annotators tag the discourse relation between every two successive sentences with one of the PDTB top four classes: Temporal, Contingency, Comparison, and Expansion. These four classes are the top level tags in the PDTB tagging system.

The downside of this corpus is that only a few Comparison and Contingency relations are labelled. After analysis, we find the Contingency and the Comparison relations tend to occur within a sentence, especially the Contingency relation. Since we annotate the relations on the inter-sentence level only, such instances are missing. Besides, the nested
relations shown in Figure 1 are also completely missing in this corpus because only the relations between every two successive sentences are labelled.

To study the Contingency and the Comparison relations occurring in sentences and their nested structure, an intra-sentential corpus was constructed as our second corpus (Huang and Chen, 2012). The discourse unit in this corpus is clause, which is defined as a sequence of words in a sentence that are delimited by commas (‘,’). Annotators decide the structure of a sentence and tag the relations between every successive clause in the sentence. To simplify the annotation work, only the sentences that consist of two, three, and four clauses are selected.

3 More Practical Considerations

To annotate a Chinese discourse corpus, we should tackle some practical issues. Firstly, the unit of a discourse argument is not regular. As mentioned in Section 1, an argument of a discourse pair may be as short as a clause, and may also be as long as several sentences. The more vexing case is the nested discourse relations illustrated in Figure 1. Annotators have to determine the correct boundary of arguments. That is important for training and testing discourse parsers.

Secondly, discourse markers are important clues for labelling discourse relations. In English, the explicit discourse markers are defined as three grammatical classes of connectives, including subordinating conjunctions, coordinating conjunctions, and adverbial connectives (Prasad et al., 2008). These words can be automatically extracted using a syntactic parser or a POS tagger. However, it is not clear what the Chinese discourse markers are. Cheng and Tian (1989) suggested a dictionary of Chinese discourse markers, which consist of many words including connectives and various parts of speech such as adverbs, verbs, prepositions, and time nouns.

Detecting the Chinese discourse markers automatically is not trivial. Wrong segmentation is prone to result in the less accurate marker detection. Besides, some words in a discourse marker dictionary are general function words that can be used in other purposes rather than discourse relation marking only. For example, the word or (“or”) can be used as a discourse marker of the Expansion relation and a correlative conjunction. Thus, to disambiguate if a word is used as a discourse marker is necessary. Furthermore, the vocabulary of Chinese discourse markers is not a closed set. The explicit discourse markers are labelled by annotators on the character level.

Thirdly, veridicality is a property of a discourse relation that specifies whether both arguments of a discourse pair are truth or not (Hutchinson, 2004). In the three-level PTDB tagging scheme, the veridicality will be distinguished in different tags. For example, the tag CONTINGENCY:Condition:unreal-past indicates a discourse pair where the second argument of the pair did not occur in the past and the first argument denotes what the effect would have been if the second argument had occurred. By labelling the data with the full PDTB tagging scheme, the veridical information of the discourse pairs are naturally labelled at the same time.

Fourthly, sentiment polarity is another property of a discourse relation that indicates the sentiment transition between the two arguments of a discourse pair (Hutchinson, 2004).
Such information will help us realize the correlations between discourse relations and sentiment polarities.

4 An Annotation Framework

A flexible interface that allows annotators to label a variety of discourse relations with detailed information is proposed. An annotator first signs in to the online annotation system, and a list of articles that are assigned to the annotator are given. The annotator labels the articles one by one. As shown in Figure 2, the annotator selects the clauses that form a discourse pair in the text if it is found. The selected clauses will be denoted in the bold and red font. The annotator clicks the button “Create” when all the clauses belonging to this discourse pair are selected, and then the advanced annotation window will be popped up.

As shown in Figure 3, the discourse relation, the discourse marker, the boundaries of arguments, and the sentiment polarities of the two arguments and the entire discourse pairs are labelled in the pop-up window. The entire selected discourse pair is present in the top of the pop-up window. The following is the drop-down selection lists that correspond to the three levels of hierarchical discourse relation tags used in the PDTB. The next part is about to highlight the discourse markers from the text. As mentioned in Section 3, the annotator highlights the discourse marker on the character level. The annotator can select multiple characters for the phrase or the pairwise discourse marker such as “因為 …, 所以…” (“Because ..., so ...”). The implicit discourse relation is distinguished if no discourse marker is highlighted. And then, the annotator splits the first argument and the second argument by selecting the clauses belonging to the first argument. The rest clauses are regarded as the second argument. The last part of annotation is labeling the sentiment information. There are three types of sentiment polarity, i.e., positive, neutral, and negative. The polarities of the whole discourse pair and both of its two arguments will be labelled. The annotator is asked to judge the sentiment polarities on the pragmatic level. That is, the sentiment polarity of the text is not determined by the surface semantics, but by its real meaning. The annotator submits the annotation by clicking the button ‘Save’ and continues to look up another discourse pair in the article. The nested relations can be annotated in this interface by choosing the repeated clauses in different rounds.

明天會更好？——尋找勞工新定位
光華雜誌，880630

![Figure 2 – Choosing a discourse pair on the web-based online system](image)
Conclusion

Discourse corpus is indispensable for the study of discourse analysis. In this paper, we address some considerations specific to Chinese language. A flexible annotation framework is proposed to cover a variety of discourse relations and determine the argument boundary of a relation. Furthermore, the sentiment polarities are also annotated on the discourse pairs and their arguments. Such a corpus is helpful for the exploration of the areas of Chinese discourse processing and sentiment analysis. The cost of the detailed annotation is much higher and the annotation task is time-consuming. In order to facilitate the complicated annotation work, we demonstrate a web-based system that supports annotators to do the work fast and accurately.
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