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Using differentia for word-sense disambiguation via Bayesian networks

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Lexicons for natural language processing don't generally provide common attributes for terms being defined, as compared to standard dictionaries. For example, WordNet (Miller 1990) does not provide any distinguishing characteristics for the words 'beagle' and 'wolfhound', indicating simply that they denote types of hounds. This work describes an approach for automatically extracting distinguishing properties from dictionary definitions. In addition, the properties extracted are shown to improve word-sense disambiguation in which the sense of a word applicable to a given word must be selected from a standard inventory as found in a dictionary.

Previously, Wiebe, O'Hara and Bruce (1998) developed an approach to word-sense disambiguation that uses analytical knowledge to reinforce the contextual support particular senses received from a standard statistical classifier. They convert the WordNet isa hierarchy into a Bayesian network, where the nodes are concepts (i.e., synsets), and the links are interpreted as the degree to which one concept will be relevant to some context given that another pertains to the context.

The main difference from that work is the inclusion of dictionary differentia as an additional source of relations among the senses. Converting this information into Bayesian networks poses several complications. First the definitions need to be parsed to determine the lexical relations. Then the relations are weighted relative to the genus category for the word being defined.

A dependency parser is used to parse the definitions because the relation output is a good match for the target representation of the lexical relations. All parser interpretations are considered and the relations are weighted by how often they occur in the various parses. The parser output is then analyzed to produce relational tuples that represent the differentia in the definitions. The relations are weighted by considering how often similar relations occur for other senses defined using the same genus term.

To evaluate the results, we apply this process using the word-sense annotations prepared for the second SensEval competition (Edmonds and Cotton 2001), which uses the WordNet inventory. Of the M sentences from this data set having multiple sense annotations, N of the cases show improvement classification for the assigned senses.

Bibliography

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