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論文題目	Analysis of Aspect-Based Sentiment in Clinical Text from Electronic Medical Records		
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### 論文の内容の要旨

Sentiment analysis is a process of understanding an opinion in a written or spoken language. It may be applied at different scales, ranging from phrases to a whole document. Instead of determining the sentiment of an entire text portion, aspect-based sentiment analysis addresses sentiments corresponding to parts, components, attributes, or aspects of an entity of interest, which are mentioned in the given text portion. This dissertation studies how a linguistic structure is used to improve aspect-based sentiment analysis and how to apply sentiment analysis to a document in medical domain, especially, a clinical narrative.

In our study, an aspect mentioned in a text portion is first detected, and elementary discourse units (EDUs) relevant to the aspect are then localized by using the linguistic structure, i.e., the rhetorical structure theory (RST). Using lexicon-based approaches, the polarity scores of terms occurring in an EDU are combined into the polarity score of the EDU. We propose a new score aggregation strategy that utilizes RST to aggregate scores from all EDUs relevant to the aspect. Experimental results on online product reviews demonstrate that our new score aggregation method improves sentiment classification at the level of local aspect segments.

To apply the proposed method to clinical text in electronic medical records (EMRs), some extensions are required. The medical-domain-knowledge corpus, i.e., the Unified Medical Language System (UMLS), is employed to detect aspects mentioned in a clinical narrative. Local aspect segments are then formed by using RST. However, occurrences of medicine-technical terms, e.g., disease names or treatment processes, make the sentiment on a clinical narrative hard to analyse. For example, the sentiment of the text portion “Appears to have premature atrial contraction with bundle showing” depends greatly on the meaning of the term “premature atrial contraction”. Semantic types of technical terms, provided by UMLS, are incorporated into lexicon-based sentiment classification methods of two types, i.e., methods using a

generic sentiment lexicon and those using a trained sentiment lexicon. Preliminary results show that different classification methods are appropriate for text portions containing different semantic types. Classifier combination is then employed to select a classification method that is most suitable for an input text portion.

*Keywords:* Aspect-Based Sentiment Analysis, Lexicon-Based Sentiment Classification, Rhetorical Structure Theory, Clinical Narrative, Unified Medical Language System

### 論文審査の結果の要旨

Instead of determining the sentiment of an entire text portion, aspect-based sentiment analysis addresses sentiments corresponding to parts, components, attributes, or aspects of an entity of interest. In this dissertation, aspect-based sentiment analysis on clinical text is studied, and effective methods are developed. Clinical text in an electronic medical record (EMR) documents activities and states of a patient from admission to discharge. In addition to explicit opinion words (e.g., “good” or “bad”), some medicine technical terms, including names of diseases or abnormalities, may express sentiments. The candidate has investigated the following three problems as solution components for aspect-based sentiment analysis on clinical text, and has provided the novel contributions:

- 1) Use the rhetorical structure theory (RST) for localizing text portions (i.e., EDUs) relevant to a given aspect.
- 2) Exploit the RST structures of relevant EDUs and their relations to infer the sentiment of a given aspect.
- 3) Exploit UMLS semantic types to improve lexicon-based sentiment classification methods. The influence of each UMLS semantic type in the Disorders group on sentiment classification is investigated.

This is an excellent dissertation, and we approve awarding a doctoral degree to Mr. SANG- LERDSINLAPACHAI Nuttapong.