

Extracting High-Order Aesthetic and Affective Components from Composer's Writings

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Abstract. A digital humanities technique for the network analysis of words with a text is applied to capture the subtle and sensitive contents of essays written by a contemporary composer of classical music. Based on analysis findings, the possible contributions of digital humanities to affective technology are discussed. This paper also provides a systematic view of digital humanities and affective technology.

Keywords: high-order cognition, emotion, music, art, network analysis, digital humanities.

1 Introduction: Affective Technology Meets Digital Humanities

Texts are the most essential research materials for many areas of humanities. Emotions and sensibilities are sometimes regarded as being fundamental conceptual devices for art-oriented areas of humanities, including literary studies and musicology. Despite their central importance, there have been few systematic treatments of texts and their affective contents within traditional humanities. It would seem that higher-order aesthetic and affective contents can only be analyzed by the subtle sensibilities possessed by humanities researchers. However, collaborations of affective technology and digital humanities may change that situation.

From a methodological perspective, the area of digital humanities can be defined by its set of techniques for handling materials within traditional humanities. As shown in Fig. 1, we have been attempting to develop new techniques to process literary and religious texts; namely, a knowledge-based approach to model reader responses [1], and a network-oriented approach to capture the cognitive components of religious thoughts [2]. The same research strategy can be applied to texts that contain affective contents as their essential components. In this paper, we briefly summarize how we have approached the texts written by a prominent contemporary composer of classical music and discuss its relevance to the enterprise of affective technology.

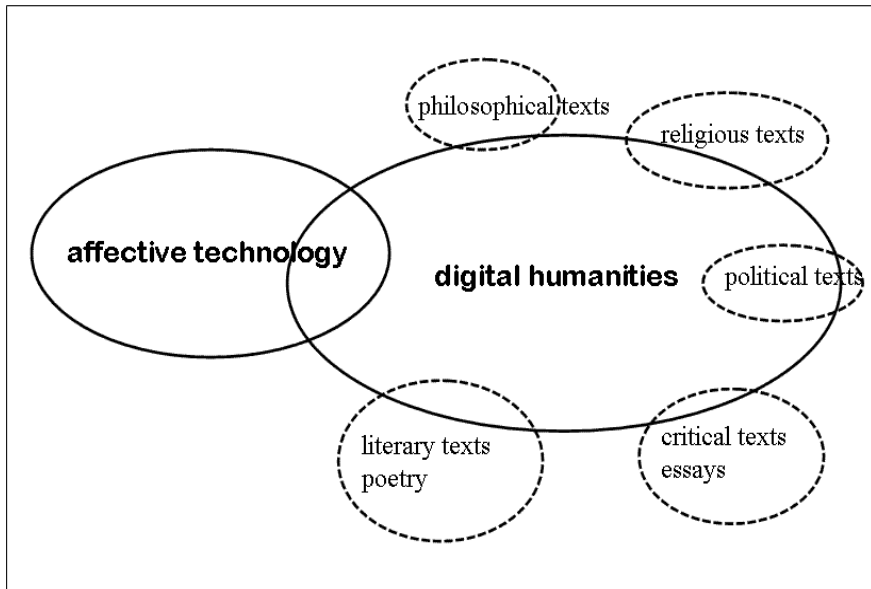


Fig. 1. Affective technology, digital humanities, and text genres

2 Extracting Cognitive Components from Texts

Expecting a full range of cognitive components from conceptual, evaluative, affective, to aesthetic, we have selected Toru Takemitsu's essays as our research target. Takemitsu was one of the most important Japanese composers of the twentieth century, and he left behind a wealth of writings on music and other topics, as well as a wide range of musical works from concert pieces to film soundtrack music.

While our larger research project focuses on the complete collection of his writings, the present paper focuses on two essays to demonstrate how the different natures of the contents can be accurately extracted. Two analysis methods were applied to the texts, as described below. Our previous report [3] describes in detail our findings concerning one of the essays.

2.1 Network Analysis

The purpose of the network analysis was to identify keywords and their surrounding words within the text. After applying a morphological analysis parser to the text, the network creation software Polaris [4] was employed to create a network for the extracted keywords with the KeyGraph algorithm. The nodes of the network are nouns from the text, because nouns are the object for the cognitive action in the content analysis. The edges of the network represent words that co-occur with the key words in the text. The decision to use co-occurrence words is that these words are used when explaining similar concepts. Fig. 2 presents the overall results from a 19,551 word essay entitled *Sound and Silence, as Measurable Each Other*, that is primarily reflections on music in general. There are clearly several node clusters and a number of

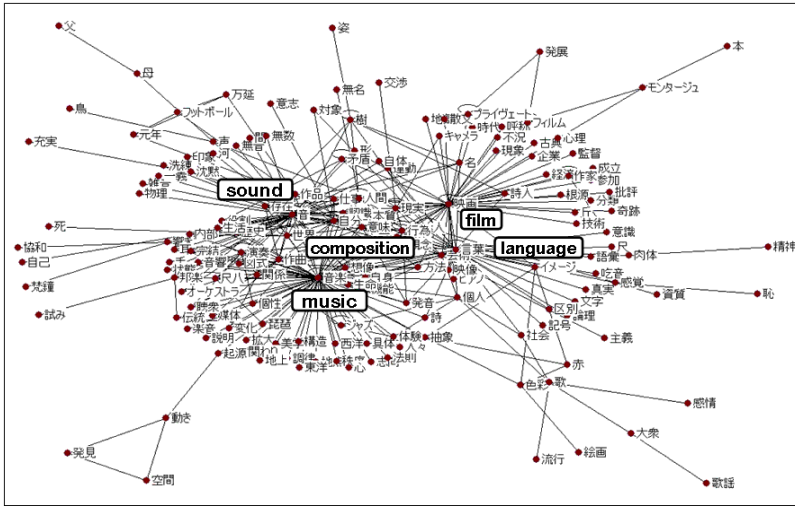


Fig. 2. A keyword network of *Sound and Silence, as Measurable Each Other* (1971)

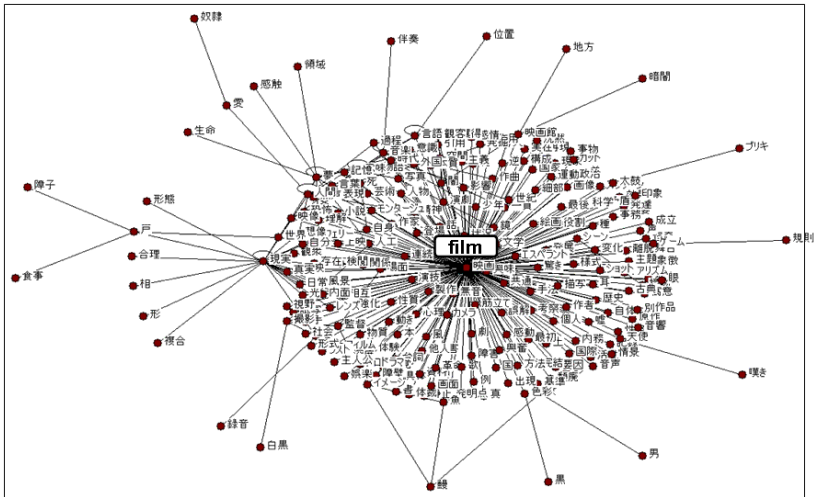


Fig. 3. A keyword network of *Citation of Dreams* (1984)

measures of centrality for the network indicate that the multi-centrality of the keyword space. In contrast, Fig. 3 indicates the singular-centered nature of the keyword space extracted from a 15,547 word essay entitled *Citation of Dreams*, which is a collection of writings about films. Despite Takemitsu's admitted affection for films, his cognitive space for films is clearly far simpler than the cognitive space for music.

2.2 Ontology and Content Analysis

Based on the keywords obtained from the network analyses, we constructed a word ontology for Takemitsu's music. The text corpus for the essays was then parsed in

order to carry out a content analysis at the semantic level. The aim of the content analysis was to extract the structures within the concepts employed by Takemitsu in talking about music. The interesting results include the findings that a) his aesthetic vocabulary is strongly associated to an abstract thinking vocabulary, and b) more ordinary emotion words tend to be associated with lower level music entities (pop music). These findings seem to substantiate the layered model of affective processes proposed in our previous report [1].

3 Conclusions

Two digital humanities techniques demonstrate that it is possible to automatize text analysis to levels that are comparable to those of more traditional humanities.

In the *Affective Technology towards Affective Society* session, we will argue for the following points;

- Network analysis of the words within a text can provide a better basis for text analysis.
- Ontology and content analysis can provide different perspectives from text analysis.
- The modeling of affective process and text analysis may be mutually beneficial.

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