Creativity Support via Terms in Thematic Relations

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ABSTRACT

Creativity is required in many fields of endeavor—especially industry and scientific research. Creative tasks we consider in this article include not only creative tasks by single individual or multiple individuals, but also collaborative tasks accomplished by a group of individuals with support of e-collaboration technologies. The difficulty of formulating new ideas calls for the development of an environment that supports creativity. Moreover, it is known that people tend to become more creative when they use words that are related thematically rather than taxonomically. In light of this, we sought to extract lists of words having a thematic relation. In this article, we propose a method of extracting such word lists and verify, through Web retrieval, that word lists with a thematic relation can support creativity. The verification method is based on the belief that we can acquire certain knowledge if a word list directs us to informative Web pages and the knowledge included in such pages is useful and can itself stimulate creativity. As a result of our experiment, we report that our methodology can extract word lists available to support creativity.

Keywords: creativity support; creative task; e-collaboration; knowledge acquisition; natural language processing

INTRODUCTION

Expansion of imagination is crucial for lively creativity. However, expanding one's imagination can be difficult because of complex/complicated inferences and deductions are required. Also, putting multiple individuals’ imaginations together in the collaborative task would be difficult; therefore, the development of an environment that supports creativity is required.
One simple method of supporting creativity is to provide users with words that tend to spark the imagination. Moreover, as for collaborative task, such words can put scattered imaginations together because they can be shared information in the group. However, words presented randomly are unlikely to be useful at promoting creativity, at least when one collects their thoughts, because they tend to trigger divergent ideas. Words must be chosen carefully, and only pertinent words should be provided. There are at least two kinds of relations between two words: a taxonomical relation and a thematic relation (Wisniewski & Bassok, 1999). It has been reported that both the taxonomical relation and the thematic relation between two objects are important to the recognition of the relations between them. The former is a relation that represents the physical resemblance between two objects such as “cow” and “horse” or “horse” and “animal”; the latter is a relation of two concepts in a thematic scene, such as “milk” and “cow” as recollected in the scene “milking a cow.” This division also applies to the relation between the concepts represented by words.

Previous research on creative design has reported that a word pair with a thematic relation sparks the imagination more than does a pair with a taxonomical relation. Such a sparking of the imagination is necessary in product development (Harakawa et al., 2005; Taura & Nagai, 2005; Nagai et al., 2006). Also, thematic relation must be very effective for creativity in an environment with support of e-collaboration technologies, although observing a thematic relation among words from resources shared among individuals for a collaborative task is very difficult.

In light of the above, we tried to extract from large-scale domain-specific documents useful word lists in which a thematic relation exists among the words. In this article, we propose a method for extracting such related word lists, and we verify their capability to support creativity.

In order to extract related word lists, we utilize inclusive relations between words based on a modifiee/modifier relationship between words in documents, which is an application of a method developed for automatically constructing a semantic hierarchy (a type of taxonomical relation) from a corpus (Yamamoto et al., 2005). Inclusive relations are evaluated by the complementary similarity measure (CSM), which was developed to recognize degraded machine-printed text (Hagita & Sawaki, 1995).

For verification, we examined whether the extracted word lists directed us to informative pages on the Web. To some extent, the capability to retrieve informative pages corresponds to the capability to support creativity. This arises from the idea that we can acquire specific knowledge if a word list directs us to informative Web pages. The knowledge contained in such pages might include useful products