Literary Cognition and Aesthetic Computing

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Literary text as a cognitive science problem

As a natural expansion from the tradition of natural language processing research, this paper presents our approach toward the poetic and artistic aspects of the human cognitive system. Our mental processes wouldn't stop when they understand the meaning of text. We always evaluate and appreciate them. Sometimes we contemplate, mediate and are moved. Cognitive science needs to invent vocabularies to describe these aspects of mental processes.

We assume that the interesting natures of literary texts are projecting following important problems:

(a) Successful literary texts attract readers, give motivations to read through, evoke subjective emotional experiences of "moved". (emotion problem)

(b) Many literary texts deal with fictitious contents. Transfer of factual knowledge may not be a major task of those texts. (knowledge problem)

(c) Successful literary texts receive high evaluations as artistic artifacts. Society of intelligent agents has mechanism to support such social activities. (art problem)

Based on psychological evidences, we have proposed an emotion oriented natural language processing model, particularly, a *wish* generation mechanism and an *aesthetic emotion* evocation mechanism (Tokosumi, 2001, Yoshimine and Tokosumi, 2001). The present paper is an attempt to give a partial answer to the emotion problem, and suggests possible solutions for the knowledge problem and the art problem.

Cognitive Computation hierarchy

The concept of affective computing (Picard, 1997) has advanced the way we talk about cognitive activities. Literary computing as a subordinate of aesthetic computing may bring new perspectives into the way we talk about language processing (Fig. 1)

Aesthetic Computing
literary computing, poetic computing, music computing, ...
Tokosumi (2001), Yoshimine and Tokosumi (2001)
Affective Computing
emotion/affect representation, emotional inference,...
Dyer (1983), Mueller (1990), Picard (1997)
Knowledge Computing
knowledge representation, case-based inference, ...

Fig. 1. Cognitive computation hierarchy.

In the set of programs called KEWP (Knowledge and Emotion Workbench Programs), we have been formalizing people's emotional experiences evoked by stories and other multimedia objects, which include content oriented emotions and aesthetic emotions.

Aesthetic emotions in literary experiences

Aesthetic emotions evoked by the quality of objects, such as linguistic expressions and other artistic forms, are important class of emotions yet to be investigated fully. Our treatment of aesthetic emotions described here is based on the cognitive theories of emotion (e.g. Frijda, 1986). We identify a cognitive appraisal component and an action readiness component for various aesthetic experiences and propose computational mechanisms to implement those components in the KEWP model.

Cognitive factors each component can deal with are:

(a) Cognitive appraisal component -- completeness, novelty, memory, ability recognition, competence, assimilation.

(b) Action readiness component -- possession, re-experience, creation, evangelic.

We also discuss the implication of the model as a competence-based neural architecture of the brain (Tokosumi et al., in press).

References

Dyer, M. G. (1983) *In-depth Understanding: A Computer Model of Integrated Processing for Narrative Comprehension*. Cambridge, MA: MIT Press.

Frijda, N. (1986) *Emotions*. Cambridge: Cambridge University Press.

Mueller, E. (1990) *Daydreaming in Humans and Machines: A Computer Model of the Stream of Thought*. Norwood, NJ: Ablex.

Picard, R. W. (1997) *Affective Computing*. Cambridge, MA: MIT Press.

Tokosumi, A. (2001) The Brain/Mind Machine: Toward modeling its wish generation processes. In Tadashi Kitamura (Ed.), *What should be Computed to Understand and Model Brain Function?* 43-51. Singapore: World Scientific.

Tokosumi, A., Noda, K., Anbo, T. and Matsumoto, N. (in press) A Competence-based Architecture for Aesthetic Emotions. *Proceedings of the 2002 IEEE International Conference on Systems, Man and Cybernetics*. Hammamet, Tunisia.

Yoshimine, N. and Tokosumi, A. (2001) The Cognitive Model of Fiction Comprehending Control System. In N. Baba, L.C. Jain, and R. J. Howlett (Eds.) *Knowledge Based Intelligent Information Engineering Systems and Allied Technologies: KES 2001,* 1228-33. Amsterdam: IOS Press.