Editor's Message to Special Session on Ontological Knowledge Base

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Despite great success of AI systems, the research on knowledge system faces several problems. One is a scale-up problem [1] that a small knowledge system can not extend to a large scale knowledge system because the knowledge is specified for a narrow domain. The other is a generality problem [2] that the knowledge in AI system has a lack of generality, and it is difficult to share the knowledge among different programs. Such problems cause a bottleneck to achieve general AI systems toward the future. AI researchers have, sometimes, said that the common sense or ontological knowledge will solve such problems. Because the ontological knowledge describes knowledge structure in real world that we can observe, and it becomes a common basis of knowledge representation.

Nevertheless, we have a lack of clear-cut definition on the ontology with consensus in the field of artificial intelligence and natural language understanding. Some projects have already attempted to implement large scale knowledge bases toward the ontology. CYC project [3] aims at coding common sense on computers for general problem solving. EDR project [4] is implementing the conceptual knowledge for natural language processing. Such projects are regarded as taking the first step to implementing the ontological knowledge base.

For the ontological knowledge that is useful for problem solving and natural language understanding, we have to examine how to describe the ontological knowledge for various phenomena of knowledge and natural language.

This special session aims at discussing ontological knowledge from different aspects such as,

1) representing ontological knowledge that is useful for both problem solving and natural language understanding.

2) representing physical knowledge and social knowledge as a case study of the ontological knowledge that describes the real phenomena.

Guha and Lenat introduce the concept of context as a solution to the inherent infeasibility of the traditional AI model. The context-based framework leads to the common solution in both knowledge representation and natural language understanding. Indeed, the introduction of the context to knowledge representation is essential to interpret the knowledge. The contexts as background common sense are used to test potential interpretations and to impose a preference ordering on them.

Nishida reports the PSX project toward integratrion of heterogeneous knowledge for high autonomous analysis of dynamic systems. The analysis of dynamic system is significant in engineering problem solving that describes a physical system. The knowledge is concerned with the vertical and the horizontal problems; the different level of abstraction and the organization of widespread knowledge. The qualitative analysis solves the vertical problem, and the interacting agents provide a framework for the horizontal problem.

Nitta. et al. present the representation of law knowledge as social knowledge. The law knowledge has a lack of rigid principle to represent it, because the social knowledge is artificial one. The authors propose two reasoning mechanisms; rule based reasoning and case based reasoning. The system is applied for actual legal problems.

Kameyama discusses discourse understanding and world knowledge from the view point of linguistics. The discourse understanding includes both linguistic interpreting and common sense reasoning. With the puzzle of "Missionaries and Cannibals," the author illustrates an information based dynamic discourse understanding.

These researches discuss various problems from different aspects, and they introduce attractive and elegant knowledge representation.

Reference

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3. LENAT, D. and. et al. CYC: Toward Programs with Common Sense, *Comm. ACM*, 33, 8, (1990), 30–49.
4. EDR EDR Concept Dictionary, EDR TM-021 (1991).

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