Networked Intelligence and Ontology

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Abstract

There are many links among electric appliances. We live with personalized appliances, which are achieved by links. AIBO(SONY: http://www.sony.co.jp) is famous as a representative example of personalized robots. Also, personalized cleaners are becoming popular. In the meantime, IT made remarkable progress especially in personalizing-related technology; authentication technology, animation on web page, and web camera. Collaboration with Network Technology is popular in RT field. Users who are not familiar with computers can use IT through friendly personal robots. It is expected wide diffusion of IT. RT, AT and IT are growing in spiral by interacting one another as Fig.1.

**Fig. 1.** Technologies growing in spiral

Many efforts have been being made as in Fig.2. For example, Ministry of Public Management, Home Affairs, Posts and Telecommunications held workshop
headed by Prof. Tokuda for networked robots technology, which aims to build an open platform. On the other hand, the policy of developments of robotics depends on each group or laboratory, but there is a movement that carries on the standardization. We think Ontology is necessary for Natural Interface and mutual understanding between different machines such as robots and cars.

**Efforts for next generation of robots**

**Ministry of Public Management, Home Affairs, Posts and Telecommunications**
- Promotion of the development to build network robots
- R&D for network robotics combined ubiquitous network tech. and RT.
- Integrated approach for network human interface

**Fire and Disaster Management Agency**
- Promotion of the construction of safe community using robots
- R&D for fire and disaster prevention robots

**Ministry of Economy, Trade and Industry**
- Promotion of the development of RT as core tech.
- R&D of element technologies such as authentication tech, drive tech. and sophisticated control tech.
- Compiling these on demonstration experiments
  - Development program for next generation robots
  - Development of parts for robots
  - Development of middle ware for robots
  - Practical use project for next generation robots

**Ministry of Education, Culture, Sports, Science and Technology**
- R&D for advancement of RT
- Promotion of transfer of specific technologies to industry and future development such as sensor technology, control technology
- R&D of next generation disaster prevention system such as rescue robots
- R&D of brain type computers
- R&D of drive control based on real lives

**Health, Labour and Welfare Ministry**
- Promotion of robot application in the medical, welfare field
- R&D of robots for operation

**Land, Infrastructure and Transportation Ministry**
- Promotion of provision of social overhead capital utilizing RT
- R&D of RT for construction field
- R&D of IT execution system

**Ministry of Agriculture, Forestry and Fisheries**
- Promotion of RT application in food production
- R&D of power saving, efficient robot managing in the agriculture field

**Fig. 2. Efforts by government agencies**

The term ontology means a systematic theory of existence in the study of philosophy[1]. Philosophically aiming to arrange everything in the systematic world, it is called Ontology. Human can communicate by gesture and so on, who has different culture and language (Fig 2 left). Because human has common basis, such as mirror neuron, his own action neuron was activated by observing other human motion like a mirror. There is ontology on that extension line. The research into ontology has been performed to study the problem of Share of knowledge and Construction of the knowledge base in the field of the knowledge processing. The knowledge processing system constructs the knowledge base of the targeted world by using ontology[2]. By studying the targeted concept, a contribution to knowledge sharing can be expected for its result(Fig 2 right). The ontology proposed here is of the knowledge-construction type and is used to communicate for the human and the system. This ontology is called a bottomup ontology[3][4][5]. Ontology is composed of Conceptual Fuzzy Sets (CFS) that has the dispersive express of concept.