1 Special Issue on Knowledge Creating Communication

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Located in "Keihanna", a science and technology city on the southern edge of Kyoto (adjacent to Osaka and Nara), the National Institute of Information and Communications Technology (NICT) promotes research and development of technologies for advancing richer and more diverse human communication.

An information and communication infrastructure that enables distribution of a vast amount of information to and from anywhere and at anytime is now being constructed. However, the infrastructure at the moment does not realize a situation where in perfect communication is possible and people can exchange "diverse" information with "anyone". We still have various "barriers" to overcome. These barriers may include:

- Language differences (we want to smoothly communicate with foreigners in our own native language),
- Obtaining useful information (we want to easily extract useful and credible information from amongst the incredible amount of information on the Internet),
- Overcoming ability differences (we want to solve the problem of the digital divide caused by the introduction of high-performance, multi-functional systems),
- Bridging cyberspace with the real world (we want to make practical use of Internet resources in our daily life and realize this seamless linkage between cyber-world information and its real-world application), and
- Overcoming distance (we want to create a communication environment where people in remote locations can communicate with each other as if they were in the same place, eliminating the distance and difference of time between them).

Aiming to conquer these barriers and to realize a human-friendly communication environment, NICT has been actively promoting its research activities under the fundamental theme of "universal communication".

Our research on "universal communication" technologies covers two types of communication:

Knowledge creating communication where language and information processing is the main study theme, and research on ultra-realistic communication technologies for the creation, transmission and display of 3D images (and information obtained through the five senses). The latter "ultra-realistic communication" technologies were presented in Journal of NICT Vol. 57 Nos. 1/2 (2010). In this special issue, we will present the former, the research on knowledge creating communication.

Our full-scale research on knowledge creating communication began with the second medium-term plan (FYs 2006-2010) - at the Keihanna-based Knowledge Creating Communication Research Center) and produced great results. Following this success, we have integrated research themes of the knowledge creating communication and the ultra-realistic communications and have been continuing to expand our research under the name of the Universal Communication Research Institute for the third medium-term plan (FY 2011 - present).

In Chapter **2** of this special issue, the Director General of Universal Communication Research Institute presents the results of the knowledge creating communication research

conducted for the second medium-term plan.

In Chapter **3**, the Director of the Spoken Language Communication Laboratory and other researchers describe multilingual speech recognition and synthesis technologies and dialogue processing technologies for understanding the contents and intention of utterances.

In Chapter **4**, the Director of Multilingual Translation Laboratory and other researchers present the technologies used for the creation of the automatic translation system among the 21 targeted languages in the tourism domain and the parallel corpora necessary for the system.

In Chapter **5**, the Director of Information Analysis Laboratory and other researchers present the technologies for automatically analyzing a huge amount of Web-extracted text data and the resultant systems "WISDOM", an information analysis system and "Ikkyu", the speech-based question answering system.

In Chapter **6**, the Director of Information Services Platform Laboratory and other researchers describe the technologies used for the cross retrieval of information from Web documents from different types and fields by using a correlation analysis, and the knowledge grid for implementing knowledge cluster systems (for solving problems by sharing knowledge among remote knowledge sites) distributed on a global network.

Chapter **7** presents the MASTAR Project. In addition to the above mentioned researches conducted by each relevant laboratory, we have founded a project called the MASTAR Project where a cross-laboratory researches the said technologies and are pursued at a practical level. In FY 2008, a series of activities by the MASTAR Project aimed at the development of an automatic speech translation system for practical use (in the tourism domain) It was designated as a 5-year Social Benefit Acceleration Project initiated by Japan's Cabinet Office. As a result of the active and incessant nature of the research activities, five companies and organizations put the resultant technologies to practical use in 2011 (a year before the planned end of the project).

Chapter **8**, the final chapter, presents information from collaborative activities between industry-academia- and government. Aiming to return the results of our research, (i.e. speech data and parallel corpora constructed as the result of automatic speech translation researches and conceptual dictionaries created as the result of information analysis technology researches), the Advanced Language Information Forum (ALAGIN) was established in 2008 in the form of Collaboration with Government, Industry, and Academia. ALAGIN has more than 200 members and has been developing and distributing numbers of open source databases and software. ALAGIN is still active in its activities and some of its resultant resources have been put to commercial use.

A huge amount of information is being created and distributed through the Web and SNSs all around the world. Such information is rapidly expanding on the Internet in terms of both quantity and variety, containing not only linguistically expressed data but images and sensor data. The diverse, ever-increasing information (i.e., big data) has drawn the attention of researchers from around the world and is being utilized to help realize a higher quality of life for people (and for intelligent activities). Under such circumstances, knowledge creating communication technologies based on natural language processing, intelligent information processing and speech interface technologies play a significant role. We truly hope that this special issue will contribute to further advances of these technologies.

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