Research area in the Strategic Objective "Creation of integration technology to enable utilizations of diverse and massive data using Artificial Intelligence core technologies rapidly growing in sophistication and complexity"

6.2.8 Fundamental Information Technologies toward Innovative Social System Design

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Overview

Rapid progress in information technologies has made it possible to link an enormous number of sensors and devices to the Internet. Various types of "Big Data" are now stored and used in a variety of settings, including medicine and healthcare, materials and physical properties, urban infrastructure, the global environment and so on. Furthermore, there is tremendous interest in artificial intelligence technologies that employ natural language processing, "deep learning" and so on, and use of such technologies in these areas is progressing rapidly.

The goal of this research area is to create the fundamental information technologies that will make it possible to design new social systems for an age of social change based on these information technologies. Fundamental technologies will be created to help enable intelligent and integrated analysis, processing and control of information, as well as the establishment of new services and social structures in areas that include social infrastructure including mobility, , healthcare including nursing care, disaster prevention and mitigation, and robotics.

Specifically, research in this research area will focus on such things as advanced sensing technologies,which make it possible to gather and acquire enormous quantities of diverse types of information, real-time data processing technologies, system optimization technologies, communication support using intelligent media, data processing and knowledge processing technologies that incorporate artificial intelligence and the like, and security and privacy enhancement technologies that can accommodate various types of equipment and systems.

This research area will operate as part of the Advanced Integrated Intelligence Platform project (AIP project) of the Ministry of Education, Culture, Sports, Science and Technology.

Research Supervisor's Policy on Call for Application, Selection, and Management of the Research Area

(1) Background

There has been dramatic progress worldwide in information technologies in recent years. Household appliances, automobiles, machinery and various other types of equipment have been provided with telecommunications functions. These developments are rapidly creating an advanced information environment in which machines are connected to the Internet, enabling them to be controlled and their surroundings measured and so on via the Internet. One of Japan's major objectives is to develop a "super smart society"ahead of other countries, and various types of "Big Data" — cohort data and other types of medical and healthcare-related data, data on materials and physical properties, data on urban infrastructure and the global environment and so on — are steadily being produced and collected in various settings in society. There is also great interest in the progress in artificial intelligence technologies recently epitomized by "deep learning," which has been called a major technical breakthrough. Rapid progress is being made in the use of these technologies in various fields.

In the future, the progress of these various information technologies will enable real-time processing of enormous quantities of data. This is expected to result in new types of communication based on intelligent media and natural language processing, as well as the creation of new services through innovative artificial intelligence technologies. It also has the potential to dramatically transform existing industry and social structures. In an age of social change based on these types of information technologies, new social structures unlike any that have come before and new infrastructure technologies for these new social structures will need to be created.

(2) Proposals to be submitted

The goal of this research area is to create fundamental information technologies that can design the new social systems of the future. We invite proposals for new fundamental technologies that will lead to the achievement of new value creation in anticipation of the age in which there will be dramatic changes in the structure of industry and society. We are hoping for proposals that help to solve technical issues in the field of information technology, and that also include the perspective of how these solutions will help to create the new social structures of the future. Applicant proposals will not be required to extend all the way to implementation of the achievements of research in society. However, applicants should devise scenarios indicating what potential the development of the proposed fundamental technology will have to change society in the future, and they should conduct basic research with a view to the future implementation of the achievements in society.

Target areas of application may include social infrastructure (including automobiles, railways and other mobility infrastructure), healthcare (including nursing care, health maintenance and preventive health that takes into consideration Japan's super-aging society), disaster prevention and mitigation with respect to natural disasters resulting from the abnormal climatic conditions of recent years and so on, robotics technologies to provide cross-sectoral support for these technologies, and organization and editing of information based on multilingual automatic translation and advanced natural language processing. However, the areas of

application will by no means be limited to these areas. We welcome proposals for technologies and areas of applications that can be expected to have a major impact on society in the future.

Specific research topics might include, but are not limited to, topics such as the following. We welcome new areas of technology that are not bound by existing paradigms.

1) Advanced and efficient sensing technologies to collect and acquire enormous quantities of various types of information in accordance with circumstances
2) Heterogeneous data integration technologies that are capable of advanced understanding of the meaning of, and integrated analysis of, various types of data based on diverse circumstances
3) Data processing technologies and system optimization technologies for real-time processing of time series data
4) Knowledge actuation technologies that use sophisticated data processing technologies and knowledge processing technologies that include artificial intelligence, etc. to build intelligent systems
5) Intelligent media technologies that can appropriately interpret external information (including human user emotions) based on existing knowledge, and can also accumulate new knowledge, in order to provide necessary and appropriate information to users
6) Security and privacy enhancement technologies that can accommodate various types of equipment and systems

(3) Research promotion and collaboration

Our goal is to establish a place where researchers who conduct research and development of state-of-the-art information science technologies, with a view to deploying the results in various fields of application, can inspire one another and benefit from a synergistic effect, in order to create cutting-edge research achievements and produce the young world-class research leaders of tomorrow.

Our hope is that researchers will make the most of the advantages of PRESTO individual research and, through interactions with researchers in other fields, will broaden the scope of their research and build a network of researchers in this research area that will carry over into the future.

This research area will also contribute in the integrated administration of the AIP project - which integrates artificial intelligence, big data, IoT and cyber security - by working on research tasks in cooperation with related research institutions such as the RIKEN Center for Advanced Integrated Intelligence Research. This is one of the research areas included in the "AIP Network Laboratory", which is part of the AIP project.

* The briefing sessions for the call for proposals in this research area will be held on the following dates at the following locations. We hope that many interested parties will attend. Both briefings listed below will be held jointly for the ACT-I research area “Information and Future,” the PRESTO research area “Fundamental

Information Technologies toward Innovative Social System Design," and "The Future of Humans and Interactions".

	Date & Time	Venue
Kyoto	April 18 th (Tue) 13:00 – 16:00	Mielparque-Kyoto 5th Floor "Conference room B" Higashi-shiokoji-chou 676-13, Higashino-Toin-dori Shichijyo Sagaru, Shimogyo-ku, Kyoto
Tokyo	April 19th (Wed) 14:00 - 17:00	JST Tokyo Headquarters Annex, 1st Floor Hall K's Gobancho,7,Chiyoda-ku

For more information, please visit the following site: http://www.senryaku.jst.go.jp/teian-en.html