Research area in Strategic Objective *"Mutual development of human-computer interaction and understanding of human behavior"*

Creating Human-Centered Interaction to Solve Social Issues

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<u>Overview</u>

  Our social lives and values are undergoing drastic transformation as people, artificial intelligence (AI), and robots become interconnected through networks and begin to interact with one another on a daily basis in both cyber and physical spaces. However, we cannot create a system that leads people and society in a healthy direction if we merely focus on technological progress. It is essential that we gain a deeper understanding of human nature, as well as social issues such as aging, population decline, health care, and social disparities, in order to create innovation that leads to a human-centered future society. For this reason, it is important to conduct research based on comprehensive knowledge that integrates new findings from various fields such as psychology, cognitive science, and social science, in addition to research related to information science and technology.

  In this research area, we engage in development of interactive systems while conducting analysis and evaluation from the standpoint of the humanities and social sciences. We do so iteratively in order to promote and disseminate integrated research style that links information science with the humanities and social sciences. In this way, we aim to create new human-centered interactions that can help solve various social issues and contribute to human well-being.

  Specifically, we strive to deepen our understanding of human beings based on cognitive science research and qualitative studies, create novel and effective interactions based on such understanding, and explore new research fundamentals that link information science and technology with the humanities and social sciences.

This research area will be operated as part of the Ministry of Education, Culture, Sports, Science and Technology (MEXT)'s Artificial Intelligence/Big Data/IoT/Cybersecurity Integration Project (AIP Project: Advanced Integrated Intelligence Platform Project).

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

1. Background

People's social lives are undergoing drastic transformation in tandem with the advancement of communication, information processing, AI, virtual reality, robotics, and other fields of information science and technology. While these technological advances have expanded people's physical and cognitive abilities and made their lives more convenient, they have also led to social fragmentation through digital addiction, digital disparities, and increased mental stress. Therefore, an overemphasis on technological advancement without sufficient understanding of people and society could be problematic.

For this reason, there is an increasing call for various stakeholders to consider, right from the research and development stage, the social, environmental, and ethical impact that information science and technology may have on people's lives so that information science and technology evolves in the right direction. Such efforts require us to grasp the nature of humans and society not only through technological advancement but also through various analytical and evaluative studies involving qualitative methods. The insights gained from such endeavors must guide our research.

2. Research and development objective and research project examples

On the basis of the above considerations, this research area targets all human-related interactions in both cyberspace and physical space, including human-to-human, human-to-artifacts (AI, chatbots, avatars, robots, IoT, and various devices), and human-to-environment interactions. We conduct both quantitative analysis and qualitative analysis iteratively while constantly developing and refining the interactive system. We thereby enhance the effectiveness of the system while deepening our understanding of people and society as we solve various social problems and contribute to people's well-being.

Specifically, the area will involve the following types of research. However, research is not necessarily limited to these topics. We expect more exciting and challenging proposals, which clearly explain the social issues to be solved, the perspective of contributing to the creation of human-centered interactions, and the academic significance of the research.

(1) Understanding humans and society based on experiments, surveys, analysis, and evaluation:
    Research to clarify the characteristics of human perception, cognition, and behavior as individuals or a group; the impact that information science and technology may have on people and society; and other social issues through quantitative and qualitative analysis and evaluation in order to acquire the knowledge needed to create novel interactions.

(2) Development of new interactive systems based on an understanding of humans and society:
   Research to develop novel and effective interactive systems based on an understanding of humans and society.

(3) Exploration of new methodologies to link system development with evaluation and analysis:
   Research to develop new methods to analyze and evaluate the current state of human interactions and the effectiveness of newly created interactions, so that the results of such analysis can be used for system development and improvement.

[Technological keywords]
   (1) Qualitative research, ethnography, behavioral economics, affective computing, cognitive psychology, brain science, etc.
   (2) Groupware, VR/MR, multimodal/cross-modal technology, telepresence, digital fabrication, human augmentation, social robots, wearable devices, affective computing, persuasive technology, AI, big data, IoT, health care/medical care, education, etc.
   (3) Digital ethnography, computer-aided qualitative data analysis, visualization, social imaging, RRI/ELSI, etc.

[Examples of social issues]
   Aging society, health care, labor shortage, childcare support, work–life balance, education disparities, stress society, ethics, privacy, discrimination and prejudice, digital divide, etc.

3. How to pursue research

   In this research area, we expect researchers to demonstrate eagerness to link an understanding of humans and society with technological development. They must conduct research iteratively to understand the characteristics of humans and society, and make constant efforts to develop systems based on the insights gained from such an endeavor. For this reason, those who have been selected are expected to pursue collaborative research with colleagues in their own domains and those in related domains, and with various stakeholders such as government, corporations, and individual citizens. Through these efforts, we expect our researchers to engage in system development and improvement, identify pressing issues and their significance, and analyze and evaluate the effectiveness of the system by conducting further experiments. In addition, we expect them to disseminate research results internationally by presenting them at academic conferences or making the data freely available to the public.

   This research area will be operated as one research area of MEXT's Artificial Intelligence/Big Data/IoT/Cybersecurity Integration Project (AIP Network Laboratory: Advanced Integrated Intelligence Platform Network Laboratory). It also contributes to the AIP project's integrated management by working on research projects in collaboration with the RIKEN Center for Integrative

Research on Innovative Intelligence and other related research institutions.

4. Research costs, research period

The research period is limited to three-and-a-half years. The maximum budget is 40 million yen in total (excluding indirect costs).

5. Notes for applicants

In this research area, we welcome proposals that center on investigation and analysis with the intent of providing suggestions for innovative interaction designs, as well as proposals for specific interactive systems. In the case of research that is preceded by analysis or evaluation, we will positively evaluate proposals that clearly indicate the problem to be addressed and the novelty of the interaction to be targeted.

In the case of research that is preceded by system development, we will positively evaluate proposals that clearly indicate the social issues to be solved and how to verify the effectiveness of the system in addition to the novelty of the interactions that will be created.

In either case, we encourage research in this area that seeks to build a system designed to solve social problems by linking information science technology with the humanities and social sciences. Therefore, we welcome proposals from applicants who are eager to take on interdisciplinary endeavors that go beyond their expertise at the time of application, proposals that make use of fundamental technologies to solve social issues or to create innovative use cases.