“What if...?”—toward a society that can achieve anything you imagine!

AI (artificial intelligence) is now making dramatic technological innovations. In order to realize “next-generation AI utilization” that can enrich your livelihood or business, people from companies, local governments and universities are meeting and taking on new challenges. AI (artificial intelligence) is now seeing dramatic evolution thanks to various innovations.

Robots and services with AI, which are able to understand people’s feelings, are going to provide support in their daily lives—a future depicted in science fiction films is on the horizon. AI is technology that can function like a human brain. For example, in the case of computer programs playing Go and Shogi matches, which are now quite famous examples of AI seen in the news, the AI makes the game decisions based on the accumulated games over decades. AI is engaged in cross-sector research, including researchers at home and abroad, companies and public institutions, and is expanding a range of research fields jointly engaged in large-scale research. Within an environment that is fully equipped with three essential elements, namely databases, computer resources and a simulation environment, the center promotes collaboration between industry and academia with a strong commitment to public implementation.

In this context, the Artificial Intelligence Research Center is engaged in research whose aim is to develop novel AI methods with a strong similarity to human intelligence, and with a firm commitment to public implementation. Additionally, the application of advanced technologies to resolve specific issues in the real world will lead to the creation of further novel and increasingly advanced technologies. According to the feasibility of this cycle within AI research, the Center is also willing to focus on facilitating cooperation between fundamental and applied research.

Research with a view to “public implementation of the technology”

As the capacity of computers and the amount of digital data are both increasing exponentially, the role of AI is becoming increasingly important. Leading IT companies in the U.S. are gathering top-tier researchers from around the world and are starting to commit to creating new businesses by developing various technologies that allow them to make the most of the enormous amount of data that they possess. Efforts to develop innovative AI approaches, by integrating a wide variety of fundamental research fields, will also become increasingly important in the future.

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AI, which is now being applied in a variety of areas including distribution, finance, medical care, housing, and creation of new businesses, is a fundamental form of technology in our modern society. It is a rapidly growing field, and therefore we are confident that it will attract further interest in the future.

Jun-ichi Tsujii,
Director, Artificial Intelligence Research Center, National Institute of Advanced Industrial Science and Technology (AIST)

Professor Tsujii has held several prominent academic positions, including Director of the School of Kyushu University, Professor at the University of Manchester, and Professor of the Graduate School of the University of Tokyo. He currently also holds the position of a Visiting Professor and Scientific Advisor at the University of Manchester.

Artificial Intelligence Research Center, AIST

The Artificial Intelligence Research Center is a research base in which researchers not only in the area of AI and related fields are deeply engaged in large-scale research. With an environment that is fully equipped with three essential elements, namely databases, computer resources and a simulation environment, the center promotes collaboration between industry and academia with a strong commitment to public implementation.

The Artificial Intelligence Research Center, under the National Institute of Advanced Industrial Science and Technology (AIST), was established as a platform for such cooperation. It is engaged in various innovative research fields, and is an important research base for cross-sector research. The Artificial Intelligence Research Center is a research base that supports cross-disciplinary research, where AI is utilized in the real world.
Dmitry aggressive

Let's Take a Look at the AI of Tomorrow

Stable and uninterrupted operation is a basic promise for civil infrastructure facilities. In the event of an interruption, the most critical issue is how quickly the system can return to ordinary operation. Therefore, we are implementing a research project on improving maintenance efficiency using AI, and as part of that research, detecting indications of malfunctions in wind-power generation systems. In this project, we asked for the cooperation of business operators in Japan and installed monitoring systems (CMS) in 48 wind turbines at 27 sites throughout Japan to collect data on a continuous basis. This was the first experimental demonstration on such a large scale to be implemented in Japan. We are going to evaluate the reliability of the AI by matching malfunction-event data with predictive data from work logs etc. leading up to the event. AI is merely a tool supporting decision making in the workplace. Giving the engineers who are in charge of the maintenance on-site confidence in the efficiency of the system is important. If this system is commercialized, it can also be applied to various other machines, for instance in manufacturing equipment in factories.

Living Lab where detailed data on people’s behavior in daily life can be collected

AIMT established the “Living Lab,” where people’s behavior can be observed in their normal living environments. The major aim is to scientifically understand the daily activities of individuals. By doing so, it is possible to detect potential dangers in everyday life (and make suggestions on how to eliminate them), for example, electricity, fire, water or other hazards. It should also provide some ideas on methods of improving existing products. Furthermore, the Living Lab has the role of providing a platform for personnel located at worksites and researchers monitoring them to communicate with each other for solving actual problems. It is important to take into account final users, location and method of use when incorporating AI into specific products and services and not simply taking technical approaches related to its use into account. Living Lab provides a simulated real-life environment for obtaining data, and advances research while incorporating knowledge gained directly from the workplace—to expand the potential of AI in preventing accidents involving children and elderly citizens.

Many areas of application

Frontline of AI research

Practical research and development based on actual living or business conditions are being implemented in the area of AI. They are related directly and indirectly to your everyday life and work.

Integrating IoT and AI utilizing high-quality data

PFN is engaged in research and technology development to fuse IoT with AI in areas including manufacturing, transportation system, and bio-healthcare. One of the characteristics of the company is that it possesses a vast amount of complicated data utilizing deep learning technology. This makes it possible to discover new information much more precisely than when rule-based algorithms are developed by human experts. For instance, it is no longer required for robot movements to require individual adjustment by engineers. However, if robots are connected to a network, they could learn on their own and cooperate with each other, making it possible to expand their areas of utilization much further. Collaboration with companies with high-quality data and know-how is important for development. In this regard, Japan has a great advantage. In the future, maintaining the computing power required for data analytics and machine learning will also be a key to ensuring a competitive edge. Our company will also strive to develop and provide methods for distributed training from vast amounts of data.

NEC and AIST: Collaboration using technical strengths of both organizations

NEC Corporation and AIST established the NEC/AIST Collaborative Research Laboratory in June 2016. Its major aim is to develop a technology which supports decision-making in unforeseen situations. Currently, a system which conducts a large variety of forecasting and control is being developed by utilizing big data generated by IoT devices. However, there are also many situations in which a sufficient amount of past data cannot be obtained easily, including disaster response and design of new products and services. Therefore, a collaborative public-private entity decided to develop a technique fusing simulation technology and AI, which takes full advantage of simulations to fill the holes in actual data. In the rapidly-developing area of AI, which incorporates a large array of information science and technologies, collaboration is essential between companies and organizations, whose individual shortcomings are complemented by other parties’ technological and information resources. The establishment of this laboratory is a perfect example of such collaboration. It is scheduled to implement various initiatives from practical-application-based principle research to research and development for industrial applications.

Autonomous driving is a major research theme. The actual traffic environment is extremely complicated and it is impossible to simulate all possible movement and decision patterns. Therefore, technology to make decisions based on information obtained through sensors is being developed.

Bringing out the potential of robots!

The laboratory is engaged in research which utilizes imitation learning by deep learning models, for example having robots fold towels and make them learn how to fold any size and material of towel within about ten seconds. Existing methods require a vast amount of time and incur huge costs for modeling and image processing in order to handle soft objects like towels. Our research using multiple deep neural nets can reduce these costs, and enable robots to perform the tasks that had been technically possible for robots but difficult to be automated. Robots become able to handle various kinds of goods with a limited amount of experience, the time it takes to teach robots about different work roles can also be reduced. There are many types of work that do not require great dexterity but yet can only be done by humans because these processes involve a high degree of safety. In the future, it will be important to commercialize these robotic technologies.
Steady progress toward the creation of new ideas!

Each business which shares its information on cases of success and pitfalls encountered by the business provides a boost to AI development. In Japan too, the movement of hosting events where different companies, organizations and researchers can exchange information and encourage collaboration between businesses is steadily spreading.

Matching needs and seeds through a consortium

The Artificial Intelligence Technology Consortium (secretariat: AIST) was established in May 2015, with the goal of accelerating value co-creation through data utilization, and produced case examples of public applications for AI. There are more than 80 member organizations in various business categories. Working groups are established in response to the issues faced by each member, and practical workshops are held. A wide variety of projects and collaboration is expected in the future between these companies through the matching of needs and seeds.

The Consortium has been communicating their activities through various symposiums and websites.

Looking for industry-academia-government collaboration

Sometimes small things make a big change

Close physical proximity is crucial

Business model utilizing AI

AIST offers a platform where venture businesses and researchers who are particularly interested in the potential of AI can exchange information smoothly. AIST holds an “Outreach Meeting” on an ongoing basis. In the meeting, each company gives a three-minute presentation on the company’s activities and problems. Then, through the poster session, venture businesses and researchers at AIST participate in free exchanges. Let’s hear from companies who actually participated in the meeting.

Top Management to Innovate Business Model through the “Earning Power”

How can we improve the “Earning Power” (the ability to make profit) in this era? IGPI provides practical hands-on support to improve business management, formulate strategies to utilize AI, and develop AI-related products. In many companies that excel at utilizing AI, the management are proactively making decisions to implement this new tool. What is important is to make changes in the organization through innovations in the business model. As AI becomes more popular, people with the following abilities will be required: the creativity to structure ways to implement AI to business, the ability to develop the structure involving AI into actual form, and the imagination to create new business models involving this new structure.

It is critical for the top management to adopt a solid business model.