An AI R&D Nexus
The Artificial Intelligence Research Center, AIST

Research and Development Division,
Industrial Science and Technology
Policy and Environment Bureau, METI
Outline of the Artificial Intelligence Research Center, AIST

- Gather up-and-coming top researchers and excellent technologies on AI domestically and internationally and build a platform that may create a virtuous cycle of development and commercialization of advanced AI and basic research; Contribute to the expanded reproduction of Japanese technologies and human resources, and the strengthening and maintenance of Japan’s industrial competitiveness
  - Integrate diverse technologies and commercialize them in collaboration with user companies, thereby solving problems and creating business chances in the real world; Feed back such results to further develop technologies
  - Conduct large-scale basic research that may solve problems in the real world with the participation of various top researchers; Accelerate basic research through demonstrations of research outcomes
  - Develop evaluation methods and benchmark dataset, etc. and contribute to raising the level of AI research as a public research institute
  - Spin out developed IP, not limited to conducting joint research with companies; Serve as a hub between the industry and academia
Gather domestic and foreign researchers, user companies and joint research partners; Promote basic to applied R&D, foster human resources and offer assistance for commercialization in an integrated manner

- Prepare incentives such as through developing an environment to enable standardization directly linked to social problems, and application and evaluation of element technologies, as well as offering support for commercialization and thereby attract up-and-coming young researchers from domestic and overseas universities, while utilizing the Cross Appointment System, Guest Researcher System, Research Assistant System, and other systems
- Frontline researchers engage in research while ensuring data security and utilizing data other than public data as well.
- A planning team, in close collaboration with relevant research teams, examines problems of respective companies and applicability of AI technologies to relevant data and provides consultations concerning appropriate technology packages.

Artificial Intelligence Research Center, AIST (established in May 2015)

- The Center started operation with approximately 75 staffs. As of October 2016, the number of staffs increased to over 360.* The system of the Center is being expanded centered on the AIST Tokyo Waterfront.
- *Total of full-time officials of AIST, invited researchers (including cross-appointed researchers and assigned researchers, etc.), guest researchers, special researchers (post-doctoral researchers), research assistants, etc.
- Allocation of researchers and teams is flexibly altered in consideration of conditions of carrying out research.
Development of Core Technologies Concerning Next-Generation AI and Robots: Major Content

R&D topic (i): Basic research for large-scale objectives and R&D on cutting-edge technologies

(1) R&D on next-generation brain architecture AI
- In order to create next-generation AI based on human information-processing principles, basic research for large-scale objectives will be carried out regarding brain architecture AI (artificial visual cortex, motor cortex and speech cortex) by incorporating the latest knowledge of computational neuroscience.
- R&D on cutting-edge technologies will be carried out while enhancing pioneering technologies including “deep learning” and using large-scale data, with the aim of achieving high performance in solving problems in the real world that have not been solved through conventional means.
  - Major interim goal: Create a prototype of brain architecture AI
  - Major final goal: Build a concept verification system for a brain architecture AI system by the use of developed means, and confirm the validity of the AI system through the application to data and problems of a real-world scale, such as moving images obtained through a camera

(2) R&D on data-knowledge integration AI
- Basic research for large-scale objectives and advanced R&D will be carried out regarding data-knowledge integration AI, which has strong affinity for human intelligence, by organically integrating diverse and unstructured large-scale data in the real world with large-scale knowledge such as a massive amount of texts within websites, and text archives and knowledge networks structured by humans.
- R&D on cutting-edge technologies will be carried out for improving the performance of advanced machine learning techniques and Bayesian probabilistic modeling techniques, which are considered to be suitable for data-knowledge integration.
  - Major interim goal: Implement basic technologies for data-knowledge integration on a trial basis and evaluate the improvements in forecast performance and identification performance
  - Major final goal: Build a concept verification system for data-knowledge integration AI, and confirm the validity of the AI through the application to problems of the real world, such as navigation of traffic and human behavior in cities, etc.

* Implement these technologies as advanced core modules while ensuring connection with R&D topic (ii)

R&D topic (ii): R&D on next-generation AI frameworks and advanced core modules

R&D will be carried out regarding next-generation AI frameworks as the information processing infrastructure that facilitates the collection, accumulation, management and utilization of large-scale data, and that enables easy incorporation and integration of various element technologies, and regarding advanced core modules integrating multiple element technologies of brain architecture AI and data-knowledge integration AI.

  - Major interim goal: Implement frameworks and modules on a trial basis to verify the advanced performance of individual modules and create multiple prototypes of services such as assistance for decision making
  - Major final goal: Efficiently carry out R&D on services in the real world where large-scale updated data are utilized on a real time basis to show the possible availability of multiple services that assist advanced judgment and daily behavior depending on time, space and surrounding circumstances

* Enable early commercialization of research outcomes and facilitate agile development of systems for practical use with diverse functions, thereby accelerating the commercialization of AI technologies

R&D topic (iii): Common fundamental technologies for next-generation AI

R&D will be carried out regarding methods for quantitatively evaluating the effectiveness and reliability of AI technologies and guaranteeing standard performance, the setting of standard tasks necessary therefor, and properties to be satisfied by a benchmark dataset and construction methods thereof.

  - Major interim goal: Decide methods for selecting and setting tasks for evaluation and methods for collecting and creating a benchmark dataset; Based on the methods thus decided, set multiple standard tasks and create a standard benchmark dataset for the evaluation of performance and reliability of AI technologies in engaging in R&D on topics (i) and (ii)
  - Major final goal: Improve methods for selecting and setting tasks for evaluation and methods for collecting and creating a benchmark dataset; Based on the methods thus improved, set multiple standard tasks and create a standard benchmark dataset for the evaluation of performance and reliability of AI technologies in engaging in R&D on topics (i) and (ii)

* Ensure connection with R&D topics (i) and (ii); Build a platform for research on next-generation AI technologies and contribute to facilitating the broad industrial application thereof