

NII

Inter-University Research Institute Corporation
Research Organization of Information and Systems

National Institute of Informatics

2023

Summary

Creating Knowledge from Information

The National Institute of Informatics (NII) is the only academic research institute in Japan focused on the field of informatics, with a comprehensive range of research activities that covers everything from long-term basic research to real-world studies that attempt to address current social issues.

As an inter-university research institute, NII also deploys various services, such as building and operating the Science Information NETwork (SINET), providing academic content and service platforms, and developing research data infrastructures. It promotes the further growth of these services by offering its research-based expertise and interactive feedback. NII works on both research and service to create future value through informatics.

From data platforms to knowledge platforms

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Research Organization of Information and Systems



Since computers first emerged in the mid-20th century, informatics has had a far-reaching impact on society and the academic world. The invention of the World Wide Web (WWW) thirty years ago fundamentally changed how information was released and circulated, how information was revolutionizing the very structure of society. In the last decade, there have been incredible developments in deep learning: AlphaFold's prediction of protein structures has revolutionized life sciences research, while the DeepL machine translation system, trained with vast quantities of bilingual data from the web, is transforming the way we communicate. Recently, the news is full of stories about ChatGPT, the AI chatbot that can write essays of a good enough level to pass regular university exams. A future of complete coexistence between AI and humans is approaching faster than we can imagine. Meanwhile, modern society is grappling with problems including environmental issues, inequality, and regional conflicts. The human race is suffering in a world of contradictions. To tackle complex social issues, design a world where AI and humans coexist, and bring true peace of mind for everyone, it will require cooperation between different areas of academic research, including the humanities and social sciences. Preparing the groundwork to make this possible is a matter of urgency.

The importance of data is a clear trend in science and society in the 21st century. Significant scientific progress is being made by creating data from observations and measurements, and digitizing and making the data openly available for discussion and utilization. In Japan, the National Institute of Informatics (NII) has been instrumental in developing research data platforms, culminating in the latest SINET6 network. One problem in promoting collaboration between different areas of academic research is that experts in a particular field are amateurs when

it comes to other fields, so it is not easy to get an overview of various fields and utilize data directly. In order to deepen future academic research as comprehensive knowledge to address complex social issues, it will be necessary to automate the process of interpreting data, interconnecting and systematizing knowledge, and building knowledge platforms to support the creation of new cross-disciplinary knowledge. The need for such platforms was first pointed out more than a decade ago. Now that data platforms are in place, people are starting to realize the value of making data openly available, and it is becoming possible to interpret papers and multimedia data using AI foundation models stemming from machine translation research. Thus, the time has finally come for us to focus on building a knowledge platform. However, building an AI-foundation model requires large-scale computational resources, and the growing oligopoly by some international companies is a major issue. I believe that in Japan, we need to work together as a nation to establish systems for research, development, and operation of AI-foundation models and to work on constructing knowledge platforms.

In this time of rapid social change, I have been appointed as Director-General of NII from April 2023. As an inter-university research institute and also the core organization for informatics in Japan, the NII has responded to the needs of society through our two areas of work: research and services under the leadership of previous directors. Furthermore, we engage in informatics research from basic theory to cutting-edge topics, and our work provides academic networks and research data platforms. Additionally, we aim to build step by step a knowledge platform that will form the foundation for collaboration in academic research.

Working on Both Research and Service to

Research

Comprehensive research from basic theory to cutting-edge technology

Merging computer science and information engineering with the humanities, social sciences, life sciences, and many other disciplines, informatics is a new domain of study that is involved in all aspects of society. Having established four Research Divisions and 15 Research Centers, NII is carrying out research comprehensively on everything from the basic theory of informatics to cutting-edge fields such as artificial intelligence, big data, the Internet of things, and information security. NII is also focusing its efforts to promote international exchange and collaboration with overseas universities and research institutes, as well as collaboration between industry, government, and academia to help implement its research achievements in the real world.



Research Divisions



Principles of Informatics Research Division

Seeks new principles and theories of informatics using algorithms and computational complexity, as well as artificial intelligence, robotics, and quantum computing. Conducts research to develop new technologies that will sustain societies of the future and break new ground in the field of informatics.



Information Systems Architecture Science Research Division

Aiming at boosting the performance, quality, and functionality of computers and networks, the building blocks of information and communication systems, conducts research ranging from creating groundbreaking technologies in software and hardware architectures, to implementing their working systems.



Digital Content and Media Sciences Research Division

Carries out research on analyzing and generating content and media, including symbolic and patterned media; storing, retrieving, and organizing content with platform technologies; and analyzing social media and interactions among humans and knowledge.



Information and Society Research Division

Conducts cross-disciplinary research based on emerging information technologies such as Big-data analytics to achieve the required levels of trustworthiness in a cyber-physical society where the cyberspace and real-world phenomena are related more closely than before.



Researchers with various expertises collaborating to work on special research domains

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| ◆ Research and Development Center for Academic Networks | ◆ Research Center for Knowledge Media and Content Science | ◆ GRACE Center: Center for Global Research in Advanced Software Science and Engineering |
| ◆ Research Center for Community Knowledge | ◆ Center for Cloud Research and Development | ◆ Center for Dataset Sharing and Collaborative Research |
| ◆ Center for Strategic Cyber Resilience Research and Development | ◆ Research Center for Open Science and Data Platform | ◆ Center for Research Data Ecosystem Development |
| ◆ Global Research Center for Quantum Information Science | ◆ Global Research Center for Big Data Mathematics | ◆ Research Center for Mathematical Trust in Software and Systems |
| ◆ Research Center for Medical Bigdata | ◆ Global Research Center for Synthetic Media | ◆ Center for Advanced Mobile Driven Research |

Graduate Program

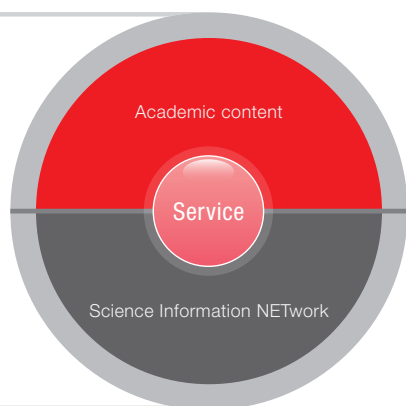
Fostering new leaders for an advanced information society

The graduate program at NII is carried out in three ways: (1) participating in the Graduate University for Advanced Studies, SOKENDAI, (2) collaborating with other graduate schools, and (3) accepting research students for special collaboration.

SOKENDAI is the first graduate university in Japan established to foster original world-class academic research that transcends traditional disciplines and to pioneer advanced fields of study that create new lines of scientific inquiry. NII has joined with SOKENDAI to establish an Informatics Program, offering graduate school education for Five-year and Three-year Doctoral Programs. There are six areas of education and research within the Informatics Program, so students can take lectures and receive research supervision according to the field in which they wish to specialize.



Create Future Value through Informatics



Service

Supporting academic research infrastructure and education

In collaboration with universities, research institutions, and the entire research community, NII builds and operates the Science Information NETWORK (SINET). Leveraging the SINET network's ultra-high speed, high reliability, and multifunctionality, NII provides an authentication federation platform, cloud adoption and utilization support, and academic content platforms as well as develops the NII Research Data Cloud to promote open science. Through those services, NII is working to maintain and provide the Scientific Research Digital Platform. Furthermore, NII Security Operation Collaboration Services contribute to building the framework enabling national universities and other academic institutions to respond quickly to cyber security incidents and other issues.

Science Information NETWORK (SINET): An ultra-high-speed network supporting over 950 universities and research institutions across Japan

Innovative connectivity

Uses leading-edge technology, such as advanced optical transmission technology, for ultra-high-speed full-mesh connectivity to all prefectures in Japan and network slicing for secure services.

Ultra-high speed

Delivers an ultra-high speed high-performance network by minimizing transmission delay and using 400 Gbps on all lines between nodes (100 Gbps lines to Okinawa).

Multifunctionality

Authentication federation platform development and provision

Develops and provides an authentication federation platform for the Academic Access Management Federation in Japan (GakuNin), UPKI Digital Certificate Issuance Service, and eduroam JP (a global wireless LAN roaming platform for academia) so that universities and research institutions can have safe and secure access to web services, computing resources, and networks for education and research.

Cloud adoption and utilization support

Offers cloud adoption and utilization support services to universities and research institutions. GakuNin Cloud Adoption Support Service provides information on cloud adoption and utilization. GakuNin Cloud Gateway Service provides one-stop access to cloud services. GakuNin Cloud On-demand Configuration Service provides support for setting up a cloud environment.

NII Security Operation Collaboration Services (NII-SOCS): Creating an inter-university collaborative information security framework

NII helps national universities and other academic institutions create a framework for rapid response to security incidents, accidents, and other issues. In collaboration with national universities and other academic institutions, NII builds a system on SINET that monitors, detects, and analyzes cyberattacks. Furthermore, NII provides them with information to meet the level of risk and urgency of attacks based on data shared by related foreign and Japanese organizations, as well as training for cybersecurity officers to enhance their capacity to counter cyberattacks.

NII Research Data Cloud (Research data infrastructure): Service to manage, publish, and search research data to promote open science

GakuNin RDM (Research data management platform/Data analysis function)



This service helps researchers to manage their data, share with collaborators, and analyze data in the research process. The data saved into the system are automatically traceable, ensuring research integrity. The data can be linked to cloud storage and other services in line with the institution's data management policies.

JAIRO Cloud (Research data publishing platform/Shared repository service)



This service provides institutional repository functionality for academic institutions. Built on the repository software developed by NII, it enables researchers to easily self-publish their research results. Nearly 700 academic institutions in Japan use this service.

CiNii (Academic information search service)



This web service allows users to search for academic information in Japan. It provides access to comprehensive scholarly information such as research papers/articles, books, research datasets, or project information (CiNii Research), book collections at university libraries (CiNii Books), and doctoral dissertations (CiNii Dissertations).

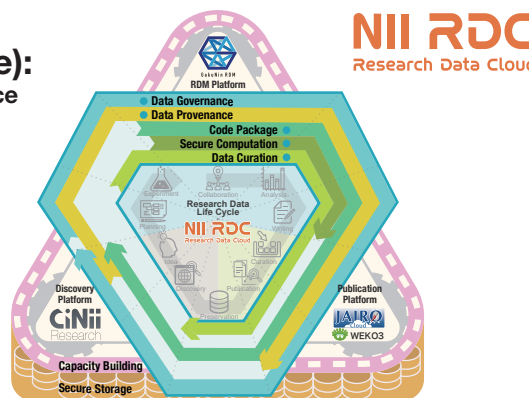
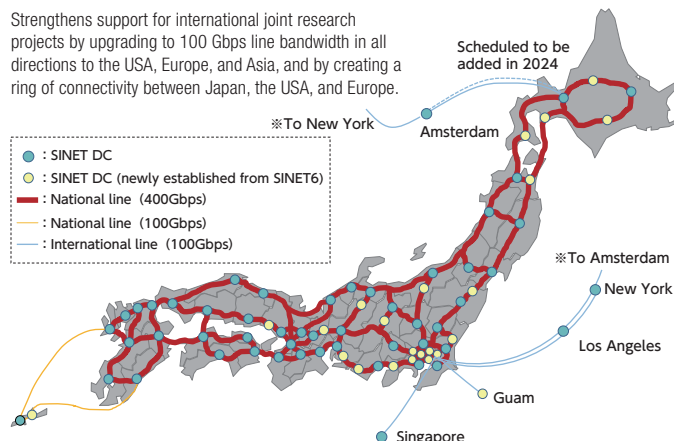


Robust and reliable

Adopts a multilayered advanced network architecture with redundancies configured at each layer and both bottleneck avoidance and bypassing systems, which are all linked together to create and provide a highly robust and reliable network.

Global reach

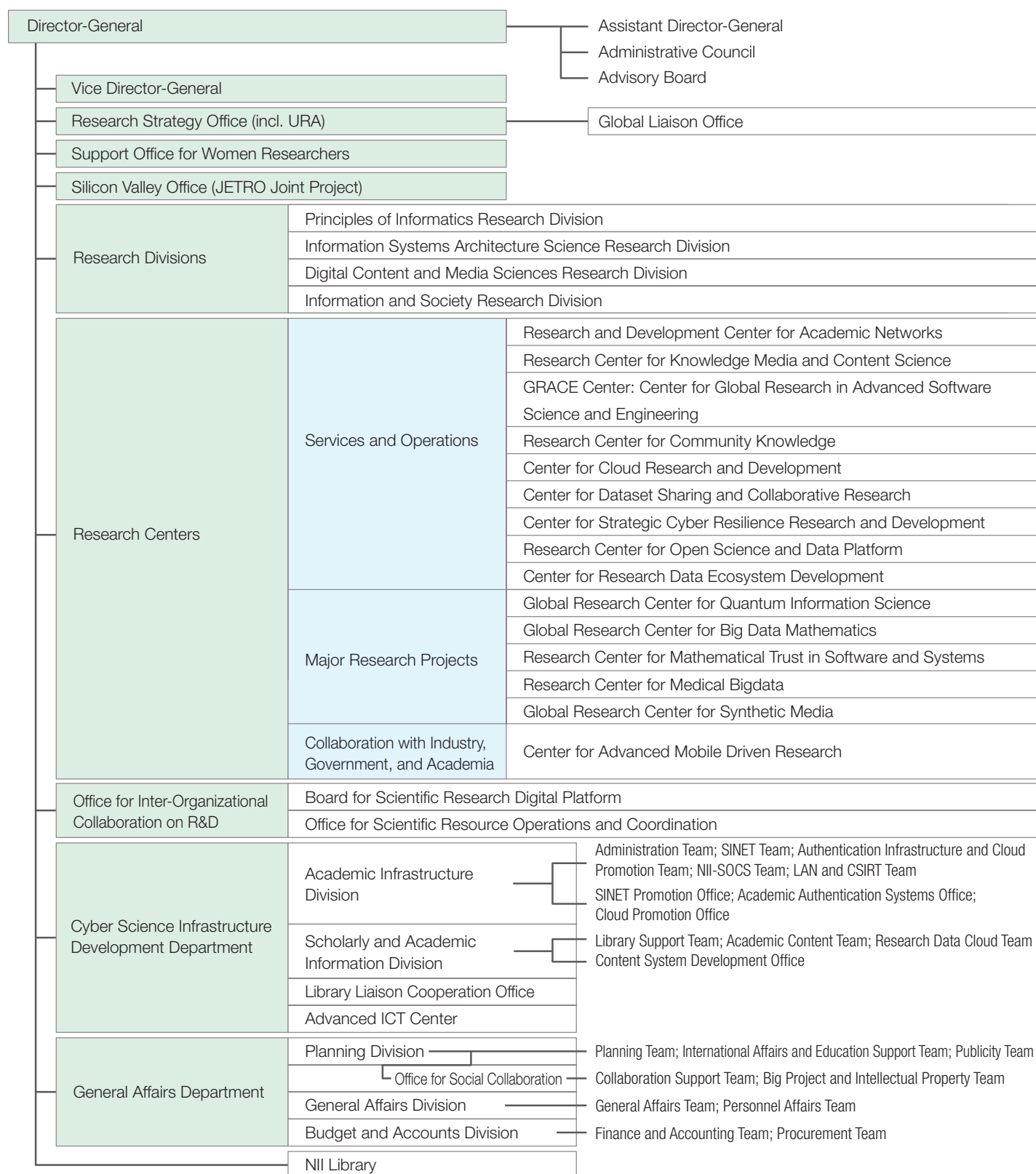
Strengthens support for international joint research projects by upgrading to 100 Gbps line bandwidth in all directions to the USA, Europe, and Asia, and by creating a ring of connectivity between Japan, the USA, and Europe.



GakuNin LMS (Research data management training course)

The Learning Management System helps researchers and staff, who provide research support services such as at libraries, URAs, and infrastructure centers, develop skills in research data management. This system can provide academic institutions with the functionality to manage users' learning statuses and digital badges are issued to those who complete the courses as certification of completion.

Organization



Collaboration with Industry, Government, and Academia

NII carries out goal-oriented research and development to address real social issues and fosters collaboration between industry, government, and academia to help implement its research achievements in the real world. NII actively promotes collaborative work between industries, local governments, and universities using a system that includes open collaborative research, comprehensive partnerships, and joint research units that are set up to operate special research laboratories under corporate partnerships. To create new collaboration and licensing opportunities for its research accomplishments, NII holds seminars to present the seeds of its cutting-edge research and to discuss corporate and social needs. It also engages in academic consulting by researchers and human resource development for the IT sector.

International Exchange

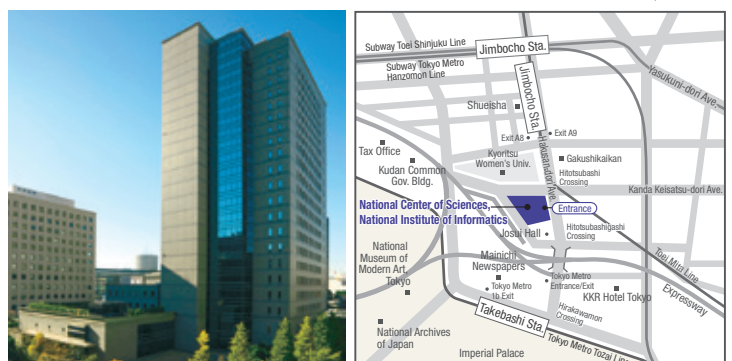
To promote organization-wide international research exchange with overseas universities and research institutes, NII set up the Global Liaison Office (GLO), which conducts various activities that include forming international exchange agreements through Memorandum of Understanding (MOU) and handling the MOU Grant for research exchange assistance, and the NII International Internship Program. In addition, NII holds the NII Shonan Meeting, a series of seminars where top-class researchers from around the world come to Japan for intensive discussions on the field of informatics. NII is also actively accepting researchers through the German Academic Exchange Service (DAAD) and the Japanese-French Laboratory for Informatics (JFLI).

Date of issue	Title
April 1, 2022	Launch of our academic research platform to support Society 5.0: SINET6, offering speeds of 400 Gbps nationwide, is integrated with the NII RDC, a research data platform, to promote Japan's research data utilization, communication, and management
April 8	The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (Science and Technology Promotion Category) for contributions to AI automatic diagnosis research on a cloud platform for medical big data.: The commendation was jointly awarded to SATOH, Shin'ichi (NII); AIDA, Kento (NII); MORI, Kensaku (Nagoya University); and HARADA, Tatsuya (University of Tokyo).
April 18	CiNii Articles integrated into CiNii Research, allowing users to discover a wealth of academic information linked to articles
May 13	"NII Weeks 2022" from Monday May 30 to Friday June 10.: NII Open Forum, NII Open House, and Japan Open Science Summit will be held on consecutive days to introduce NII's work to a wide audience
May 16	The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (Science and Technology Promotion Category) for the research and development of the Researchmap research information platform service: The commendation was jointly awarded to ARAI, Noriko (NII); MASUKAWA, Ryuji (NII); and MIYASHITA, Hiroshi (Uniadex).
May 17	Learn programming thinking at the NII Open House: Computer Science Park will be held on Saturday June 4, online and in Tokyo, Hamamatsu, and Himeji
May 24	Data science in the response to the COVID-19 pandemic: Lecture by Dr. NAGAI, Ryoza, President of Jichi Medical University, and discussion with KITSUREGAWA, Masaru, Director-General of NII. Keynote speech on opening day of NII Open House, Friday June 3
July 7	A new method for mathematically proving the safety of automated driving vehicles: Accelerating social acceptance of automated driving by efficiently deriving logical safety rules
July 27	An overview of personal information protection rules for research in the big data era: "Data Management Platform Handbook for Open Science" published
August 12	Development of AI to support pathologic diagnosis in gastric biopsies: Supporting insufficient pathologists and ensuring cancer treatment
August 18	Data from around 160,000 product/service reviews made available free of charge for academic research purposes
August 31	Listings data from marketplace app Mercari made available free of charge to universities: Aiming to help create a circular economy through research into behavioral and psychological analysis of consumers in the second-hand market
September 15	Emojis featuring the NII's official mascot Bit-kun available in the LINE app, in addition to the annual LINE stickers
October 26	Miwo, the world's first AI character recognition app for characters written in cursive script, wins a 2022 Good Design Award: Contributing to the study of cursive script and local history research using historical documents
October 31	The number of user institutions of Japan's academic research platform SINET reaches 1,000
November 1	Development of surveillance system using COVID-19 pneumonia CT images: ICT platform for research & development in response to the pandemic
November 8	Center for Advanced Mobile Driven Research (CAMDR) established at NII: Aiming to create an innovative value-generating platform for high-performance mobile 5G environment
November 24	Travel data posted by users of Japanese travel guidebook website "Chikyu no Arukikata" made available free of charge for academic research
December 23	Analysis of changing attitudes and interest surrounding the COVID-19 vaccines: Using large-scale data from over 100 million Twitter posts
January 10, 2023	Release of AI system to estimate biological age from fundus images: Forming the basis to develop new biomarkers relating to eye conditions
January 13	SYNTHETIQ VISION, a program to automatically identify AI-generated fake face images, adopted to detect deep-fake videos of celebrities: First practical use of an automatic fake image detection system in Japan
January 23	NII and NTT launch trial of a secure computation system for universities: Providing the world's first "secure computation AI software capable of learning and inference processing using key algorithms of the four major categories of AI"

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April, 2023

