CNRS THEMATIC REPORTS

ARTIFICIAL INTELLIGENCE AT CNRS
Distinct research communities work in the field of Artificial Intelligence (AI) and have contributed in various ways to recent successes in this area. The growth of modern AI was brought about by the availability of large amounts of data and the development of computing architectures and specialised software environments. The field has also benefited from recent advances in fundamental research, particularly those made in machine learning. Beyond AI’s applications like computer vision, natural language processing or the localisation and piloting of autonomous systems, AI has led to repercussions in many other sectors (health, digital humanities, environment, biology, observation of the universe and the planet, etc.). The CNRS works in joint research units with its partners (universities, schools, organisations and companies), carrying out research into the whole spectrum of AI ranging from the foundational aspects to its societal impacts through its various fields of application. The CNRS’s national presence and broad thematic coverage mean the organisation is a core actor through its Institute of Information Sciences and their Interactions (INS2I) in the implementation of the national AI strategy launched by the French President in March 2018. The CNRS is a partner in the four interdisciplinary Artificial Intelligence Institutes (3IA) selected in April 2019. Joint research units involving the CNRS host 27 of the 40 individual research and teaching chairs in AI announced in December 2019. On behalf of GENCI (the Very Large Computing Research Infrastructure), the CNRS also hosts the Jean Zay AI-HPC (High Performance Computing) converged supercomputer inaugurated in January 2020 at its national IDRIS computing centre at Paris-Saclay University.

Research themes:
- Fundamental themes
- Integration
- Applications
- PIA Institutes
- Chairs

Number of researchers and academics working in Artificial Intelligence:
- Less than 25 people
- Between 25 and 50 people
- Over 50 people

Cartography of CNRS Artificial Intelligence Laboratories

Overall total 1120
WHAT AI RESEARCHERS SAY

"My research interests have essentially focused on the structure and interpretation of a text using formal methods. I am coordinating the ANITI project based around integrative programmes which aim to address issues raised by several AI application areas (certification of critical systems, fairness and acceptability, emerging industrial applications)."

Nicholas Asher
CNRS senior researcher at the IRIT laboratory, beneficiary of an ERC Advanced Grant in 2010, winner of the CNRS silver medal in 2019, scientific director of the Interdisciplinary Institute in Artificial Intelligence (3IA) ANITI at Toulouse.

"Developing efficient sampling algorithms of high-dimensional probability distributions for machine learning using repulsive stochastic processes, a tool from statistical physics."

Rémi Bardenet
CNRS researcher at the CRISMAL laboratory in Lille, beneficiary of an ERC Starting Grant in 2019, winner of the CNRS bronze medal in 2021, ANR AI Chair.

"Developing new AI approaches for next generation microscopic image processing and analysis."

Laure Blanc-Féraud
CNRS senior researcher at the I3S laboratory, former director of the ISIS Research Network, Chair at the Interdisciplinary Institute in Artificial Intelligence (3IA) in Côte d’Azur.

"The work of the Interdisciplinary Institute in Artificial Intelligence (3IA) ranges from hardware architecture to software at the core of Artificial Intelligence. Its working programme is structured around two main themes: AI for the future and AI for humans and the environment. This is a multidisciplinary programme in which data specialists, computer scientists, mathematicians, seismologists, doctors, sociologists, lawyers and philosophers collaborate with our partner companies."

Éric Gaussier
Professor at the University of Grenoble-Alpes, former director of the Interdisciplinary Institute of Artificial Intelligence (3IA) MIAI in Grenoble.

"Integrating the notions of fairness which are studied in social choice using machine learning to achieve trusted AI and exploiting recent progress in preference learning to define collective decisions which are both efficient and fair."

Jérôme Lang
CNRS senior researcher at the LAMSADE laboratory, winner of the CNRS silver medal in 2018, Chair of the Prairie Institute.

"Developing fast computational algorithms and applying these advances to machine learning, computer vision and also in the field of neuroscience to democratise optimal transport."

Gabriel Peyré
CNRS senior researcher at the DMA ENS laboratory, beneficiary of an ERC Starting Grant in 2011 and Consolidator Grant in 2016, winner of the CNRS silver medal in 2021, deputy scientific director of the Prairie Institute.

SCIENTIFIC POLICY

AI is deemed an important subject in the CNRS Contract of Objectives and Performance for the 2019-2023 period. Firstly, AI is a priority theme in the area of digital technology with fundamental research questions which need to be taken addressed, particularly involving issues related to the energy footprint, reliability and explainability. AI also represents a societal challenge for all scientific disciplines aiming to master issues related to impacts on scientific discoveries, how organisations function or the transformation of society.

SCIENTIFIC LEADERSHIP

As well as structuring research forces in joint research units, the CNRS possesses scientific coordination tools for mobilising the different research communities on the national scale. As the name suggests Research Networks (Groupements de Recherche) facilitate the creation of federating networks and also act as forums for exchanges between scientists and industry, as foresight instruments and also as tools to support young researchers. Four such Research Networks are specifically linked to different aspects of AI.

The AI Research Network (AI)

This Research Network focuses on formal and algorithmic aspects such as learning, reasoning or planning and its mission is to create a new community capable of responding to future challenges in the field in interaction with the other Research Networks.

The ISIS Research Network (ISIS)

The ISIS Research Network works on information, signal, image and vision processing methods ranging from signal shaping to transmission and including modelling and analysis. It particularly uses machine learning techniques for this research.

The MaDiCS Research Network (MaDiCS)

The MaDiCS Research Network promotes interdisciplinary research positioned within a continuum “from data to knowledge and decision making”. The masses of data in science are the starting point for the network’s research.

The NLP Research Network (TAL)

The TAL Research Network deals with computer processing of all forms of natural language (written, oral, sign language). Its mission is to mobilise the top-level international scientific community on this strategic subject for digital sciences.
The CNRS Innovation Medal

The CNRS honours scientific research that is at the origin of an outstanding innovation with its Innovation Medal which was created in 2011. In 2017, Daniel Le Berre, professor at Artois University and a member of the Computer Science Research Lab (CRIL - CNRS/Artois University) was awarded the Innovation Medal for having developed the Sat4j free software for the satisfiability of logical formulas. This software provides a set of tools for reasoning in Boolean variables for the Java language.

Increasing the transfer of knowledge to companies and to society as a whole as well as the economic impact of these transfers is a priority for CNRS. The field of AI offers numerous opportunities for interaction between laboratories and the economic sphere.

38% of the 1400 start-ups which derive from CNRS joint research units are in the information and communication technologies sector and a significant proportion of these involve the use of AI technologies.

KAYRROS

Kayrros was co-founded in 2016 by Alexandre d’Aspremont (CNRS senior researcher at DI ENS - CNRS/ENS/Inria) and was awarded a European Innovation Council (EIC) ‘Accelerator’ grant in September 2019. This company develops innovative data analysis techniques and particularly radar imagery to extract quantitative information for the energy sector like the real-time status of worldwide oil stocks.

The Jean Zay supercomputer enables the traditional uses of High-Performance Computing (HPC) to be broadened to include new uses in the field of Artificial Intelligence (AI).

BEHAVIORS.AI

The joint Behaviors.ai laboratory is a partnership between the LIRIS (Computer Science Laboratory for Image Processing and Information Systems - CNRS/INSA Lyon/University of Lyon/École Centrale de Lyon) in Lyon and the Hoomano SME. It receives funding from the National Research Agency’s LabCom programme and explores AI-based developmental learning. This enables a robot to improve its learning as it interacts with users and to adopt social behaviour which is adapted to its human interlocutors.

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THE LABORATORIES’ PARTNERS

Aix-Marseille University  
Artois University  
Bordeaux INP  
CentraleSupélec  
CY Cergy Paris University  
École Centrale de Lille  
École Centrale de Lyon  
École Centrale de Nantes  
École des Mines de Saint-Étienne  
École des Ponts ParisTech  
ENGEES (National School for Water and Environmental Engineering)  
ENIB (Brest Graduate School of Engineering)  
ENS  
ENS Lyon  
ENS Rennes  
ENS Paris Saclay  
ENSEA  
ENSICAEN (National Graduate School of Engineering of Caen)  
ENSTA Bretagne  
Grenoble-INP (Institute Of Engineering)  
IMT Atlantique  
INP Toulouse  
Inria  
INSA Lyon  
INSA Rennes  
INSA Strasbourg  
Institut Polytechnique de Paris  
Paris-Saclay University  
Sorbonne University  
Toulouse 1 Capitole University  
Université Bretagne Occidentale  
University of Caen Normandy  
Université Clermont Auvergne  
Université Côte d’Azur  
University of Bordeaux  
Université de Bretagne-Sud  
University of Grenoble-Alpes  
Université Gustave Eiffel  
University of Lille  
Université de Lorraine  
Université de Lyon  
University of Montpellier  
University of Nantes  
Université de Rennes 1  
University of Strasbourg  
University of Technology of Compiègne  
University of Toulon  
Université Lumière Lyon 2  
Université Paris-Dauphine PSL  
Université Polytechnique Hauts-de-France  
Université Sorbonne Paris Nord  
Université Toulouse 2 Jean Jaurès  
Université Toulouse 3 Paul Sabatier

Cover photo: Compute nodes of the Jean Zay supercomputer named after the Minister of National Education and Fine Arts who was responsible for the creation of the CNRS, along with Jean Perrin. This converged supercomputer was capable of performing 13.9 million billion operations per second (petaflops) in its initial configuration installed in summer 2019 and two successive extensions have increased its capacity to 28.3 petaflops in 2022. It enables the traditional uses of high-performance computing (HPC) to be broadened to include new uses in the field of Artificial Intelligence (AI). This HPE SGI 8600 supercomputer was designed by Hewlett Packard Enterprise before being acquired by GenCI (Very Large Computing Research Infrastructure) in 2019 and is operated by IDRIS on the Plateau de Saclay.

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