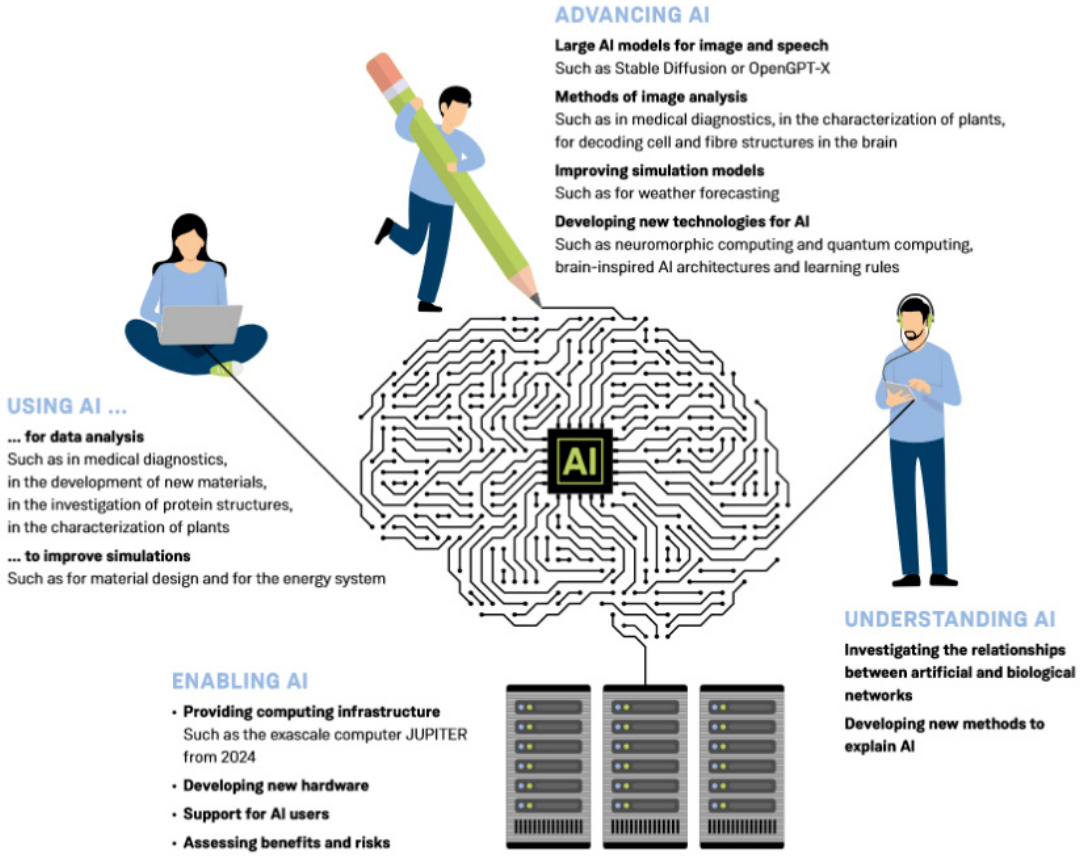
Artificial intelligence at Forschungszentrum Jülich

The boom in artificial intelligence (AI) has only just begun. Experts agree that AI is a key technology that Germany should not miss out on. This is precisely what we are focusing on at Forschungszentrum Jülich. We are making the technology fit for the challenges of the future and are already using its potential to solve complex problems. For many years, our scientists have been researching learning machines – algorithms that recognize patterns in data sets and use them to solve tasks independently, whether it be generating texts and images or identifying promising active ingredients for drugs.

Thanks to our unique computing infrastructure and technical expertise, we have become a hotspot for AI in Germany and Europe. We are making an important contribution to driving forward innovation in the field of artificial intelligence, strengthening European competitiveness, and learning to realistically assess the possibilities of the technology.



Powerful computers for powerful AI

Specifically, AI research at Jülich is pursuing four key objectives. Firstly, we aim to create excellent conditions for the use of AI. We achieve this, for example, by providing the necessary computing infrastructure. Complex AI algorithms can only be trained and used on powerful supercomputers. Fortunately, JUPITER, one of the world's fastest AI computers, will soon be up and running at Jülich.

Secondly, we are further developing AI. For example, Jülich scientists are involved in the development of large image and language AI models such as OpenGPT-X, which complies with European data protection regulations. We are also playing a leading role in the development of AI foundation models for applications in science, including for climate and materials research. Foundation models are AI applications that use a comprehensive knowledge base to solve a range of complex problems. New models like these are designed to make users independent of commercial, mostly US-based, providers. In the future, our research in the field of neuromorphic computing could help to create completely new AI architectures: technologies inspired by the human brain.

We aim to make our computing power, models, and technologies available to a broad user base in science and industry. In this context, we are, thirdly, also concerned with issues of transparency and traceability. How are results obtained using AI? And how can we explain this to lay people in a way that they can understand?

Fourthly, we use AI for our own work in our diverse research fields. Machine learning, for example, helps us to develop new types of climate models or optimize materials for photovoltaics. Artificial intelligence also enables more effective and faster weather forecasting, diagnosis of brain tumours, and analysis of visitor flows at major events.

We want to ensure that AI is not only developed behind the closed doors of industry.

Dr. Stefan Kesselheim, Head of SDL Applied Machine Learning & AI Consultant team

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projects that use AI and machine learning methods are now running on the Jülich supercomputer JUWELS.

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million euros are being invested by the Helmholtz Association to develop foundation models for AI applications in science.

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exaflops of computing power at 8-bit precision make the Jülich high-performance computer JUPITER possibly the fastest AI computer in the world.

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