New centre for model-based artificial intelligence

A centre for model-based artificial intelligence has been set up at Heidelberg University to link mathematical modelling methods with information processing in neuronal networks. The Carl Zeiss Foundation (CZS) is funding the CZS Heidelberg Center for Model-Based AI with five million euros over a period of six years. The centre will link research activities of the Interdisciplinary Center for Scientific Computing (IWR) with deep learning techniques. The aim is to develop highly effective, energy-efficient, and privacy-compliant problem-solving processes for research and industry, explains Prof. Dr Jürgen Hesser, a researcher at the Medical Faculty Mannheim and spokesperson for the new interdisciplinary institution.

The researchers at the CZS Heidelberg Center for Model-Based AI will start by implementing existing knowledge from large data sets using methods from model-based deep learning. This is intended to train neuronal networks for information processing such that problems can be solved as quickly and precisely as possible. To achieve this goal, the experts will examine a variety of issues from artificial intelligence research with regard to reliability of learning data, effectiveness of object recognition, and the quality of data storage and analysis, among other things. Of central significance is combining mathematical models and modern machine learning processes.

"We are working on methods that are reliable and demonstrate how certain the decisions made with the aid of neuronal networks are," states Prof. Dr Ullrich Köthe, group leader at the IWR's Computer Vision and Learning Lab, who is majorly involved in setting up the new centre. With "green IT" as their motto, the researchers intend to design their numerical techniques to consume as little energy as possible not only during analysis but also during their adaptation to the data being used in the respective case. They will also do research on methods to integrate legal regulations such as data protection or medical law into the AI-models in a reasonable way.

To demonstrate what the new methods are capable of achieving, the researchers intend to apply their processes in a highly relevant field of medicine – cancer research. The goal is to optimise systems of artificial intelligence for therapy using pre-programmed knowledge, according to Prof. Hesser. The expert in medical physics directs the "Data Analysis and Modeling in Medicine" research group at the Mannheim Institute for Intelligent Systems in Medicine, which is located at the Medical Faculty Mannheim. He is also a member of the Interdisciplinary Center for Scientific Computing at Heidelberg University.

The CZS Heidelberg Center for Model-Based AI began its work in the spring. Members of the centre include eleven researchers from the fields of mathematics, computer science, physics, and medicine. The Institute of Computer Engineering of Heidelberg University is also involved besides the IWR. A junior professorship in model-based AI will also be set up for a more in-depth exploration of the basic questions of research in this field.

The Carl Zeiss Foundation is funding the establishment of the CZS Heidelberg Center for Model-Based AI in the context of its "CZS Breakthroughs" programme. The Foundation thereby supports top international research in Baden-Württemberg, Rhineland-Palatinate, and Thuringia. These funds are intended to further develop and expand proven research strengths both nationally and internationally.

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Further information

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