The Brain as a Model for Artificial Intelligence - Or Vice Versa?

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Artificial neural networks underlie the impressive successes of today's artificial intelligence, e.g. the powerful image recognition in our cell phones, the chatbot ChatGPT or the AlphaFold program. At least in some fundamental aspects, the development of artificial neural networks has benefited from neuroscientific insights into the architecture and functioning of the brain.

Conversely, AI neural networks are increasingly being conceptualized in brain research as models of the brain and used in practice. Here, the enormous learning capacity of neural networks is used and it is assumed that they find similar solutions to given tasks as the brain has found over evolutionary and ontogenetic periods.

By analyzing the “trained” artificial networks, it is hoped that the secrets of biological neuronal networks can be deciphered. I will demonstrate the fruitful, bidirectional interaction between artificial intelligence and brain research outlined above using concrete work from our laboratory and explain how this can lead to new hypotheses on the functioning of the brain and how these can be empirically tested.