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CS-Colloquium

Learn to play, play to learn! Deep learning in competition

mit **Dr. Bernhard Nessler** (Johannes Kepler Universität Linz)

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Wo? Seminarraum 10 (SR10), Fakultät für Informatik
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Abstract

Deep learning has created a lot of success stories in these last years, be it in supervised learning tasks, like skin cancer diagnosis, be it in unsupervised learning settings like sampling artificial faces, or be it in reinforcement learning systems, where the most prominent examples are AlphaGo, and AlphaStar, winning against humans in strategy games. What is common to all these tasks is the fact that the resulting systems show human-like or even super-human performance. Yet seemingly simple tasks, like driving a car safely through a crowd of cars, cyclists and pedestrians – in the same robust way as humans can do – looks like an infeasible task. There are still very obvious differences between deep learning systems and the human brain both on an overall functional level and in the neuronal and synaptic processes of learning and thinking. Deep learning systems still miss a notion of a world model, a universal understanding of our reality.

In spite of these differences, deep networks are the most promising building blocks for artificial systems that are to achieve human-level cognition and decision capabilities. The most crucial ingredients for doing successful learning in a deep network are a lot of data, consistent data and correctly labeled data. It is tempting to try and use a second deep learning network for the tedious task of creating or annotating training data for the first one and vice-versa. Even though this looks like a silly circular reference at the first glance, this competitive learning approach is in fact a most promising current system design which is already used in generative adversarial networks (GANs) and in deep reinforcement learning. I will give an outlook on current research ideas, how to merge these approaches in order to tackle real-world tasks like driving cars or controlling a production robot.