KCIST ONLINE LECTURE SERIES

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22. Februar 2021, 17:30 – 19:00 Uhr

KIT-Zentrum Information · Systeme · Technologien

Intelligence is the ability to adapt to change
Stephen Hawking

Living the Change

Programm

Florentin Wörgötter
A critical view onto Deep Learning – and our hope to do it better

Walter F. Tichy
Von Programmieren in Alltagssprache zu maschinellem Lernen aus Unterweisung

PROGRAMM

Prof. Dr. Florentin Wörgötter – Computational Neuroscience Department at the Bernstein Center for Computational Neuroscience of the University of Göttingen

Title: *A critical view onto Deep Learning – and our hope to do it better*

Abstract: Modern AI is currently one of the central catch phrases in society and politicians consider it a "disruptive technology" potentially leading to major changes in the world, because – yes – there are indeed extremely powerful applications existing. Therefore, some believe in deep neural networks (DNNs) with almost religious fervor. In this talk, I would like to adopt a more critical stance and start by discussing "what scientist should not do", when it comes to Deep Learning research.

Following this, I will try to show some examples from our own work, with the hope to convince the audience that we "do it at least a little bit better". Specifically, first we show how across-layers feedback, common in all real brains, will massively improve the performance of DNNs. Second, we demonstrate, how certain NN-structures can be used to improve the state of the art in chaotic time series prediction by several hundred percent. Finally, third, we provide an algorithm to solve planning in complex mazes. This is traditionally addressed iteratively using step-after-step calculations. Different from this we have designed a network without any training/learning that finds optimal paths in mazes with about 10^9 nodes in a single pass for multiple agents. Interestingly, this would – for example – allow Uber to calculate the shortest route for several taxis to reach a customer in one go without any training of the DNN. Such networks can be rephrased to become fully compatible to Dijkstra's famous algorithm allowing us to solve any planning problem quickly using a network without learning.

From all this, my personal summary concerning Deep Learning is that it becomes more and more important to search for relevant questions than just to address more and more application examples.

Prof. Dr. Walter F. Tichy, Institut für Programmstrukturen und Datenorganisation

Titel: *Von Programmieren in Alltagssprache zu maschinellem Lernen aus Unterweisung* **(**Walter Tichy und Sebastian Weigelt**)**

Abstract: Digitale Assistenten, die auf Sprachbefehle reagieren, sind im Alltag angekommen. Sie führen aber nur Einzelbefehle aus. Man kann sie nicht im eigentlichen Sinne programmieren.

Wir zeigen einen ersten Durchstich, bei dem in Alltagssprache formulierte, gesprochene Anweisungsfolgen in ausführbarem Code überführt werden, einschließlich Bedingungen, Schleifen und Parallelverarbeitung. Diese Ergebnisse führen auf natürlichem Wege zu Lernen aus Unterweisung. Diese Form des Lernens erfordert keine umfangreichen Trainingsdaten, sondern lediglich geeignet benannte Anweisungsfolgen in Alltagssprache. Wir zeigen hierzu den Stand der Technik.