ZALF Guest Lecture

The Third Wave of AI: Closing the Gap between AI and the Domain Experts

Prof. Dr. Kristian Kersting

Head of the Artificial Intelligence and Machine Learning Group, Computer Science Department and Centre for Cognitive Science, TU Darmstadt

Wednesday, **11 March** at 11 am, ZALF K1-B4

Deep neural networks have shown excellent performances in many real-world applications such as plant phenotyping. Unfortunately, they generally do not know when they do know and may show "Clever Hans"-like behaviour — making use of confounding factors within datasets — to achieve high prediction rates. In this talk, propose to not "go down the full neural road." Instead I shall argue to use e.g. sum-product networks, a deep but tractable architecture for probability distributions. They "know when they duo not know" and even pave the way towards automating density estimation, making machine learning accessible to a broader audience of non-experts. Moreover, rather than discarding the trained models or the dataset when they show "Clever Hans"-like behaviour, I shall show that interactions between the learning system and the human user can correct the model. Specifically, we revise the models decision process by adding annotated masks during the learning
loop and penalize decisions made for wrong reasons. In this way the decision strategies of the machine can be improved, focusing on relevant features, without considerably dropping predictive performance. This talk is based on joint works with many people such as Carsten Binnig, Zoubin Ghahramani, Andreas Koch, Alejandro Molina, Sriraam Natarajan, Robert Peharz, Constantin Rothkopf, Thomas Schneider, Patrick Schramwoski, Xiaoting Shao, Karl Stelzner, Martin Trapp, Isabel Valera, Antonio Vergari, and Fabrizio Ventola.

Bio: Kristian Kersting is a full professor (W3) for AI and ML at TU Darmstadt. After receiving his Ph.D. from U. Freiburg in 2006, he was with MIT, Fraunhofer IAIS, U. Bonn, and TU Dortmund. His main research interests are (deep) probabilistic programming and learning. Kristian has published over 170 peer-reviewed articles. He is an EurAI Fellow, an ELLIS Fellow and received the inaugural German AI Award (Deutscher KI-Preis) 2019, as well as several paper awards (TPM 2019, AIIDE 2015, ECML 2006) and the EurAI Dissertation Award 2006. Kristian has been on the (senior) PC of major AI/ML conferences (e.g. AAAI, ICML, IJCAI, NeurIPS, ICLR, and CVPR) and co-chaired the PC of ECML PKDD 2020, 2013, and UAI 2017. He is the EiC of Frontiers in ML and AI and a (former) AE of TPAMI, JAIR, AIJ, DAMI, and MLJ.

All interested ZALF members are cordially invited.