TECHNISCHE FAKULTÄT

VORTRAG

Mittwoch, 8. Mai 2019, 10:30 Uhr
Georges-Köhler-Allee Gebäude 101
Seminarraum 101-02-016/018

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Navigation in changing environments as testbed for robot learning: From computer vision engineering and feed-forward deep learning to computational brain models and symbolic reasoning

In this talk, I will use the example of mobile robot navigation in changing environments to illustrate several aspects of my research in the area of robot learning. In particular, I will use the problem of recognizing known places based on the robot's current camera images despite severe appearance changes of the environment, e.g. due to varying time of day, changing weather, different seasons, or dynamic objects. The complexity of this task is strongly influenced by the amount and type of appearance change. For example, think of a post card photo of a street scene in a foreign city captured on a sunny summer day. Now, months or years after the photo was taken, we visit this place at a snowy winter afternoon, when all the parked cars moved, facades were remodeled, the sun sets behind a newly constructed building, and the only light sources are faint street lamps and the headlights of a car. Presumably, as a human, we would demand all the robustness of our perception system and knowledge about the world to recognize this place. This potential complexity makes this task an interesting testbed for robot learning approaches.
My research talk will outline the application of several quite different learning approaches to this problem: the combination of computer vision engineering and deep learning for landmark based place recognition, learning to predict systematic changes of the environment, the adaptation of a biologically plausible model of sequence processing in the human neocortex in combination with deep learning visual front-ends, and the application of vector symbolic architectures for sequence-based place recognition. The talk will also relate this to some of my other research interests like robotic systems, 3d perception and modeling from images and laser data in robotic and automotive context, benchmarking and metrics, biologically inspired algorithms and computational efficiency.

Gastgeber: Prof. Dr. Rolf Backofen, Prodekan