der Bundeswehr
Universität *München*

Vortragsankündigung

Am **Donnerstag, den 16.12.2021,** hält **um 17:00 Uhr**

Simon Gottschalk
(UniBw München)

einen Vortrag über das Thema

Reinforcement Learning and Classical Optimal Control
Links and Synergies

Der Vortrag findet im **Raum 1401** in **Gebäude 33** statt.

Vortragszusammenfassung

These days, machine learning techniques enter nearly every research field. Sometimes, because of this very fast growth, we forget to look back to classical successful methods. These well-established methods may already provide answers to recent challenges.

In this talk, we address this issue in the context of optimal control tasks (OC). We present a comparison of the Deep Reinforcement Learning (DRL) framework, representing the machine learning approach, and the classical theory. It turns out, that under mild assumptions the DRL framework can be transformed to an optimization problem, which is similar to an optimal control problem. This provides the opportunity to discuss classical results like the necessary optimality conditions in the context of DRL and to deduce new numerical methods.

Furthermore, we illustrate these results and further universal properties of RL by considering various applications cases. For example, we actuate muscles of a biomechanical human arm in order to reach a certain point and we find controls for a model of a satellite in order to perform a docking maneuver. Further examples are the steering of a car or a robot arm.

Besides the ability of RL to solve many quite different problems, it is shown that there are also some limitations such as a costly training for simple subtasks or the presence of many local optima, which are far away from the global solution. Some of these can be handled by classical OC approaches. Thus, in the end of this talk, we give an outlook on how a hybrid method, which unites advantages from the RL as well as from the OC framework, could extract the best out of both worlds.

Alle Interessierten sind dazu herzlich eingeladen.