V O R träge zum Operations Research

Kolloquium des Instituts für Operations Research

Zeit:	Donnerstag, 15. Mai 2025, 16:30 – 17:30 Uhr
Ort:	**Raum 4A-21, Gebäude 05.20**
Es spricht:	Prof. Dr. Jingui Xie, Technical University of Munich
Zum Thema:	Personalized Extubation Decisions under Resource Constraints: An Offline Constrained Reinforcement Learning Approach

In the high-stakes environment of Intensive Care Units (ICUs), particularly highlighted by the challenges of the COVID-19 pandemic, the extubation decision for patients under invasive mechanical ventilation (MV) treatment plays an important role in influencing both patients' outcomes and the operational efficiency of ICUs. The extubation decision-making process is a challenging task, where both prolonged dependence on mechanical ventilators and premature removal can significantly elevate the risks of complications and escalate healthcare costs. Currently, there is no widely agreed-upon protocol for the optimal timing of extubation. Our research aims to bridge this gap by employing an advanced method that leverages existing patient data to optimize the timing of personalized extubation decisions, while simultaneously addressing the limitation of hospital resources. To achieve this, we developed a decision-support framework based on Offline Reinforcement Learning (Offline RL) and Constrained Reinforcement Learning (Constrained RL) techniques. Through application of the Fitted-Q-Evaluation (FQE) method to evaluate policies derived from our approach using a real-world medical dataset, our results indicate that the proposed approach successfully reduces the extubation failure rate (EFR), while maintaining adherence to clinical practices. Additionally, it enhances ICU efficiency by effectively managing patients' Length-of-Stay (LOS) in ICUs. These findings open up new possibilities for refining decision-making in critical care and improving the quality of care for ICU patients.

Die Vorträge zum Operations Research wenden sich an alle Interessierten!

Bei Rückfragen wenden Sie sich bitte an:
Prof. Dr. Stefan Nickel, Institut für Operations Research