The chair of Operations Management offers the following thesis

Master's Thesis

Optimizing Inpatient Postoperative Therapy Scheduling: Integrating AI-assisted Physical Therapy

Problem Description:
After lung cancer surgeries or certain cardiac and orthopedic procedures, patients require postoperative therapy in the hospital. The limited availability of specialized therapists can extend patients' hospital stays or delay necessary treatments. To meet the high demand for postoperative therapy, some companies offer AI-assisted therapy as a supplement to in-person sessions. The introduction of AI-assisted therapy at hospitals, for example, via mobile phone apps, creates new opportunities for the efficient scheduling of therapy sessions.

This master's thesis focuses on optimizing therapy schedules that combine in-person and AI-assisted sessions. Motivated by the case of our practice partner *Breathment*, a startup offering an AI-assisted therapy app for pulmonary diseases, the thesis will build on prior research that developed a mixed-integer optimization model to minimize patient length of stay (LOS) by efficiently scheduling therapy sessions.

Task:
Revise and improve the existing mixed-integer scheduling model. Reassess the model's assumptions to better reflect the complexities of real-world scheduling in hospitals. Make use of advanced solution approaches, particularly *Column Generation*, to efficiently solve challenging scheduling instances. Acquire and use real-world data to create meaningful scheduling instances for a computational study. This study should demonstrate how hospitals can integrate on-demand AI-assisted therapy with in-person sessions and benefit from the added therapy capacity and scheduling flexibility.

We are looking for a motivated and outstanding student with an excellent background in linear optimization. If you are interested, please send your application documents (curriculum vitae, transcript of records) to Christian Jost.

Contact: Christian Jost (christian.jost@tum.de)