Rainer Kolisch, Hans-Jörg Schütz

Technische Universität München

rainer.kolisch@wi.tum.de

„Capacity allocation for magnetic resonance imaging scanners“

Abstract:

In health care magnetic resonance imaging scans constitute an expensive method of examination where patients often have to wait long times for an appointment because of scares capacities. Therefore, it is important to ensure timely access of patients with high priority while at the same time maintaining high utilization rates.

In this paper we consider the problem whether to accept or to reject requests for examinations on a magnetic resonance imaging scanner that come from patient classes with different priorities such as inpatients and outpatients.

The booking process is modeled as a Markov decision process based on work in the field of revenue management that is concerned with the booking of flights. In contrast to previous capacity allocation models in health care we allow for different examination types, cancellations, no-shows and overbooking, and same-day demand. Furthermore, we propose three possibilities to compute the expected overtime for a given booking state. While we concentrate on MRI scanners in health care, the model could also be applied to similar problems in other industries.

We use dynamic programming to determine an optimal policy for a realistic case using data from a hospital. With the help of a simulation model the optimal policy is evaluated and compared to simple booking limit policies. The best booking limit policy is found to closely match the optimal policy.