TUM School of Management

Technische Universität München

At the **Chair of Operations Management** at the **TUM School of Management**, we are looking for interested and qualified students to conduct their

Master's Thesis

on the following topic:

Workforce Planning for Airline Pilots Considering Seniority Rules and Fair Distribution of Overtime

In times of ever changing demand for air travel, airlines dynamically face the tradeoff between having their existing cockpit personnel working overtime and hiring new pilots. Many airlines have implemented a so-called seniority principle, under which the salary of pilots is periodically and automatically adjusted in predetermined steps, depending on their length of service with the airline. In addition, there are precisely formulated promotion rules from first officers to captains and any overtime should be distributed fairly across pilots of all salary levels. The planning objective is to minimize total personnel costs while covering all demand and complying with numerous legal and practice-driven constraints, with the main decision being how many pilots of which experience level should be hired and when.

Your tasks:

- Perform a literature review on existing approaches to the problem (and/or similar problems)
- Based on existing work provided by us, formulate a mixed-integer model for the problem, potentially considering stochastic future demand
- Implement the model using appropriate software such as Python/Gurobi
- If necessary, develop a solution method for the problem
- Systematically create data instances of different complexity for the problem
- Solve the problem for the instances you created and analyze the behavior of the model and/or your solution method

Requirements:

- Profound knowledge in mathematical optimization
- Familiarity with commercial solvers (Gurobi, CPLEX, or similar)
- Programming experience (preferably Java or Python)
- Affinity to aviation is a plus

Beginning date: as soon as possible

Main supervisor: Prof. Dr. Rainer Kolisch (rainer.kolisch@tum.de)

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