At the Chair of Logistics and Supply Chain Management of TUM School of Management we are looking for an interested and qualified student to conduct his/her

Master thesis

on the topic

Optimization of Condition-based maintenance decision: Decomposition algorithm for Large-Scale Markov Decision Processes

Condition-based maintenance is a proactive maintenance strategy that involves the monitoring of equipment and components of a system to determine the appropriate time for maintenance decisions according to their condition. This approach has the potential to improve the efficiency and effectiveness of maintenance activities. This thesis aims to conduct a study on modeling a system with condition-based maintenance with Markov decision processes (MDP). MDPs are mathematical models that can be used to represent decision-making processes under uncertainty. Solving large-scale MDP models is computationally expensive due to the exponentially increasing number of states and decisions. Decomposition algorithms are techniques that can be used to solve large-scale MDPs by dividing them into smaller subproblems. In this thesis, a decomposition algorithm will be proposed and developed to solve the model to optimality.

Key project tasks:

- Literature review relevant to Condition based maintenance and MDP decomposition algorithms
- Implementation of an exact algorithm for solving large-scale MDP
- Evaluation and sensitivity analysis of the model

Requirements:

The thesis is for master students of the study-program TUM-BWL (with a major in Operations and Supply Chain Management). Candidates should be familiar with mathematical programming and commercial solvers (e.g., Gurobi). Experience with programming in Python is a plus. The ability to work independently as well as analytical skills are required. The thesis should be written in English.

Begin: as soon as possible

Supervisor: Mahsa Abbaszadeh Nakhost

Application: Email with curriculum vitae and transcript of records to logtheses.log@mgt.tum.de