

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's Thesis

on the topic

Policy Mining in Multi-Product Inventory Management Using Machine Learning.

In their seminal paper, Bravo and Shaposhnik (2020) introduced a methodology to mine optimal inventory policies using Machine Learning from state-action data. Their approach has been validated to work for single-item inventory policies such as (s, S). The extension of the work to multi-item policies such as (s, c, S), so-called can-order policies, is still an open question.

Due to the interaction of joint decision-making, simple decision trees fail to learn the characteristics of these policies. Thus, a more sophisticated approach is needed. This thesis aims to investigate how the policy mining approach can be extended to more complex policy structures.

Relevant Literature:

Bravo & Shaposhnik (2020). Mining Optimal Policies: A Pattern Recognition Approach to Model Analysis. INFORMS Journal on Optimization 2(3):145-166. <https://doi.org/10.1287/ijoo.2019.0026>.

Key project tasks:

- Implement a simulation for (multi-item) inventory problems
- Development of a framework for efficient mining of policies
- Application of ML methods for policy mining
- Analysis of results and derivation of implications

Requirements:

This thesis is suitable for master's students in Management and Technology. The ability to work independently, as well as analytical skills, are required. Profound programming skills in Python and good knowledge of shallow machine learning (SVM, linear/logistic regression, Decision Trees) are required. Knowledge of inventory management is beneficial, but not required.

Earliest begin: January 2025

Supervisor: Patrick Helm

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