

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

## **Interdisciplinary Project**

on the topic

### **Evaluation of Demand Fulfillment Policies with Offline Reinforcement Learning**

Online retailers typically build large inventory systems distributed in multiple locations to serve nationwide customers. Demand fulfillment decisions are crucial to optimizing service, including from where items will ship, by what shipping method, and whether multiple-item orders will be split into multiple shipments. A primary challenge in demand fulfillment is the uncertainty in customer demand, which often shows spatial correlation across locations and can be influenced by unexpected factors such as promotions and fulfillment efficiency. Therefore, it is important to investigate the performance of demand fulfillment policies under stochastic demand.

Since the demand process is unknown and only historical data are available, we need to approximate the performance of any policy using these data. New fulfillment policies should first be evaluated offline with historical data to ensure their potential effectiveness before being implemented in real-time. This project aims to develop a deep reinforcement learning approach for off-policy evaluation, using historical data to assess demand fulfillment strategies.

#### **Key project tasks:**

- Data analysis for historical user data, e.g., correlation analysis, feature selection, etc.
- Implementation and testing of the DRL approach.
- Analysis of results and derivations of implications.

#### **Requirements:**

The thesis is suitable for Master students in Informatics or Data Engineering and Analytics looking for an IDP. The ability to work independently, as well as analytical skills, are required. Profound programming skills in Python and good knowledge of (deep) reinforcement learning are required.

**Earliest begin:** January 2025

**Supervisor:** Yihua Wang

**Application:** Email with curriculum vitae and transcript of records to [logtheses.log@mgt.tum.de](mailto:logtheses.log@mgt.tum.de)