Concepts of Artificial Intelligence in Supply Chain Man-  
agement

Course Description

With start of the 2020s, the fragility of global supply chains and their relevance for economies down to individual consumers became apparent as global production and transportation stopped for weeks due to the COVID-19 pandemic. The results of these broken supply chains were production stops and even some empty shelves in supermarkets. Consequently, the question arises as to how new technology fields such as artificial intelligence can contribute to more resilient, more effective, and yet efficient supply chains. This course begins by explaining the current understanding of supply chains and a possible future state of it – supply chains 4.0. Next, the most promising artificial intelligence disciplines are presented and discussed to address the outlined challenges in the supply chain. In this context, the course presents suitable AI concepts, methods, and specific models for several relevant fields of supply chain management, which are also applicable to a variety of supply chain topics and use cases. The focus is on transparency, decision-making, and operations along supply chains. The course concludes by discussing specific challenges for implementing AI in supply chains.

Contents

1. Fundamentals of Supply Chain Management
   1. Concept of Supply Chain and Supply Network
   2. End-to-End View of Supply Chain Management
   3. The Vision of Supply Chain 4.0
2. Conceptional and Mathematical Introduction to Key Artificial Intelligence Disciplines for Supply Chains
   1. Conventional Techniques
   2. Machine Learning Algorithms
   3. Neural Networks
   4. Robot Process Automation
   5. Multi-Agent Systems
3. Models for Improving Transparency along Supply Chains
   1. Customer and Churn Analytics
   2. Order Peak Time Prediction
   3. Risk and Fraud Detection
   4. Spend Analytics
   5. Defect Detection and Predictive Maintenance
4. Methods to Support Strategic and Tactical Decision-Making in Supply Chains
   1. Supply Chain Network Planning
   2. Supplier Selection
   3. Replenishment Strategies
   4. Route Optimization
   5. Sales and Operations Planning
5. AI Concepts in Supply Chain Operations
   1. Supplier Communication and Purchasing
   2. Autonomous Allocation of Orders to Production Resources
   3. Dynamic Routing
   4. Object Identification in Logistics
6. Challenges of Applying AI in Supply Chains
   1. The Challenges of Trust
7. The Challenges of Capability
8. The Challenges of Accountability
9. The Challenges of Accessibility
10. The Challenges of Organizational Transformation