Agentic AI for Supply Chain and Optimization Applications: A Company-Oriented Assistant for Solution Development

Companies increasingly rely on optimization and data-driven models for inventory, production planning, logistics, and disruption response. In practice, developing such solutions is difficult: business problems must be translated into formal models, suitable methods selected, and prototypes implemented and validated. Many firms lack sufficient optimization expertise or face long development cycles between business and analytics teams. Agentic artificial intelligence offers a way to support this process through interactive, application-oriented systems.

Agentic AI systems can plan multi-step workflows, use tools, retrieve domain knowledge, generate and refine models or code, and collaborate with users toward a defined goal. In an industrial supply chain setting, such an agent can help company users structure problems, propose modeling approaches, support implementation with solvers or simulation tools, and interpret results for managerial decisions. The focus is on practical applicability for companies rather than academic research support.

This thesis aims to develop and evaluate a focused agentic AI prototype that supports companies in selected supply chain and optimization solution tasks. Building on existing agent frameworks and tools, the prototype should assist with a clearly scoped workflow, for example problem structuring, method recommendation, or prototype model generation for a chosen industrial use case. The study will address the following research questions:

How can existing agentic AI frameworks be adapted to support companies in selected supply chain and optimization solution tasks?

Which agent capabilities (e.g., tool use, knowledge retrieval, or human-in-the-loop interaction) are most relevant for a focused industrial use case?

How does an agent-assisted process compare with a traditional manual modeling workflow in terms of solution quality, development time, and usability?

A literature review will cover agentic AI, industrial decision-support systems, and AI applications in supply chain optimization. Based on this, a company-oriented agent prototype will be developed for one selected use case, such as inventory optimization or production planning, and evaluated using quantitative performance measures and practice-oriented feedback.

The topic is suitable for a student with interest in supply chain management, optimization, and artificial intelligence. Prior exposure to large language models or agent tools is advantageous but not mandatory, as the necessary methods can be learned during the thesis.