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Smart Supply Network Optimization: OR and AI Perspectives

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Abstract

In this talk, we first present a review of the research on smart supply chain management under Industry 4.0. An integrated approach is introduced to explore the impact of Industry 4.0 and related information and communication technologies (ICT) on smart supply chains. This includes an overview of current national strategies in North America, an analysis of the research landscape supported by major North American research councils on ICT-assisted supply chains, and a systematic literature review. Emerging challenges faced by supply chains under tariff uncertainty are also examined. In addition, we propose a hierarchical framework for smart supply chains with multi-level intelligence. Future research directions are also discussed. In the second part, we investigate distributed manufacturing network optimization problems enabled by additive manufacturing, focusing on integrated location, production, and routing decisions. To solve these problems efficiently, we develop a machine learning-assisted optimization method. The proposed integration approach demonstrates promising performance in large-scale optimization, validated on both randomly generated instances and a real-world healthcare supply network with geographically dispersed locations.

Keywords
Supply chain optimization, Machine learning, Distributed manufacturing, Tariffs.