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Machine Learning (ML) in Logistics and Supply Chain Management (SCM)

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Abstract

Machine Learning (ML) is one of the recent set of tools and techniques under artificial intelligence, interacting with robotics, data mining and data science domains. This study provides a comprehensive review regarding the significant potential of ML in logistics and Supply Chain Management (SCM). First, main techniques and approaches categorized under ML are investigated. Afterwards, various supply chain operations and processes are associated with the most relevant and frequently used ML tools and techniques. Main supply chain processes having the potential for benefitting from ML are identified. It is supported that ML has notable opportunities to bring improvements in forecasting accuracy, increase operational efficiency and productivity; decrease inventory costs; and improve reliability, availability, and performance of machines and equipment. Findings revealed that aforementioned ML techniques are useful in almost all macro SCM processes including supplier management, demand management, customer management, inventory management, maintenance management, transportation management, distribution management, quality management, import/export management and shop floor management. Through the implementation of various ML algorithms, smart and autonomous decision-making and predictive capabilities are built for more intelligent processes. These techniques are utilized in different hybrids with a variety of IoT technologies (such as sensors, GPS, vehicle tracking systems, 3D printers, robots/COBOTS) to bring improvements. Based on sensor data coming from different points of the IoT ecosystem, ML algorithms enable advanced analysis and prediction of patterns, such as failure patterns of machines in the shop floor, customer demand patterns, inventory consumption patterns and quality defect patterns. Consequently, ML tools and techniques represent a great potential to provide more data-driven and predictive management of SC processes, and to contribute to end-to-end supply chain traceability, visibility and transparency.

Keywords:
Machine Learning, Logistics, Supply chain management

Biographies

Duygu Aghazadeh is currently lecturer in the Department of Logistics Management in University of Turkish Aeronautical Association. She is a Ph.D. candidate in Industrial Engineering at TOBB University of Economics and Technology, and worked as a Research and Teaching assistant at the same university since 2014. She has received her Master's degree from the Industrial Engineering Department of TOBB University in 2016. Her B.Sc. is from Urmia University of Technology, Iran, in the same major. She has three journal papers, two of them in the field of Industrial Engineering and the other in the field of Computer Engineering. She has presented many papers at national/international conferences. Her fields of interest are logistics, inventory control, integration of logistics and inventory, replenishment and fleet sizing, computer programming, and machine learning.

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