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Data intelligence and risk analytics

Data intelligence and risk analytics develop dramatically in recent years. However, the relevant research work is still lack of attention. The purpose of this special issue is to innovative research methodologies from the perspective of data intelligence and risk analytics.

Data intelligence is the analysis of various forms of data in such a way that it can be used by companies to expand their services or investments (Waller and Fawcett, 2013). Data intelligence is used widely in lots of fields, such as O2O service (He *et al.*, 2016), recommendation system (Pan *et al.*, 2019), energy system (Wen *et al.*, 2019; Xiao *et al.*, 2018), supply chain fields (Corbett and de Groote, 2000; Wu *et al.*, 2019), forecasting management (Yu *et al.*, 2008; Zhang *et al.*, 2009), machine learning (Abadi *et al.*, 2016; Wu and Dash Wu, 2019) and risk identification (Wu and Chen, 2017). The risk exists on many aspects in managemental and economic insights (Chod, 2016; Tang *et al.*, 2017) and so on. Risk analytics combined with data intelligence will provide a brand-new perspective to facilitate industry and society development. However, such massive and invaluable data from risk analytics may bring new challenges such as data processing, data visualization, data-driven decision models, risk decision support systems, etc., in the era of big data.

This special issue of *Industrial Management & Data Systems* contains 11 research papers. These papers focus on recent advances topics of data intelligence and risk analytics including quay crane (QC) scheduling problem, forecasting of supply chain sales, food safety risks, credit risk assessment, risk of battery accidents, the entrepreneurial team's adaptability in risk decision-making process, risk of the marketplace channel strategy, ordering decision for capital-constraint retailers with risk-averse preference and bankruptcy threshold, forecast on interval-valued exchange rate, lead-lag relationship between investor attention and the stock price, and the public attention to the accident.

The work by He *et al.* addresses QC scheduling problem for multiple hatches vessel considering double-cycling strategy. This paper formulates a mixed integer programming model considering realistic operational constraints, where a novel objective is proposed to maximize the number of dual-cycle operations of QCs in the whole process. The proposed model also provides approach to realize the trade-off between energy cost and operation efficiency in the double-cycling problem. A series of numerical experiments validate the proposed model, and the results analysis demonstrates the proposed approach can promote the number of double-cycling in the handling process of a vessel. This work can help improving the operational efficiency and reduce the delay risk of a vessel departure.

The work by Weng *et al.* proposes a new model based on LightGBM and LSTM to forecast the supply chain sales. First, the paper shows the process of data analysis and data feature extraction in a visual way. Next, the paper uses LSTM model to extract high-level time series feature from data and combines it with other sale features, then uses them as input to the LightGBM model to forecast sales. Finally, three raw sales data sets are used to evaluate the performance of the model. The result shows the combined model can forecast supply chain sales with high accuracy and strong interpretability which is suitable for industrial production environment.

The paper by Wang *et al.* establishes the microbial growth model to identify the characteristics of food safety risks. Benchmark functions and numerical experiments examine the performance of algorithm, which can improve the efficiency of cold chain distribution and reduce distribution costs. This work finds that the established model and algorithm are effective to control the risk of perishable food in distribution process.

Moreover, it extends the existing literature and can provide a theoretical basis and practical guidance for the vehicle routing problem of perishable foods.

The study by Luo presents a comprehensive decision support approach in credit risk assessment. Multidimensional data including number and text is identified in the risk analytics approach. The paper demonstrates that identification efficiency and prediction accuracy in this new approach have been improved compared the single classifiers. Besides, this work provides a comprehensive model for credit risk scoring and offer valuable information to business intelligence literature by considering the perspective of machine learning.

The study by Qin *et al.* presents a fusion model to estimate the remaining useful life, which provides effective information to the user to avoid the risk of battery accidents. This paper combines the advantages of the data-driven method and particle filter algorithm. The proposed method has good prediction accuracy and has an uncertain expression on the RUL of the battery. Besides, the method proposed is relatively easy to implement in the battery management system, which could more easily and quickly evaluate the health of the battery and provide users with more reliable battery status information.

The paper by Wang *et al.* examines the entrepreneurial team's adaptability in risk decision-making process. The work identifies the relationship among entrepreneurial team's adaptability, opportunity identification, entrepreneurial efficacy and risk decision making through theoretical and empirical methods, respectively. The finding of this study extends existing literature about entrepreneurial efficacy. The work explores the driving mechanism of entrepreneurial team risk decision making from team cognition perspective and establishes a framework of cognitive adaptability's impact on risk decision.

The study by Shi *et al.* considers a Retailer-Stackelberg price model to investigate the risk of the marketplace channel strategy. Then, the paper illustrates that the strategy of introducing the marketplace is not always satisfying. The results show that the strategy could be conducted when retailers are the prevailing parties in service output. This work points out that the effectiveness of the channel strategy differs in different categories, supplementing the weakness of existing literature in risk management about the online retailers' marketplace channel strategy. Besides, this research facilitates both academia and industry becoming more intelligent about category management.

The paper by Yang *et al.* investigates the optimal ordering strategy of the capital-constraint retailer with factors including risk-averse preference and bankruptcy threshold. The study establishes a bi-objective programming to derive the retailer's management decision. A comparative analysis between decentralized system and centralized system is implemented by numerical experiment. The study provides an innovative insight to formulate the model by involving bankruptcy threshold and retailers' wealth in bi-objective programming. The influences of retailers' type and ETWTT on ordering decision are derived.

The work by Sun *et al.* formulates an interval decomposition ensemble (IDE) learning approach, which combines bivariate empirical mode decomposition, interval multilayer perceptron and interval autoregressive method (AR), to forecast interval-valued exchange rate. The study finds that the proposed IDE learning approach with different forecasting horizons and different data frequencies dramatically outperforms some other benchmark models, meaning that the proposed IDE improves forecasting performance of exchange rate.

The work by Sun *et al.* investigates the lead-lag relationship between investor attention and the stock price based on thermal optimal path method. The results show that forecasting based on investor behavior are more accurate only when investor attention of the stock is stable leading its price change most of time. This paper provides an innovative insight to deconstruct framework of investment portfolio on risk management. The tools used in this model can capture the dynamic interplay between investor attention and stock price change, which can help investors to identify the risk of their portfolio easily.

The study by Liu *et al.* measures the public attention to the accident of the Malaysia Airlines aircraft by using internet search data extracted from Google Trends and the Baidu Index, and analyzes how such events affect company stock price and volatility. This paper builds a VEC model and finds that the negative impact on stock price continue to expand within 18 days after the announcement of the Malaysian Airlines incident, and subsequently remain at a stable level. Then an AR-GARCH model is introduced to verify that the investor attention to an aircraft accident can raise the volatility of Malaysia Airlines stock. By comparing the Google and the Baidu Index searches, the authors find that international investors exerted a more significant, lasting effect on stock prices and volatility than Chinese investors did. This study contributes to the existing literature by incorporating open-source data to analyze how catastrophic events affect financial markets and effect persistence.

We would like to extend our appreciation to all the authors who have submitted their impressive works for this special issue. We also thank all the reviewers for their service and commitment to this journal. It is crucial to analyze application of data intelligence in risk management with the fast development of the society. This special issue involves in various interfaces of data intelligence and risk analytics in the form of formal models as well as applications, which could provide advanced perspective to existing literature.

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