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Editorial
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Editorial: Machine learning in social complex systems

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Editorial on the Research Topic
Machine learning in social complex systems

Machine learning in social complex systems is an emerging Research Topic that applies advanced computational algorithms to analyze and model complex social phenomena.

Previous works show that machine learning has interesting and fruitful findings in natural and social complex systems. Frontier in Physics has already had a good summary of machine learning in natural complex systems. Social systems are more complex than natural systems, due to the reason that human behaviors cannot be abstracted to identical elements. This gives more potential for machine learning techniques to bring light to fundamental laws in major social systems. This is exactly what this Research Topic targets. We finally accepted four articles in our Research Topic. These articles provided illustrate the diverse applications of machine learning techniques in different domains, including financial crisis prediction, public health emergencies, global student mobility, and systemic financial risk contagion.

In the first article, the authors (Qiu et al.) delve into the prediction of financial crises, which is a critical area of research for maintaining financial stability and preventing economic downturns. The article discusses various methods and models used in predicting financial crises, such as probability distribution, signal analysis, quantitative indices, and logit models. Researchers have found success with the Multi-layer Supervised Network Analysis (MSNA) method, which uses a combination of PCC, VD, and TE to construct multilayer networks and graph neural network classification to study financial crisis prediction. The study proposes a multilayer information spillover network as input for an early warning model that can provide strategic support to regulatory authorities in preventing financial crises. This article contributes to the topic by showcasing the use of machine learning algorithms to improve the accuracy and efficiency of predicting financial crises.

In the second article, the authors (Fang et al.) focus on the role of social media during public health emergencies, specifically the COVID-19 pandemic. The article presents various data-driven approaches to analyze public attention and opinion during the pandemic. By applying machine learning techniques, researchers can identify patterns and trends in social media data to understand public sentiment and response to the crisis. The study proposes a four-stage crisis model for addressing epidemic responses, highlighting the role of social

media in disseminating authoritative and scientific information. This article demonstrates how machine learning can help analyze large-scale social media data and guide public health communication strategies during emergencies.

In the third article, the authors (Cui et al.) investigate the network structure and complexity characteristics of global student mobility, an essential factor driving the diversification and integration of the world economy. By using machine learning algorithms, researchers can analyze the complex network patterns of global student mobility and reveal a small-world character with discussions between countries becoming closer. The article emphasizes the need to improve the ability to gather talent, enhance the construction of weak disciplines, and establish international cooperation mechanisms to promote education globalization. This research contributes to understanding global talent mobility and the potential of machine learning in studying the dynamics of international education networks.

In the fourth article, the authors (Wang et al.) explore multiple dimensions of bank risk and their impact on related spillovers, including interbank activities, financial and stock market factors, and macroeconomic factors. The authors use various methods to measure systemic financial risks contagions, such as the SVQR model and the minimum density method (MDM) to build interbank lending networks, the minimum spanning tree algorithm (MST) to construct stock price-associated networks, and the CoVaR index. Large state-owned banks, such as BOC, ICBC, CCB, and BCM, are identified as systemically important institutions due to their scale and high relatedness. The article suggests comprehensive measures for preventing and controlling risks in the banking sector. This research highlights the potential of machine learning in analyzing complex financial networks and contributes to the development of risk management strategies in the financial sector.

In conclusion, these four articles showcase the diverse applications of machine learning in social complex systems, covering domains such as finance, public health, education, and systemic risk management. By leveraging advanced computational algorithms, researchers can gain insights into complex social phenomena, ultimately leading to more effective policy-making and intervention strategies.

Author contributions

WY, Z-QJ, LL, RH, and JL design the research, WY writes the article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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