Guest Editorial
Special Issue on Data-Driven Computational Intelligence for e-Governance, Socio-Political, and Economic Systems

WIRELESS sensing and distributed embedded computation is spurring a growth in connected computing artefacts - enabling accessibility to a plethora of new and diverse, multi-modal sources of quantitative, qualitative, environmental and user centered data. Examples of these data sources include geolocation, social media and online interaction from different personalized devices, mobile phone data, audio, visual, text, digitally associated opinions, human affect and sociometric sensor data. A key challenge is to harmonize and extract meaningful features and associations from these data streams as well as to handle dynamically and real-time generated data where quantities of interest might be spatially and temporally distributed in terms of their relationships for modelling and predicting particular events, behaviors and conditions. To address this challenge significant breakthroughs in the development of nature inspired Computational Intelligence (CI) techniques have facilitated interpretability, analysis and modelling of these data sources to develop sustainable data centered methodologies for deriving understanding and predictive insight into complex human centered phenomena as shown in Fig. 1.

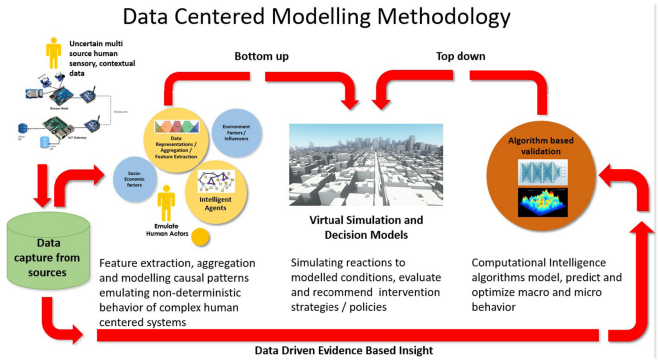

Fig. 1. Data centered modelling methodology.

Many social, political and economic structures can be understood through bottom up computational methodologies such as agent-based modelling for decomposing these systems into their various actors and components, modelling their characteristics, and interaction behaviors. These models need to be based on real-world data sources which are fraught with uncertainties pertaining to noise, human decisions, knowledge perception, reliability, trust and levels of agreement between stakeholders. These sources of uncertainties can be managed and handled using fuzzy and probabilistic representation, aggregation and reasoning methodologies.

New developments in top down CI algorithms such as deep learning approaches can be used to model real world and simulated processes to emulate complex patterns and correlations in dynamic and historical data that can also be used for empirical validation and estimation. Advances in evolutionary algorithms can be developed for assessing and optimizing policies and strategies through simulating their impact on aspects such as labor and employability, modelling complex negotiation processes and improving the syntactic, semantic and search capabilities of evolutionary algorithms for handling multi-faceted real-world problems. CI techniques can be applied to understand population mobility, financial and economic activities, social behavior, human sentiment, wellbeing, security and political risk, education, welfare, geopolitics and environmental concerns.

This Special Issue presents three papers that reflect the design and development of computational tools and systems to exploit data generated through the interaction of citizens and organization to provide optimized e-governance services. Contagion in bank failures threatens world economics. In "Network-based computational techniques to determine the risk drivers of bank failures during a systemic banking crisis," Krause *et al.* investigates the main risk drivers of individual bank failures by developing a computational model of solvency and liquidity contagion. This model helps to assess the vulnerability of banks to systemic risk. The model is designed to explicitly consider the complex network of financial connections between banks arising from interbank loans, derivatives positions, and payments systems. The study reveals that the main risk factors associated with bank failures during a systemic banking crisis are the position of a bank in this network. These results have significant implications on bank regulation.

Regime change reflects significant changes in the collective trading behavior of a financial market. A key challenge is to detect regime changes, which in turn could lead to a better understanding, and subsequently monitoring, of these markets. In "Regime Change Detection Using Directional Change Indica-

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tors in the Foreign Exchange Market to Chart Brexit," Tsang *et al.* presents a novel data driven approach based on hidden Markov models for detecting regime change based on Directional Change (DC). A comparison made between both DC and time series analysis of financial data during the Brexit referendum show that both approaches complement each other in detecting volatile changes in the market. Such insight can help traders establish trading strategies under different market regimes, and regulators to monitor market volatility.

In the context of E-Governance, content confidentiality has become a serious concern in modern information driven societies. In "PCCA: Position Confidentiality Conserving Algorithm for Content-Protection in e-Governance Services and Applications," *Medhane et al.* proposed a Position Confidentiality Conserving Algorithm for content protection based on the users current position information and the application of a rule-based approach. A simulation model implemented using a roaming user's real-time position-based information demonstrates that the algorithm can efficiently conserve user's position confidentiality while accomplishing better performance and better quality of service for e-Governance applications.

The above presented papers were selected following a rigorous peer review process and provide a window into current research pertaining to data centric systems for e-Governance, socio-political and economic applications. The guest editors would like to thank all the authors for their contributions and all the reviewers for their hard work in completing timely and considered reviews. Special thanks also goes to the Editor-In-Chief, Prof Yew-Soon Ong and members of the editorial team for their support during the editing process of this Special Issue.

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Edward Tsang received the first degree in finance and the Ph.D. degree in artificial intelligence. He is an Emeritus Professor with the School of Computer Science and Electronic Engineering, University of Essex, Colchester, U.K. He cofounded the Centre for Computational Finance and Economic Agents (CCFEA) in 2002 and was the Director from 2009 to 2016. CCFEA is an interdisciplinary research centre, which applies artificial intelligence methods to problems in finance and economics. He is best known for his work in constraint satisfaction and computational finance where his book in constraint satisfaction is the most cited work in the field. He has also founded the Computation Finance and Economics Technical Committee in IEEE Computational Intelligence Society.