

Special Issue on **Computational Intelligence in Data-Driven Modelling and Its Engineering Applications**

CALL FOR PAPERS

Modern engineering systems show increasing complexity due to their high non-linearity and large disturbances and uncertainties introduced into the systems. In many cases, the conventional mathematical models, such as the differential equations that can accurately describe these complex systems and can be exploited in real-life applications, do not exist. However, with the fast development of advanced sensing, measurement, and data collection technologies, large amounts of data that represent input-output relationships of the systems become available. This makes data-driven modelling (DDM) possible and practical.

Data-driven modelling aims at information extraction from data and is normally used to elicit numerical predictive models with good generalisation ability, which can be viewed as regression problems in mathematics. It analyses the data that characterise a system to find relationships among the system state variables (input, internal, and output variables) without taking into account explicit knowledge about physical behaviours. Many paradigms utilised in DDM have been established based on statistics and/or computational intelligence. For instance, artificial neural networks (ANNs) and fuzzy rule-based systems (FRBSs) serve as fundamental model frameworks, which are alternatives to statistical inference methods, while evolutionary algorithms (EAs), swarm intelligence (SI), and machine learning (ML) methods provide learning and optimisation abilities for calibrating and improving the intelligent or statistical models. In recent years, DDM has found widespread applications, ranging across machinery manufacturing, materials processing, power and energy systems, transport, and so on.

This special issue intends to bring together the state-of-the-art research, applications, and reviews of DDM techniques. It aims at not only stimulating deep insights into computational intelligence approaches in DDM but also promoting their potential applications in complex engineering problems.

Potential topics include but are not limited to the following:

- ▶ The use of computational intelligence techniques, such as ANNs, deep neural networks, FRBSs, neurofuzzy systems, genetic programming, evolutionary programming, EAs, SI, nature-inspired metaheuristics, ML in data-driven modelling for
- ▶ Materials processing and metal processing
- ▶ Manufacturing and instrumentation
- ▶ Robotics and industrial automation
- ▶ Transport and logistics systems
- ▶ Power and energy systems

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