Editorial

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Intelligent techniques for robust modelling and data processing are important for the development of useful decision support systems. These techniques are required to support decision making processes in complex environments that often demand many different types of expert knowledge and involve vast amount of data. In this special issue, four papers that describe intelligent techniques for battle modelling and decision support as well as for dynamic information processing and data analysis in defence, security, and related domains are presented. A summary for each paper is as follows.

Simulated combat models are useful for military strategists to predict the possible battle outcomes. In the first paper, the use of Lanchester equations to analyse multiple

sequential battles between two opposing forces is described. The approach is useful to military strategists in making decisions that can influence the battle outcomes. The proposed approach is able to avoid the computational costs of high-resolution models that deal with detailed interactions of individual combatants. Examples are also presented to demonstrate the usefulness of the proposed approach.

Space surveillance is a major concern in formulating defence strategies. In the second paper, analysis of spatial objects detected by a ground-based radar operated for space surveillance is described. Simulated examples with realistic scenarios are presented. Estimation of the perigee on simulated trajectories of ballistic weapons and satellites are first performed, and classification of the detected objects is then conducted. Factors that affect the false alarm rate and the detection rate are analysed and discussed.

Clustering methods have been successfully used in many data mining applications. However, in many real applications, the data structures are changing constantly, and dynamic methods are needed to tackle the uncertainty resulting from changing data. In the third paper, the concepts of dynamic data mining to rough clustering, in particular to rough *k*-means, are investigated. The new cluster structure is first derived from the initial data structure and is then refreshed by the new data. Properties of the proposed approach, which include increasing and decreasing the number of clusters as well as the uncertainty within the cluster structures, are presented.

In road networks, it is important to aggregate information from spatial as well as temporal data streams. However, existing methods are less effective in handling spatial-temporal queries. In the fourth paper, a histogram-based dynamic sketch index (DynSketch index) approach aims to improve the quality of queries over network-constrained moving objects, and to improve the quality of the approximation is proposed. The method dynamically adjusts the number of sketches according to the number of moving objects. An empirical study reveals that the proposed DynSketch index approach consumes a small storage space, and has a quick response time and an efficient query quality.

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