

Guest Editorial

The fuzzy system and its application in East Asia

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Abstract. The Fuzzy Logic and system are widely used in many fields during the last decades. Many tools and methods are developed to mine the data in the interdisciplinary science, which witnesses the novel discovery in Science and new technologies in Engineering. To exchange the ideas and research in East Asia, the 2015 International Conference on Fuzzy System and Data Mining (FSDM 2015) is held during 12th~15th December 2015. This special issue is selected some papers related to the fuzzy system and its application in East Asia, which will have a snapshot of the regional research in the field.

Keywords: Fuzzy logic, artificial intelligence system, data mining

1. Introduction

This special issue is selected from the 2015 International Conference on Fuzzy System and Data Mining (FSDM 2015), held from the 12th to the 15th of December 2015, provides an opportunity for researchers and practitioners around the world to present the most recent advances and future challenges in the fields of Fuzzy Theory, Algorithm and System, Fuzzy Application, Interdisciplinary field of Fuzzy Logic and Data Mining, amongst others. This selection focuses on the data mining methods.

2. Highlighted papers

Some selected papers are highlighted as follows:

The paper entitled “Evaluation of scientific publications with hesitant fuzzy uncertain linguistic and

semantic information” aims to investigate multiple attribute decision-making problems with the application of hesitant fuzzy uncertain linguistic information. In the paper, Xu et al. Develop an induced hesitant fuzzy uncertain linguistic correlated averaging (IHFULCA) operator to solve hesitant fuzzy uncertain linguistic multiple attribute decision-making problems. More importantly, the study verifies the developed approach and demonstrates its practicality and effectiveness.

In the paper “An indirect tire identification method based on a two-layered fuzzy scheme”, Zhang et al. propose an indirect tire identification method to identify the types of the tires, which uses the widths of the tires, the diameters and the shapes of the hubs to classify the tires. Experimental results show that the two-layered fuzzy scheme is more effective than the fuzzy C-means clustering algorithm. And the proposed indirect tire identification method can achieve an accuracy of above 99.9% in the assembly line of tires.

The paper “Wind power prediction interval estimation method using wavelet-transform neuro-fuzzy

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network” by Ji et al. propose a wavelet transform combined with a neuro-fuzzy network model to estimate the prediction interval of wind power. In the study, a wavelet-based ramp event is used and the moving block bootstrap method and the bootstrapped datasets are estimated by a neuro-fuzzy network inference system. A case study provides a 90% confidence level of prediction intervals, which was constructed to examine the effectiveness of the model.

The paper “Fuzzy neural network-based robust adaptive control for dynamic positioning of underwater vehicles with input dead-zone” proposes a design for a robust adaptive controller for the Dynamical Positioning (DP) of underwater vehicles with unknown hydrodynamic coefficients, unknown disturbances and input dead-zones. In this paper, stability analysis is conducted according to the Lyapunov theorem, and the tracking error is proved to converge to zero. Simulation results by Xia et al. indicate that the proposed controller demonstrates good performance.

The paper entitled “Matching method for emergency plans of highway traffic based on fuzzy sets and rough sets” propose a plan matching method proposed based on fuzzy sets and rough sets. The traffic emergency plan matching case for Changzhou section of Shanghai-Nanjing highway demonstrates that the proposed method can improve the accuracy and reliability of highway traffic emergency matching. The research by Chai et al. reflects the advantages of rough sets and fuzzy sets in emergency plan matching.

In the paper “Attitude control based on fuzzy logic for continuum aircraft fuel tank inspection robot”, the author Niu et al. design a continuum robot to help crews inspect aircraft fuel tanks, aimed to improve maintenance efficiency and reduce the intensity of crews. A closed-loop fuzzy controller based on attitude feedback is proposed to achieve fast and accurate control of the robot. The effectiveness and stability of the fuzzy controller based on attitude feedback are verified.

The paper “Attitude synchronous tracking control of double shaking tables based on hybrid fuzzy logic cross-coupled controller and adaptive inverse controller” by Zhang et al. propose a novel hybrid controller combined a hybrid fuzzy PD cross-coupled controller (CCC) with an adaptive inverse controller (AIC) to solve the poor tracking and synchronous accuracy of load masses. The combination of hybrid fuzzy PD CCC and AIC has the advantage of integrating a superiority of the two control techniques for better control performance. The test results of control scheme demonstrated the viability of the proposed hybrid control scheme.

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All the great efforts from above people have made this conference successful.