

## 2 · 項目簡介

(項目所屬科學技術領域、主要研究內容、發現點、科學價值、同行引用及評價等內容。)

In the past decade, computational intelligent systems have been widely used in many scientific and engineering applications related to systems modeling, intelligent adaptive control, regression and density estimation, decision-making, and pattern recognition, etc. Within the paradigm of computational intelligent systems, neuro-fuzzy or fuzzy-neural combination is one of popular combinations in systems modeling and decision-making. A neuro-fuzzy system possesses characteristics of neural network, linguistic information, and inference engine characterized by logic control in fuzzy systems. Although the significant progress has been made by combining different learning algorithms with neuro-fuzzy systems, there are still problems that need to be solved for practical implementations. In addition, with fast development of cloud computing and big data techniques and recently popularized scientific and engineering applications using computational intelligent systems in systems modeling, analysis, decision-making, and systems control to provide more precise outcome and value added services become very preferable and imperative.

In this project, several fundamental discoveries have been conducted theoretically and practically. The main contributions are listed below:

1. design an adaptive tracking control strategy for a class of nonlinear stochastic systems with unknown functions using a fuzzy-neural network
2. design a consensus control strategy for nonlinear multi-agent systems with state time-delay
3. discover computational challenges, technologies, and applications in big data
4. design a fuzzy multi-attribute decision making algorithm for routing in personalized intelligent vehicle assistance environment
5. design a strategy for sensor networks-based urban traffic information collection for cloud infrastructure
6. design a fuzzy multi-attribute decision making algorithm for routing in personalized intelligent vehicle assistance environment
7. develop a fully-connected neuro-fuzzy system and derive the bounded capacity of the newly fully-connected system
8. develop a computational algorithm to guarantee fast and successful convergence and to achieve much better accuracy based on the developed theoretical capacity bounds

Being passed through the peer review in the same field, the research outcomes have resulted in more than 125 SCI publications with more than 1000 citations in the very top of IEEE Transactions papers within six years. Within which only 24 SCI papers are selected for this award applications. Such top journals are IEEE Transactions on Fuzzy Systems (top rank among 123 in Journal Citation Reports in Computer Science-Artificial Intelligence), IEEE Transactions on Neural Networks and Learning Systems (top rank among 102 in Journal Citation Reports in Computer Science-Theory & Methods), IEEE Transactions on Cybernetics (former IEEE Transactions of Systems, Man, and Cybernetics, Part B: Cybernetics) (second rank among 24 in Journal Citation Reports in Computer Science-Cybernetics), IEEE Transactions on Intelligent Transportation Systems

(thirteen rank among 125 in Journal Citation Reports in Engineering-Civil), and many top conferences such as IEEE International Conference on System, Man, and Cybernetics, etc. These journals have great impacts in the area of intelligent systems, learning systems, system modeling, cybernetics, and intelligent transportation systems. It is indicated that the research made tremendous contributions in its respective fields.

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