

# Building Parsimonious Systems from Data: Computational Intelligence Approaches

Date: 16 May 2024 (Thursday)

Time: 10:00am - 11:00am

Venue: Rm 6-211, Lau Ming Wai Academic Building,  
City University of Hong Kong

## ABSTRACT

I begin with two quotes: “Make everything as simple as possible, but not simpler.” (Albert Einstein) “The principle of parsimony is valid esthetically in that the artist must not go beyond what is needed for his purpose.” (Rudolf Arnheim) These quotes were not written for designing of decision-making systems from data. But they implicitly, at least in my view, suggest a great principle of designing systems from data. When we design a system we should not go (use) beyond what is needed to solve the problem. They advocate for parsimonious systems, which should use just “adequate” inputs (adequate information) and should not have unnecessary degrees of freedom. Instead of using the word “minimum” inputs, the word “adequate” has been used to address a practical issue - if a system uses the minimum required information, it may not be able to stand any measurement error and hence a controlled level of redundancy should be kept. But how can we design such a system? Computational Intelligence (CI) is an excellent tool for this. In this talk, we shall discuss how CI, in particular, Neural Networks, Fuzzy Systems, and neuro-fuzzy systems can be used to realize parsimonious systems. We shall consider a few approaches to realize parsimony in designing algorithms for data visualization, classification, and prediction using neural and neuro-fuzzy systems. In this context, we shall also discuss, sensor selection, a generalized version of the feature selection problem.



## Professor Nikhil R. Pal

### GUEST SPEAKER'S PROFILE

Nikhil R. Pal was a Professor in the Electronics and Communication Sciences Unit and was the founding Head of the Center for Artificial Intelligence and Machine Learning of the Indian Statistical Institute. His current research interest includes brain science, computational intelligence, machine learning and data mining. He was the Editor-in-Chief of the IEEE Transactions on Fuzzy Systems for the period January 2005-December 2010. He has served/been serving on the editorial /advisory board/ steering committee of several journals including the International Journal of Approximate Reasoning, Applied Soft Computing, International Journal of Neural Systems, Fuzzy Sets and Systems, IEEE Transactions on Fuzzy Systems and the IEEE Transactions on Cybernetics. He is a Fellow of the West Bengal Academy of Science and Technology, Institution of Electronics and Tele Communication Engineers, National Academy of Sciences, India, Indian National Academy of Engineering, Indian National Science Academy, International Fuzzy Systems Association (IFSA), The World Academy of Sciences, and a Fellow of the IEEE, USA.