Area: Power and Energy Systems (PES)

Host: Prof Dipti Srinivasan

Jointly organized by IEEE Computational Intelligence Society & GEMS (Green Energy Management & Smart Grid Research Center)

TOPIC	:	**Building Parsimonious Systems from Data: Computational Intelligence Approaches**
SPEAKER	:	**Prof Nikhil R Pal** **INSA Senior Scientist** **Indian Statistical Institute, Kolkata**
DATE	:	**Monday, 14 April 2025**
TIME	:	**6:00PM-7:00PM**
VENUE	:	**LT2, NUS**

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 fuzzy systems. In this context, we shall also discuss, sensor selection, a generalized version of the feature selection problem.

BIOGRAPHY

Prof Nikhil R. Pal is an INSA Senior Scientist at the Indian Statistical Institute, Kolkata, where he was a Professor in the Electronics and Communication Sciences Unit and the founding Head of the Center for Artificial Intelligence and Machine Learning of Indian Statistical Institute. He is also an Honorary Visiting Professor at the South Asian University, New Delhi. 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 and is currently serving on the editorial /advisory board/ steering committees 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. Prof Pal is a recipient of the 2015 IEEE Computational Intelligence Society (CIS) Fuzzy Systems Pioneer Award and 2021 IEEE CIS Meritorious Service Award. He has given many plenary/keynote speeches in different premier international conferences in the area of computational intelligence. He has served as the General Chair, Programme Chair, and co-Programme chair of several conferences. Prof Pal has also been a Distinguished Lecturer of the IEEE CIS (2010-2012, 2016-2018, 2022-2024) and was a member of the Administrative Committee of the IEEE CIS (2010-2012). He served as the Vice-President for Publications of the IEEE CIS (2013-2016) and the President of the IEEE CIS (2018-2019). In addition, Prof Pal 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.

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