The tutorial focuses on some theoretical concepts for fuzzy systems and networks in the context of model complexity attributes such as nonlinearity, dimensionality and structure. In particular, rule base reduction and compression methods for fuzzy systems are considered. Also, fuzzy networks with chained and modular rule bases are discussed. The theoretical results are applied to several case studies and validated comparatively using established metrics for model performance indicators such as accuracy, efficiency and transparency.

Dates
Wednesday 27th June 2018: 10:00 am - 1:00 pm (Aula 2)
Thursday 28th June 2018: 10:00 am - 01:00 pm (Aula 2)

Lecturer
Alexander Gegov from University of Portsmouth .

Short bio
Alexander Gegov is Reader in Computational Intelligence in the School of Computing, University of Portsmouth, UK. He holds a PhD in Control Systems and a DSc in Intelligent Systems – both from the BulgarianAcademy of Sciences. He has been Humboldt Guest Researcher at the University of Duisburg in Germany. He has also been EU Visiting Researcher at the University of Wuppertal in Germany and the Delft University of Technology in the Netherlands. Alexander Gegov's research interests are in the development of computational intelligence methods and their application for modelling and simulation of complex systems and networks. He has edited a few books and authored several research monographs plus a dozen of book chapters - most of them published by Springer. He has published a significant number of articles and papers in international journals and conferences including ones managed and organised by IEEE. He has presented invited lectures and tutorials at a wide range of international research events including IEEE Conferences and Summer Schools on Fuzzy Systems, Intelligent Systems, Computational Intelligence and Cybernetics.

Main Aims
1. Theoretical knowledge in fuzzy logic.
2. Applied knowledge in fuzzy systems and networks.

Learning Outcomes
1. Explain and interpret the mathematical foundations of fuzzy logic.
2. Use and apply techniques for building fuzzy systems and networks.

Syllabus Outline

1. Sets and relations for fuzzy rule based systems.
2. Fuzzification, inference and defuzzification in fuzzy rule based systems.
3. Mamdani, Sugeno and Tsukamoto fuzzy rule based systems.
4. Modelling, simulation and control of fuzzy rule based systems.
5. Formal models for fuzzy rule based networks.
6. Basic and advanced operations in fuzzy rule based networks.
7. Feedforward and feedback fuzzy rule based networks.
8. Performance evaluation of fuzzy rule based networks.

Lecture Notes

Available for download here .