Module Name: (A.4) Computational Intelligence

Aim

This module aims to teach a number of paradigms for machine learning including (un)supervised learning, knowledge representation, reasoning, automated (computer) decision-making, and optimization (stochastic) in practical applications. Care will be given to implementation issues including implementation via the Internet.

Learning Objectives

The learning objectives include the knowledge, comprehension, applicability, analysis, design and evaluation of biologically-inspired or otherwise, methodologies for inducing a decision-making "intelligent" function from the training data. Specific concepts and models are introduced including classic Computational Intelligence schemes such as artificial neural networks, fuzzy systems as well as uncertainty managing schemes and stochastic (evolutionary, etc.) optimization techniques. Additional topics of interest include extended Computational Intelligence schemes such as alternative decision support systems, reasoning/logic-based schemes, hybrid intelligence fusion as well as combinations of all aforementioned methodologies. A unifying approach to Computational Intelligence will be shown based on Order Theory via the unification of disparate types of (partially ordered) data.

Learning Outcomes

On successful completion of this module, students should be able to:

- Critically evaluate different computational intelligence methodologies.
- Decide whether a specific practical problem can be dealt with a computational intelligence methodology.
- Choose the best computational intelligence methodology for application in a specific problem.
- Develop effective / efficient synergies of computational intelligence methodologies in response to a practical problem.
- Anticipate future problem demands towards an optimal development of a computational intelligence methodology.

Bibliography

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[4] V.G. Kaburlasos, G.A. Papakostas, Introduction to Computational Intelligence – A Holistic Approach. (in Greek) Hellenic Academic Ebooks (www.kallipos.gr), 2016. (https://repository.kallipos.

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