UNIVERSITY of BRADFORD

Module Descriptor

Neural Networks and Fuzzy Systems

Module Code:	COS6004-B
Academic Year:	2018-19
Credit Rating:	20
School:	Department of Computer Science
Subject Area:	Computer Science
FHEQ Level:	FHEQ Level 6
Module Leader:	Professor Rami Qahwaji

Additional Tutors:
Dr Attila Csenki

Pre-requisites:	Symbolic and Declarative Computing and Artificial
Co-requisites:	

Contact Hours

Type	Hours
Lectures	20
Tutorials	4
Laboratory	24
Directed Study	152

Availability Periods

Occurrence	Location/Period
NLA	Namal College / Semester 1 (Sep - Jan)
BDA	University of Bradford / Semester 1 (Sep - Jan)

Module Aims

To understand neural networks and fuzzy logic theory; to gain knowledge of neural networks and fuzzy system development; to apply the techniques for solving real-life problems, such as signal processing, control, and pattern recognition.

Outline Syllabus

Typical neural networks, including M-P model, Perceptron, Multi-layered Perceptron, ADALINE, MADALINE, Radial Basis Function, Recurrent Neural Networks, Hopfield Networks, Adaptive Resonance Theory Neural Networks, Kohonen Neural Networks. Fuzzy set theory and fuzzy logic control. Typical learning and searching techniques, including supervised learning, unsupervised learning, competitive learning, hill climbing, and simulated annealing. A practical project, may involve both hardware and software development, to apply the taught neural networks and fuzzy logic for solving a real-life problem such as pattern recognition, data mining, or behaviour learning.

Module Learning Outcomes

On successful completion of this module, students will be able to...

1 Demonstrate detailed knowledge and systematic understanding of essential facts, concepts, principles and theories relating to computing and computer applications of neural networks and fuzzy systems. use such knowledge and understanding in the modelling and design of computer-based neural networks and fuzzy systems. Apply mathematical principles and mathematical methods, tools and notations proficiently in the analysis and solution to problems.

2 Specify, analyse, design and train feedforward neural networks, recurrent neural networks, and self-organising neural networks, fuzzy logic control systems, evolution computing for sensor-actuator mapping and pattern classification.

Critically analyse and deploy appropriate theory, practices and tools for the specification, design and implementation of neural networks and fuzzy systems.

Apply the principles of appropriate supporting engineering and scientific disciplines.

3 Demonstrate extended analytical and problem-solving skills.

Communicate effectively in electronic as well as written and oral form.

Learning, Teaching and Assessment Strategy

Formal lectures will outline the theoretical principles. Practical exercises will be carried out to link the theories with practical implementation in laboratory by providing sample codes of typical neural networks and fuzzy logic systems. The module will be assessed through a project to apply the learned knowledge to solve a real-life problem. Several assessed exercises will be provided for testing the understanding of theoretical knowledge and the practice of implementation skills. The supplementary assessment is to repair deficiencies identified in the original assessment. Oral feedback will be given during laboratory classes. Students who have an acceptable body of knowledge equivalent to the pre-requisite shown will be permitted to study this module.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Referral	Examination - closed book	Supplementary Examination for assessment of both content understanding and application capability	3 hours	100%	No
Summative	Coursework	Neural Networks exercises and coursework		50%	No
Summative	Coursework	Fuzzy logic exercises and coursework		50%	Yes

Legacy Code (if applicable)

CM-0340D

Reading List

To view Reading List, please go to **rebus:list**.