

SUBJECT TEACHING GUIDE

M1519 - Neural Networks

Master's Degree in Mathematics and Computing

Academic year 2019-2020

1. IDENTIFYING DATA			
Degree	Master's Degree in Mathematics and Computing		Optional. Year 1
Faculty	Faculty of Sciences		
Discipline			
Course unit title and code	M1519 - Neural Networks		
Number of ECTS credits allocated	3	Term	Semester based (2)
Web	https://personales.unican.es/crespoj/redes/Cursoredes.html		
Language of instruction	Spanish	English Friendly	No
		Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION
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Other lecturers	

3.1 LEARNING OUTCOMES

- Neural networks basics: modelling and learning; links with standard statistical and optimization techniques
- Informed algorithm choice
- Real life problem solving with neural networks
- Choice of neural network type

4. OBJECTIVES

Real life problem solving
Context-based method choice
Introduction to modeling and learning with neural networks; including statistics and optimization considerations
Neural networks algorithms understanding

6. COURSE ORGANIZATION

CONTENTS

1	Common neural network usage. Biological networks. Cognitive models. Classification. Regression
1.1	Neural network definition. Biological neurons. Cognitive modelling.
1.2	Feedforward multilayer perceptron
1.3	Deep networks
1.4	Radial basis function networks
1.5	Competitive networks
1.6	Autoassociators
2	Applications with particular challenges
2.1	Feature selection
2.2	Time series analysis.
2.3	Model selection
3	Variations
3.1	Activation function
3.2	Error functions
3.3	Generalization.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Implementation of a neural network for a particular problem	Work	Yes	Yes	100,00
TOTAL				100,00
Observations				
<p>The teacher will provide each student with a problem to be solved with neural networks. There is a single final deadline up to september. Students present their solution whenever they have it ready before that deadline. If their solution is not valid, they will be told how to improve it, and will be able to present it whenever it is improved, again, before the september deadline. Top (honor) grades are limited. Students deserving those grades will be acknowledged following presentation order. When the top limit is hit, no further maximum grades can be awarded.</p>				
Observations for part-time students				
<p>Since dates for developing the application and presenting it are chosen individually by agreement between the teacher and each student, no further considerations are needed for half-time students.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Neural Network Design

Martin T. Hagan

Publisher: Martin Hagan; 2 edition (September 1, 2014)

Paperback 800 pages

eBook PDF (1012 pages, 11 MB)

Language: English

ISBN-10: 0971732116

ISBN-13: 978-0971732117

(<http://hagan.okstate.edu/NNDesign.pdf>)