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MODULE DESCRIPTOR

Module Title

Advanced Algorithms and Datasets

Reference	CMM301	Version	1
Created	December 2018	SCQF Level	SCQF 11
Approved	April 2019	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

To introduce the students to real-time analysis of streaming data, showing how data mining techniques can be adapted to address the challenges posed by the streaming nature of some applications.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Critically appraise the challenges posed by the volume, variety and velocity of modern data sources.
2	Justify the selection of data analysis approaches and data structures for application to a given problem through appraisal of established literature.
3	Construct and defend an experimental analysis of a dataset through the application of advanced data analysis algorithms.
4	Critically evaluate state-of-the-art data science algorithms and data structures and their application to complex problems in the computing industry or computing science research fields.

Indicative Module Content

Supervised and unsupervised learning. Advanced data structures. Examples of problems requiring advanced algorithms and data structures. Specific topics to be drawn from: linear and logistic regression; classification and regression trees; Naive Bayes methods, kNN, SVM, PCA, Random Forest, advanced Neural Network techniques; deep learning; gradient-based optimisation; advanced algorithms for graphs and trees; fundamentals of data stream mining.

Module Delivery

This is a lecture-based module with associated practical exercises that will involve a number of advanced data analysis algorithms and data structures.

Module Ref:	CMM301 v1

Indicative Student Workload	Full Time	Part Time
Contact Hours	40	N/A
Non-Contact Hours	110	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2
Description:	written examination				

Component 2

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	3, 4
Description:	a practical coursework				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The calculation of the overall grade for this module is based on equal weighting of C1 and C2 components. An overall minimum grade D is required to pass the module.

		Examination:						
		A	**B**	**C**	**D**	**E**	**F**	**NS**
Coursework:	**A**	A	A	B	B	C	E	
	B	A	B	B	C	C	E	
	C	B	B	C	C	D	E	
	D	B	C	C	D	D	E	
	E	C	C	D	D	E	E	
	F	E	E	E	E	E	F	

NS Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	None.
Corequisites for module	None.
Precluded Modules	None.

Module Ref:	CMM301 v1

INDICATIVE BIBLIOGRAPHY

1	Lantz, B (2019) Machine Learning with R: Expert techniques for predictive modeling, 3rd Edition. Packt Publishing
2	Sayed-Mouchawek, M. (2018) Learning from Data Streams in Evolving Environments: Methods and Applications. Springer-
3	Verlag. Raschka, S. (2019) Python Machine Learning. Packt
4	Leskovec, J., Rajaraman, A., and Ullman, D. (2020) Mining of Massive Datasets. Cambridge University Press.
5	Steele, Chandler, Reddy. (2016) Algorithms for Data Science. Springer.