APPROVED

DATA C9004: Machine Learning

Module Details

Module Code:	DATA C9004
Full Title:	Machine Learning APPROVED
Valid From::	Semester 1 - 2019/20 (June 2019)
Language of Instruction:	English
Duration:	1 Semester
Credits::	10
Module Owner::	Rajesh Jaiswal
Departments:	Unknown
Module Description:	This module covers methods involved in designing and developing computer based programs that learn and improve with experience to make meaningful predictions based on test data. This module will focus on the concepts based on probability, statistics and optimization to train machine learning models.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	**Module Learning Outcome Description**
MLO1	Segregate and discuss a variety of machine learning algorithms
MLO2	Outline the critical features of supervised and un-supervised learning
MLO3	Research the types of problems that machine learning algorithms can solve
MLO4	Compare various methods of training and optimization of computer programs that is obtained through learning from data
MLO5	Design and train machine learning algorithms for independent and identically distributed data
MLO6	Establish the data analyst role in constructing the machine learning solutions.
MLO7	Evaluate and Analyse the performance of a selected of machine learning model and its solution.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named DkIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).*
No recommendations listed

Module Indicative Content
Introduction AI background, what is machine learning?, the five tribes
Categories of Machine Learning Algorithms Supervised Learning- Classification and Regression, Unsupervised Learning - Clustering
Supervised Learning - Classification Discriminant Analysis, Support Vector Machines, Naive Bayes, Random Forest, Nearest Neighbor
Supervised Learning - Regression Linear Regression, GLM, Ensemble Methods, Decision trees, Neural Network - MLP, Back Propagation, RNN and CNN. Intro to deep learning
Unsupervised Learning - Clustering K-means, Fuzzy C -means, Hierarchical - clustering basis functions, Gaussian Mixture, HMM, Neural Network - Self Organizing Maps (2D)

Module Assessment

Assessment Breakdown	%
Course Work	50.00%
Project	50.00%

Module Special Regulation

Assessments

Full Time On Campus

Course Work

Assessment Type	Continuous Assessment	**% of Total Mark**	10
Marks Out Of	100	**Pass Mark**	40
Timing	S1 Week 2	**Learning Outcome**	1,2
Duration in minutes	0		

Assessment Description
CA1 - Assignment to identify and analyse the features of machine learning algorithms

Assessment Type	Continuous Assessment	**% of Total Mark**	40
Marks Out Of	100	**Pass Mark**	40
Timing	n/a	**Learning Outcome**	3,4,5,7
Duration in minutes	0		

Assessment Description
CA2- Two assignments (20% each) to identify, design, and evaluate performance of the chosen machine learning algorithms to solve a given data analytics problem

Project

Assessment Type	Group Project	**% of Total Mark**	50
Marks Out Of	100	**Pass Mark**	40
Timing	End-of-Semester	**Learning Outcome**	3,4,5,6,7
Duration in minutes	0		

Assessment Description
Group Project will consist of the following deliverable - Project proposal, Progress report and Project presentation. - Students will given a data related problem and will be asked to propose a solution based on machine learning model. Students will design and train and further analyse the performance of machine learning model and its solution

No Practical

No Final Examination

Part Time On Campus

Course Work

Assessment Type	Continuous Assessment	**% of Total Mark**	10
Marks Out Of	100	**Pass Mark**	40
Timing	S1 Week 2	**Learning Outcome**	1,2
Duration in minutes	0		

Assessment Description
CA1- Assignment to identify and analyse the features of machine learning algorithms

Assessment Type	Continuous Assessment	**% of Total Mark**	40
Marks Out Of	100	**Pass Mark**	40
Timing	n/a	**Learning Outcome**	3,4,5,7
Duration in minutes	0		

Assessment Description
CA2- Two assignments (20% each) to identify, design, and evaluate performance of the chosen machine learning algorithms to solve a given data analytics problem

Project

Assessment Type	Group Project	**% of Total Mark**	50
Marks Out Of	100	**Pass Mark**	40
Timing	End-of-Semester	**Learning Outcome**	3,4,5,6,7
Duration in minutes	0		

Assessment Description
Group Project will consist of the following deliverable - Project proposal, Progress report and Project presentation. - Students will given a data related problem and will be asked to propose a solution based on machine learning model. Students will design and train and further analyse the performance of machine learning model and its solution

No Practical

No Final Examination

Reassessment Requirement
No repeat examination *Reassessment of this module will be offered solely on the basis of coursework and a repeat examination will not be offered.*
Reassessment Description Individual Project - Students will given a data related problem and will be asked to identify and analyse the performance of machine learning model and its solution. This project will cover all the learning outcomes of the module.

Module Workload

Workload: Full Time On Campus					
Workload Type	*Contact Type*	*Workload Description*	*Frequency*	*Average Weekly Learner Workload*	*Hours*
Lecture	Contact	1 hour lecture to cover the theory of machine learning	Every Week	1.00	1
Practical	Contact	Two 2-hour lab per week to cover the tutorial and practicals of the module	Every Week	4.00	4
Directed Reading	Non Contact	Lecture notes, books and web resources	Every Week	2.00	2
Independent Study	Non Contact	Lecture notes, books and web resources	Every Week	9.00	9
				Total Weekly Learner Workload	16.00
				Total Weekly Contact Hours	5.00

Workload: Part Time On Campus					
Workload Type	*Contact Type*	*Workload Description*	*Frequency*	*Average Weekly Learner Workload*	*Hours*
Lecture	Contact	1 hour lecture to cover the theory of machine learning	Every Week	1.00	1
Practical	Contact	Two 2-hour lab per week to cover the tutorial and practicals of the module	Every Week	4.00	4
Directed Reading	Non Contact	Lecture notes, books and web resources	Every Week	2.00	2
Independent Study	Non Contact	Lecture notes, books and web resources	Every Week	9.00	9
				Total Weekly Learner Workload	16.00
				Total Weekly Contact Hours	5.00

Module Resources

Recommended Book Resources

Sarah Guido, Andreas Müller. (2016), Introduction to Machine Learning with Python, O'Reilly Media.

Supplementary Book Resources

Aurelien Geron. (2019), Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media.

This module does not have any article/paper resources

Other Resources

website, GITHUB link,
https://github.com/amueller/introduction_to_ml_with_python