

PCIT301 : Machine Learning(PCC)

Teaching Scheme	Examination Scheme
Lectures: 3 Hrs./Week	Continuous Assessment: 40 Marks
	End-Sem Exam: 60 Marks
Credits: 3	Total: 100 Marks
Prerequisite Course: Linear Algebra, Calculus and Probability, Statistics, Foundation of Data Science,	

Course Objectives

1. To understand Machine Learning concepts.
2. To explore the Regression techniques
3. To explore the different types of Classification algorithm.
4. To acquire the knowledge of Clustering techniques
5. To acquire the knowledge of Association rules and Dimensionality Reduction

Course Outcomes (COs):

After successful completion of the course, student will be able to

Course Outcome (s)		Bloom's Taxonomy	
		Level	Descriptor
CO1	Recognize the characteristics of machine learning that makes it useful to real-world problems,	2	Understand
CO2	Apply the Regression methods,	3	Apply
CO3	Apply different classification algorithms for various machine learning applications,	3	Apply
CO4	Apply Clustering technique,	3	Apply
CO5	Apply the Association rule and Principle Component Analysis,	3	Apply

Mapping of Course Outcomes to Program Outcomes (POs) & Program Specific Outcomes (PSOs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	2	1	1	1	2	1	1	2	3	1
CO2	3	2	2	3	3	2	1	1	1	2	1	1	2	3	1
CO3	3	2	2	3	3	2	1	1	1	2	1	1	2	3	1
CO4	3	2	2	3	3	2	1	1	1	2	1	1	2	3	1
CO5	3	2	2	3	3	2	1	1	1	2	1	1	2	3	1

Course Contents			
Unit-I	INTRODUCTION TO MACHINE LEARNING	No. of Hours	COs
	Introduction: Definition, Real life applications, Introduction to Data in Machine Learning Types of Learning: Supervised Learning Unsupervised Learning, Semi-Supervised Learning, Reinforcement Learning, Concept of Feature, Feature construction, Feature Selection and Transformation, Curse of Dimensionality. Dataset Preparation: Training Vs. Testing Dataset, Dataset Validation Techniques – Hold-out, k-fold Cross validation, Leave-One-Out Cross- Validation (LOOCV).	09	CO1
Unit-II	REGRESSION	No. of Hours	COs
	Linear Regression, Logistic Regression, Ridge Regression, Lasso Regression, Polynomial Regression Types of Regression, performance metrics Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), R^2 (R-Squared)	09	CO2
Unit-III	CLASSIFICATION	No. of Hours	COs
	Sigmoid function, Classification Algorithm in Machine Learning: Decision Trees, Ensemble Techniques: Bagging and boosting, Adaboost and gradient boost, Random Forest, Naïve Bayes Classifier, Support Vector Machines. Performance Evaluation: Confusion Matrix, Accuracy, Precision, Recall, AUC-ROC Curves, F-Measure	09	CO3
Unit-IV	CLUSTERING	No. of Hours	COs
	Distance measures-Euclidean, Manhattan, Hamming, Minkowski Distance Metric, Different clustering methods (Distance, Density, Hierarchical), K-means clustering Algorithm-with example, k-medoid algorithm-with example, Performance Measures-Rand Index, K-Nearest Neighbour algorithm,	09	CO4
Unit-V	ASSOCIATION AND DIMENSIONALITY REDUCTION	No. of Hours	COs
	Association Rules-Market Basket Analysis, The Apriori Algorithm, Performance Measures – Support, Confidence, Lift. Dimensionality Reduction: Principal Component Analysis, Partial Least Squares Subset Selection, Feature Reduction/Dimensionality reduction, Principal components analysis (Eigen values, Eigen vectors, Orthogonality)	09	CO5
Text Books:			
1.	Ethem Alpaydin, Introduction to Machine Learning, PHI 4th Edition-2020, The MIT Press, ISBN:9780262043793.		
2.	Deep Learning- Ian Goodfellow, Yoshua Benjio, Aaron Courville, The MIT Press ISBN:97802620356133. Machine Learning, Tom M. Mitchell, McGraw Hill, 1997 ISBN: 0071154671, 9780071154673		
3.	Machine Learning, Tom M. Mitchell, McGraw Hill, 1997 ISBN: 0071154671, 9780071154673		

Reference Books:

1. Peter Flach, "Machine Learning The Art and Science of Algorithms that Make Sense of Data", Cambridge University Press India. ISBN 13: 9781107422223
2. Pattern Recognition and Machine Learning. Christopher Bishop. Springer. 2006, ISBN-13: 978-1493938438
3. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press. 2017. ISBN:978-1-107-05713-5.
4. Kevin P Murphy: Machine Learning – A Probabilistic Perspective, MIT Press, August 2012. ISBN 978-0-262-01802-9

E-Resources:

1. http://imlab.postech.ac.kr/dkim/class/csed514_2019s/DeepLearningBook.pdf
2. https://kkpatel7.files.wordpress.com/2015/04/alpaydin_machinelearning_2010.pdf
3. <https://nptelac.in/courses/106106139>
4. <https://nptelac.in/courses/106/106/106106202>
5. <https://nptelac.in/courses/106/106/106106198>
6. <https://nptelac.in/courses/106/105/106105152>
7. <https://nptelac.in/courses/106/106/106106213>
8. <https://www.udemy.com/share/101XEQ3@UfHr0o6yGKpfHUzm-xhzBLB1IHr5AP74CFbbhcUENjbuiY>

PCIT304 : Machine Learning Laboratory			
Teaching Scheme		Examination Scheme	
Lectures: 4 Hrs./Week		Term Work:	20 Marks
		Oral :	NA
		Practical:	30 Marks
Credits: 2		Total:	50 Marks
Prerequisite Course: Python Programming Language			
Course Objectives			
To perform data preprocessing for Exploratory Data Analysis(EDA) and apply regression techniques, To implement supervised classification Machine learning algorithms in python, To implement ensemble technique for classification algorithms using bagging and boosting, To implement clustering techniques in python,			
Course Outcomes (COs):			
After successful completion of the course, student will be able to			
Course Outcome (s)			Bloom's Taxonomy
			Level Descriptor
CO1	Perform data preprocessing for EDA and Apply regression techniques,		3 Apply
CO2	Implement supervised classification algorithms in python programming language,		3 Apply
CO3	Implement ensemble technique for classification algorithms using bagging and boosting,		3 Apply
CO4	Implement clustering techniques in python,		3 Apply

Mapping of Course Outcomes to Program Outcomes (POs) & Program Specific Outcomes (PSOs):															
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	3	3	1	1	1	1	1	2	2	3	2	1
CO 2	3	3	2	3	3	1	1	1	1	1	2	2	3	2	1
CO 3	3	3	2	3	3	1	1	1	1	1	2	2	3	2	1
CO 4	3	3	2	3	3	1	1	1	1	1	2	2	3	2	1

Suggested List of Assignments			
Sr. No.	Assignment	No. of Hours	COs
1.	Exploratory Data Analysis(EDA):Downloading the dataset and perform cleaning of data. Data Analysis & visualization-using NumPy, pandas matplotlib/Seaborn, SciPy.	2	CO1
2.	Assignment based on Linear regression using python.Assess the performance of model using evaluation metrics.	4	CO1
3.	Assignment based on Logistic Regression for classification using python. Assess the performance of model using evaluation metrics.	4	CO2
4.	Assignment based on Naive Bayes Classifier using python. Assess the performance of model using evaluation metrics.	4	CO2
5.	Assignment based on Support Vector Machine(SVM) using python. Assess the performance of model using evaluation metrics.	4	CO2
6.	Assignment based on Decision Tree Algorithm using python. Assess the performance of model using evaluation metrics	4	CO3
7.	Assignment based on Random Forest Algorithm using python. Assess the performance of model using evaluation metrics	4	CO3
8.	Assignment based on Adaboost using python. Assess the performance of model using evaluation metrics	4	CO3
9.	Assignment based on K-means Clustering Algorithm using python for Mall Customer Segmentation or any other dataset,	4	CO4
10.	Assignment based on K-Nearest Neighbour algorithm(KNN) Algorithm using python,	4	CO4
11.	Assignment based on K-Medoid Clustering (ML) Algorithm using python,	4	CO4
Reference Books:			
1.	Andreas C. Müller, Sarah Guido, “Introduction to Machine Learning with Python”,Released October 2016, O’Reilly Media, Inc. ISBN: 9781449369415.		
2.	Manaranjan Pradhan and U Dinesh Kumar, “Machine Learning using Python” Wiley ISBN-13. 978-8126579907		
3.	Peter Flach, “Machine Learning The Art and Science of Algorithms that Make Sense of Data”, Cambridge University Press India.ISBN 13: 9781107422223		
4.	Ethem Alpaydin, Introduction to Machine Learning, PHI 4th Edition-2020 ,The MIT Press,ISBN:9780262043793		