Title	Machine Learning	
Instructors	Amlan Chakrabarti	
Target Students	Senior Undergraduate Stundets, Graduate Students	
Credit Category	Elective	
Credits	1	
Description	This course will serve as a comprehensive introduction to various topics in machine learning. At the end of the course the students should be able to design and implement machine learning solutions to classification, regression, and clustering problems; and be able to evaluate and interpret the results of the algorithms.	
Prerequisites	Engineering Mathematics, Python Programming	
Schedule	1.	Introduction to Machine Learning: Definition, Use cases, Different Types of Tasks, Model Representation
	2.	Regression: Linear, Cost Function, Gradient Descent for Linear Regression, Feature Scaling, Non-Linear regression
	3.	Classification: k-NN, Decision Tree, Naïve Bayes, SVM
	4.	Clustering Theoretical understanding of K-Means,DBSCAN, Agglomerative Clustering, EM
	5.	Ensemble Random Forest, AdaBoost, GradientBoosting
	6.	Introduction to Neural Network Motivation, Perceptron, Activation Function, Loss Function, Back Propagation
	7.	Introduction to Deep Networks: Convolution Neural Network, Recurrent Neural Network
	8.	Exam
Teaching Method	In each session, a lecture will be given according to the above schedule with either Skype or Zoom or Google Meet. In the last session, a final exam will be conducted.	
Objectives	1.	Understanding of Machine Learning an its different variants
	2.	Understanding Classification and Clustering Techniques
	3.	Understanding Neural networks and Basics of Deep Networks
Evaluation Method	Grade evaluation will be based on the score of the final exam (out of 100 points).	
Keywords	Machine Learning, Regression, Classification, Clustering, ANN, DNN	
Required Textbooks	N/A	
References	1. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press, July 2014. 2. Aaron Courville, Ian Goodfellow, and Yoshua Bengio, Deep Learning, MIT Press	
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