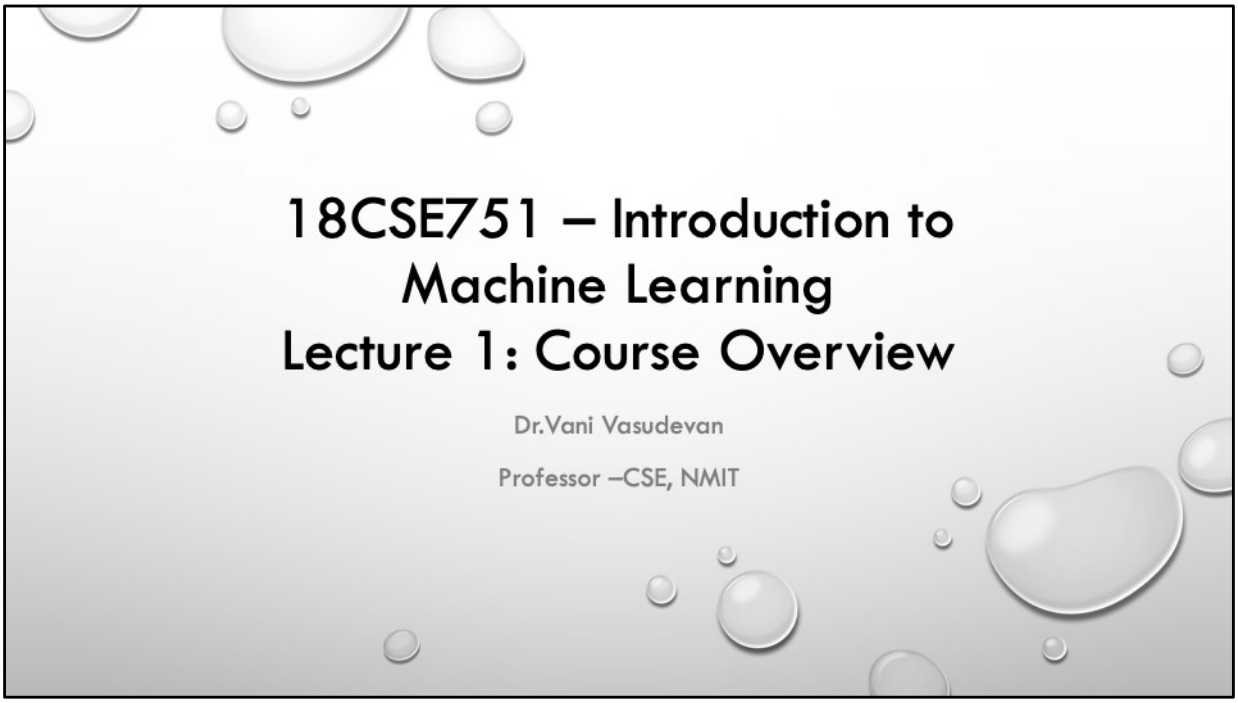

machine learning, a subset of artificial intelligence, refers to the ability of a computer system to understand large – often huge – amounts of data, without explicit directions, and while doing so adapt and become increasingly smarter. – from UNSW blog

the use of machine learning dramatically reduces the possibility of human error.

COURSE COORDINATOR

Name: Dr. Vani Vasudevan

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MY SCHEDULE

Nitte Meenakshi Institute of Technology
Department of Computer Science and Engineering
Time Table – Odd Semester (2021_2022)

Name: Dr. Vani Vasudevan
Designation: Professor
Room #: 332, Level 3
Ext.: 980
E-mail: vani.v@nmit.ac.in

18CS54 Data Mining (Room No. C1: 138, C2: 132)
18CSE751 Introduction to Machine Learning (Room No. 307)

DAY	8:45 am	9:45 am	10:45-10:55 pm	10:55 am	11:55 am	12:55-1:30pm	1:30 pm	2:30 pm	3:30 pm
MON	CP		Break	18CSE751	OH	Lunch Break	PA		
TUE	CP			OH	18CS54 (C2)		CP	18CS54 (C1)	CP
WED	CP			18CSE751			PA		
THU	CP	18CS54 (C2)		DA	OH		PA		
FRI	18CSE751	CP		DA			PA		
SAT	CP	18CS54 (C2)		18CS54 (C1)			CP	18CS54 (C1)	CP

OH: Office Hours; **CP**: Course Preparation/Assessment; **DA**: Department Activities; **PA**: Project/Research Activities

Feel free to drop by my office during OH or send an email to make an appointment.

COURSE DESCRIPTION

This course imparts the concepts of Machine Learning(ML) which is the necessity in today's self learning systems. It includes the concepts of ML, types, perceptron and neural networks, decision tree learning, Bayesian learning and clustering.

COURSE OBJECTIVES

- To understand the concepts of ML, types of ML and preliminaries
- To understand and describe Neural Network learning, Bayesian learning, Decision Tree learning, Nearest Neighbour learning and Clustering.
- To employ ML techniques to solve problems

COURSE CONTENTS…

Unit –I (T1 – Chapters 1&2)

Introduction : Machine Learning, Types of Machine Learning, Machine Learning Process, Supervised Learning, Examples of Machine Learning Applications,

Machine Learning Preliminaries: Weight Space, Curse of Dimensionality, Testing Machine Learning Algorithms: Overfitting, Training, Testing, and Validation Sets, Confusion Matrix, Accuracy Metrics, ROC Curve, Unbalanced Datasets, Measurement Precision,

Basic Statistics : Averages, Variance, Covariance, Gaussian, Bias, Variance Tradeoff

Unit –II (T1 – Chapters 3 & 4)

Neurons, Neural Networks: The Brain and the Neuron, Neural Networks, The Perceptron, Training a Perceptron, Learning Boolean Functions, Linear Separability, **Multilayer Perceptron** : The Multi-layer Perceptron Algorithm, Initialising the Weights , Different Output Activation Functions, Backpropogation Algorithm, Sequential and Batch Training, local minima, picking up momentum, minibatches and stochastic gradient descent, other improvements

COURSE CONTENTS…

UNIT -III (T2-Chapter-3,8 ;T1-Chapters 6,7)

Bayesian Learning : Introduction , Classification, Losses and Risks, Discriminant Functions, Utility Theory, Association Rules, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks. **Nearest Neighbor Methods**: K-nearest Neighbor Learning, Distance – Weighted Nearest Neighbor Algorithm , Examples

Unit –IV (T2-Chapter-9,13;T1-Chapters 8,12)

- **Decision Trees :** Learning with Trees, Using Decision Trees, Univariate Trees, Classification Trees, Regression Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data, Multivariate Trees, ID3, Examples **Support Vector Machines** : Optimal Seperation, Kernels, SVM Algorithm, Multiclass Classification, SVM Regression

COURSE CONTENTS

Unit -V (T2-Chapter 7;T1- Chapters 14)

Unsupervised Learning-Clustering : Introduction, Mixture Densities, *K*-means Clustering, Expectation-Maximization Algorithm, Mixtures of Latent Variable Models, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters

COURSE OUTCOMES

CO1: Interpret ML, types and preliminary concepts related to ML

CO2: Describe the working of perceptron and MLP, utilize them to solve problems

CO3: Illustrate the working of Bayesian learning and Nearest Neighbour learning

CO4: Learn to construct and use Decision Trees and Support Vector Machines

CO5: Identify the need of Unsupervised learning and illustrate Partitioning methods and Hierarchical methods of Clustering.

BOOKS

TEXTBOOKS :

1. STEPHAN MARSLAND, **MACHINE LEARNING, AN ALGORITHMIC PERSPECTIVE,** CRC PRESS SECOND EDITION, 2015.

2. ETHEM ALPAYDIN, **INTRODUCTION TO MACHINE LEARNING,** 2ND ED., PHI LEARNING PVT. LTD., 2013.

REFERENCE BOOKS:

1. TOM M. MITCHELL, **MACHINE LEARNING,** MCGRAW-HILL EDUCATION (INDIAN EDITION), 2013

2. T. HASTIE, R. TIBSHIRANI, J. H. FRIEDMAN, **THE ELEMENTS OF STATISTICAL LEARNING,** SPRINGER; 1ST EDITION, 2001.

COURSE ASSESSMENT PORTFOLIO

Type of Assessment	WEIGHT (Marks)	ASSESSMENT DATES
Continuous Internal Assessment(CIA)	50%(50)	
Mid-Semester Exam(MSE) 1	15	Nov 15-17, 2021(Mon-Wed)
MSE 2	15	Dec 22-24, 2021 (Wed-Fri)
MSE 3	15	Jan 24-27, 2022 (Mon,Tue, Thurs)
Best of two MSEs	**30**	
Laboratory Based Exercises	**20**	Dec 8-10,2021(Wed-Fri)
		Jan 17-19,2022 (Mon-Wed)
Semester End Examination (SEE)	**50%** (100)	Feb 15,2022 onwards

WEB RESOURCES

- https://cognitiveclass.ai/ - Data Science and Cognitive Computing Courses
- https://www.kdnuggets.com/ - Site on AI, Analytics, Big Data, Data Mining, Data Science, and ML
  https://www.kaggle.com/ - ML & DS community
- http://archive.ics.uci.edu/ml/index.php - ML Repository
- https://homepages.ecs.vuw.ac.nz/~marslast/MLbook.html - Stephen Marsland homepage
- https://www.cs.waikato.ac.nz/ml/weka/courses.html – Waikato University - Weka MOOC
- https://nptel.ac.in/courses/106/106/106106202/ - NPTEL - Machine Learning
- Rohit singh, tommi jaakkola, and ali mohammad. *6.867 Machine learning*. Fall 2006. Massachusetts institute of technology: MIT opencourseware, https://ocw.mit.edu.
- Leslie kaelbling, tomás lozano-pérez, isaac chuang, and duane boning. *6.036 introduction to machine learning*. Fall 2020. Massachusetts institute of technology: MIT opencourseware, https://ocw.mit.edu.