



Guru Nanak Dev Engineering College, Bidar

Course Planning

Artificial Intelligence & Machine Learning(18CS71)

Credit: 4

Hours: 50

CONTENTS

Course Objectives: To

1. Explain key aspects of AI and ML
2. Apply suitable AI method to solve problem.
3. Analyze the given problem and apply suitable ML method to solve problem
4. Design solution employing ANN and Bays learning
5. Describe instance based and reinforcement learning

Pre-requisites:

students needs basic understanding of statics, probability theory, logical reasoning, programming in Python

Linkages with other Courses:

1. Data structures
2. Complex analysis, probability and statistical methods
3. Application development using python

Course Policies and Procedures:

(Expectations from students, Rules for Student Assignments, Assignment Grading System, CIE and Semester End Examinations.)

Expectations from student:

1. Students should have the knowledge of pre-requisite
2. Students should complete all assignments in a time bound manner

Rules for assignments: At the end of every module, assignments in the form of question answers/Quiz will be given and students have submit the same before last date

Assignment Grading System

Assignment 1: Each assignment will be evaluated for 5 marks and final score for assignment will be the average marks scored in all the assignments.(Similarly other assignments like seminar, model making has to be evaluated using suitable rubrics)

Assignment 2: Group Activity

Students group comprising of 5 students shall present a case study depicting the application of AI & ML in present context. They have to prepare a report and PPT to present case study.

The cases study will be evaluated for 5 marks.

CIE and Semester End Examinations: As per the VTU regulations.

Evaluation Policy

Level of Question	Approximate % of Question
Understanding	10
Apply	20
Analyze / Solve	30
Design	40

Lesson Plan

Module wise distribution of Classes	Topics	Class Number	Teaching Methodology
	Overview of course, Course Outcome its linkages with other courses and practical applications, expectations from students, Evaluation Policy etc.	1	Interactive Discussion
10	Module 1: Introduction to AI What is artificial intelligence?	2	Pen / Board
	AI Problems and assumptions	3	Pen / Board
	AI level of modeling	4	NPTEL Video
	Defining problem as state space search	5	Pen / Board
	Search space search algorithm	6	Pen / Board
	Production system and characteristics	7	PPT
	Generate and test, Hill climbing	8	Pen and board
	Best first search , problem reduction	9	PPT
	Constraint satisfaction and mean end analysis	10	Video based
		11	Revision / Quiz
10	Module 2: Knowledge representation and concept learning Knowledge representation issues and approaches	12	Pen / Board
	Representing facts as logic, ISA relationship	13	NPTEL Video
	Computable functions and predicates, resolution and deduction	14	Pen / Board
	Procedure and declarative knowledge	15	PPT
	Logic programming and reasoning	16	PPT
	Concept learning task, Concept learning as search	17	Pen / Board
	Find-S algorithm	18	Pen / Board
	Candidate Elimination Algorithm	19	Flip class
	Inductive bias of Candidate Elimination Algorithm	20	Pen / Board
Examples on concept learning	21	Pen / board	

		22	Revision / Quiz
	Module 3: Decision Tree Learning and ANN Introduction to Decision Tree Learning	23	Pen / Board
	Decision tree representation	24	Pen / Board
	appropriate problems	25	Pen / Board
10	ID3 algorithm	26	PPT
	Examples on training set	27	Excel based demo
	Introduction to ANN	28	PPT
	ANN representation	29	PPT
	Perceptron learning	30	VLab demo
	Back propagation algorithm	31	Video based
	Solution live demo using Python	32	Live class demo
		33	Revision / Quiz
10	Module 4: Bayesian Learning Introduction and Bays theorem	34	Pen / Board
	Bayes theorem and concept learning	35	Pen / Board
	ML and LS error hypothesis	36	NPTEL
	ML for predicting	37	Pen / Board
	MDL principle	38	PPT
	Bays optimal classifier	39	PPT
	Gibbs algorithm	40	Flip class
	Navie Bayes classifier,	41	PPT
	BBN	42	Pen / Board
	EM Algorithm	43	Pen / Board
		44	Revision / Quiz
10	Module 5: Instance based and re-enforcement learning Introduction to instance based learning	45	Pen / Board
	k-Nearest Neighbor Learning	46	Pen / Board

	Locally weighted regression	47	Python based demo
	Radial basis function	48	PPT
	Case-Based reasoning	49	PPT
	Introduction to Reinforcement Learning	50	Pen / Board
	The learning task	51	NPTEL Video
	Q-Learning	52	Pen / Board
	Q-leaning algorithm	53	Pen / Board
		54	Revision / Quiz

Course Teaching Materials:

Module No.	Course Teaching Materials	Links
1	Notes	drpahagargi@blogspot.com
	PPT	drpahagargi@blogspot.com
	Videos	https://advanceddynamiccomputingsystem.blogspot.com/
2	Notes	drpahagargi@blogspot.com
	PPT	drpahagargi@blogspot.com
	Videos	https://advanceddynamiccomputingsystem.blogspot.com/
3	Notes	drpahagargi@blogspot.com
	PPT	drpahagargi@blogspot.com
	Videos	https://advanceddynamiccomputingsystem.blogspot.com/
	Demonstration using tool	http://googlecolab
4	Notes	drpahagargi@blogspot.com
	PPT	drpahagargi@blogspot.com
	Videos	https://advanceddynamiccomputingsystem.blogspot.com/
	Demonstration using tool	http://googlecolab
5	Notes	https://advanceddynamiccomputingsystem.blogspot.com/

	PPT	drpahagargi@blogspot.com
	Videos	drpahagargi@blogspot.com

Virtual Laboratory:

Machine Learning Virtual Laboratory - [IIT Bombay](#)

Google Co-Lab

Question Bank:

Text Books:

1. Elaine Rich, Kevin K and S B Nair, "Artificial Inteligence", 3rd Edition, McGraw Hill Education, 2017
2. Tom M Mitchell, "Machine Larning", 1 st Edition, McGraw Hill Education, 2017

Reference Books:

1. Saroj Kaushik, Artificial Intelligence, Cengage learning
2. Stuart Rusell, Peter Norving , Artificial Intelligence: A Modern Approach, Pearson Education 2nd Edition
3. AurÈlienGÈron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, Shroff/O'Reilly Media, 2017.
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.
5. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press
6. Srinivasa K G and Shreedhar, " Artificial Intelligence and Machine Learning", Cengage

Journals:

International Journal of Machine Learning and Cybernetics Springer

Machine Learning with Applications - Journal - Elsevier

Web Resources:

Blogs:

NPTEL/MOOCs:

1. Machine Learning Edx course
2. Introduction to AI NPTEL course
3. Introduction to Machine learning NPTEL course

Software:

Matlab

Scilab

Python (Pandas, Scikit learn, Seaborn)

Research Organizations / Industries in the field:

Amazon, IBM, Google, IISc Bangalore

Course Outcomes:

- CO1:** Describe important concepts of AI and select suitable search technique to solve problem?
- CO2:** Design predicate logic by representing facts and apply concept learning method to determine an appropriate hypothesis
- CO3:** Design suitable decision tree and artificial neural network to solve the given problem
- CO4:** Analyze the given data to determine the solution to given problem by applying Bays method.
- CO5:** Apply instance based learning and Reinforcement learning

CO-PO Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										1		1
CO2	2	3	2									1		1
CO3	2	2	3									1		2
CO4	2	3										1		1
CO5	3	1										1		1
Avg.	2.4	2.2	2.5									1		1.2