COURSE DESIGN, DELIVERY AND ASSESMENT

Course Code and Title: AIL57 Machine Learning Laboratory	**Course Credits: 0:0:1**
CIE: 50 Marks	SEE: 50 Marks
Total No of Theory / Tutorial / Lab Hours/Self-Study: 0:0:14	
Prepared by: Dr. Manasa S M	Date: 23/09/24
Reviewed by: Dr. Meeradevi AK	Date: 23/09/24

Prerequisites: mathematical formulas

SYLLABUS

Course Content

1. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Find-S algorithm to output a description of the set of all hypotheses consistent with the training examples.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naive Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Python ML library classes/API.
7. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Python ML library classes/API in the program.
8. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
9. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs
10. Implement and demonstrate the working of SVM algorithm for classification.

Suggested Learning Resources

Text Books:

1. Tom M Mitchell, “Machine Lerning”,1st Edition, McGraw Hill Education, 2017.

2. Nello Cristianini, John Shawe-Taylor, An Introduction to Support Vector Machines and Other Kernel-based Learning Methods, Cambridge University Press, 2013.
3. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf)

Course Contents and Laboratory Schedule for Lab

Lesson No/ Session No	Topics	No. of hours
1	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Find-S algorithm to output a description of the set of all hypotheses consistent with the training examples.	2 hrs
2	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples	2 hrs
3	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.	2 hrs
4	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.	2 hrs
5	Write a program to implement the naive Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.	2 hrs
6	Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Python ML library classes/API.	2 hrs
7	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Python ML library classes/API in the program.	2 hrs
8	Lab Test 1	
9	Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.	2 hrs
10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs	2 hrs
11	Implement and demonstrate the working of SVM algorithm for classification	2 hrs

Lesson No/ Session No	Topics	No. of hours
12	Write a program to Demonstrate RANDOM FOREST using the dataset California housing price prediction	
13	Write a program to Demonstrate the working of the KNN. Use an IRIS data set	
14	Lab Test 2	

Course Outcomes:

At the end of the course the student will be able to:

CO 1. Describe the working principles of Find-S and Candidate Elimination algorithms. (PO-1,2,3,5 PSO-1,2,3)

CO 2. Demonstrate the working of various Classification algorithms with respect to training and test data sets. (PO-1,2,3,5 PSO-1,2,3)

CO 3. Illustrate and analyze the principles of Supervised and unsupervised machine learning. (PO-1,2,3,5 PSO-1,2,3)

Mapping Course Outcomes with Programme Outcomes:

Course Outcomes	Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3		2								1	2	2
CO2	2	3	3		2								1	2	2
CO3	2	3	3		2								1	2	2

Course Assessment and Evaluation:

	What		To Whom	When/ Where (Frequency in the course)	Max Marks	Evidence Collected	Contribution to Course Outcomes
Direct Assessment Methods	CIE	Lab Test	Students	Once	20	Data Sheets	1,2 3
				Continuous Evaluation	30	Record	1,2,3
	SEE	Lab Examination		End of Course (Executing 2 Programs)	50	Answer scripts	1,2,3
	End of Course Survey			End of the course	-	Questionnaire	1,2,3 Effectiveness of Delivery of instructions & Assessment Methods

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

CIE and SEE evaluation:

S.No	Bloom's Category	Test1	Test 2	Continuous Evaluation	Semester-End Examination
1	Remember	0	0	5	0
2	Understand	2	2	5	10
3	Apply	5	5	15	20
4	Analyze	0	0	0	0
5	Evaluate	0	0	0	0
6	Create	3	3	5	20

Evaluation of Lab for 50 marks:

Evaluation of CIE		**Evaluation of Lab test**	
Each lab session (12 lab sessions)	30 marks	Lab Test	20 marks
Total (Average of marks evaluated for each lab session)	30*12/12		
Total	**30 marks**	**Total**	**20 marks**
Total		**50 marks**	

Lab test Dates:

Review	**Dates**	**Marks**
Continuous Evaluation	Weekly	30
Lab Test	During 7th Week and 13th Week (Average of 2)	20