Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY,BANGALORE

LABORATORY PLAN

Academic Year 2019-20

Program:	B E – Computer Science & Engineering
Semester :	7
Course Code:	15CSL76
Course Title:	Machine Learning Laboratory
Credit / L-T-P:	2 / 0-0-3
Total Contact Hours:	40
Course Plan Author:	Nagarathna C

Academic Evaluation and Monitoring Cell

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INSTRUCTIONS TO TEACHERS

- Classroom / Lab activity shall be started after taking attendance.
- Attendance shall only be signed in the classroom by students.
- Three hours attendance should be given to each Lab.
- Use only Blue or Black Pen to fill the attendance.
- Attendance shall be updated on-line & status discussed in DUGC.
- No attendance should be added to late comers.
- Modification of any attendance, over writings, etc is strictly prohibited.
- Updated register is to be brought to every academic review meeting as per the COE.

Table of Contents

Note : Remove “Table of Content” before including in CP Book
Each Laboratory Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. LABORATORY INFORMATION

1. Laboratory Overview

Degree:	B.E	*Program:*	CS
Year / Semester :	4 / 7	*Academic Year:*	2019-20
Course Title:	Machine Learning Lab	*Course Code:*	15CSL76
Credit / L-T-P:	2 / 0-0-3	*SEE Duration:*	180 Minutes
Total Contact Hours:	40 Hrs	*SEE Marks:*	60 Marks
CIA Marks:	20	*Assignment*	-
Lab. Plan Author:	Mr. Nagarathna C	*Sign*	Dt :
Checked By:	Mr.	*Sign*	Dt :

2. Laboratory Content

Expt.	Title of the Experiments	Lab Hours	Concept	Blooms Level
1	Implement and demonstratethe FIND-Salgorithm	4	Classification of Machine Language.	L4
2	Implement and demonstrate the Candidate-Elimination algorithm	4	Category Learning.	L4
3	demonstrate the working of the decision tree based ID3 algorithm	4	Statistics on Objects	L4
4	Implementing the Backpropagation algorithm	4	Predictive Modeling	L4
5	Implement the naïve Bayesian classifier	4	Weightage of Neural Network	L4
6	the naïve Bayesian Classifier model	4	Errors on Objects	L4
7	construct a Bayesian network	4	Predicting of objects.	L4
8	EM algorithm and *k*-Means algorithm	4	Estimating accuracy on Hypothesis.	L4
9	Implement *k*-Nearest Neighbour algorithm	4	Used to find the Dependencies	L4
10	Implement the non-parametric Locally Weighted Regression algorithm	4	Used to find the Dependencies	L4

3. Laboratory Material

Books & other material as recommended by university (A, B) and additional resources used by Laboratory teacher (C).

Expt.	Details	Expt. in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1.	Tom M. Mitchell, Machine Learning**,** India Edition 2013, McGraw Hill Education.		
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1. 2.	Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.	Not Availabl e	In Lib
			Not Available
3	Others (Web, Video, Simulation, Notes etc.)		
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
D	**Software Tools for Design**	**-**	**-**
E	**Recent Developments for Research**	**-**	**-**
		?	In lib
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1	How Electron / Vacuum Tubes work ? https://www.youtube.com/watch?v=nA_tglygvNo		
?			

4. Laboratory Prerequisites:

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Expt.	Lab. Code	Lab. Name	Topic / Description	Sem	Remarks	Blooms Level
1	15CS73	Machine Learning	ML concepts and algorithms.	7		Understand L2
2						
3						
5						
-						
-						

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Expt.	Topic / Description	Area	Remarks	Blooms Level
3				

3				
5				
-				

B. Laboratory Instructions

1. General Instructions

SNo	Instructions	Remarks
1	Observation book and Lab record are compulsory.	
2	Students should report to the concerned lab as per the time table.	
3	After completion of the program, certification of the concerned staff in-charge in the observation book is necessary.	
4	Student should bring a notebook of 100 pages and should enter the readings /observations into the notebook while performing the experiment.	
5	The record of observations along with the detailed experimental procedure of the experiment in the Immediate last session should be submitted and certified staff member in-charge.	
6	Should attempt all problems / assignments given in the list session wise.	
7	It is responsibility to create a separate directory to store all the programs, so that nobody else can read or copy.	
8	When the experiment is completed, should disconnect the setup made by them, and should return all the components/instruments taken for the purpose.	
9	Any damage of the equipment or burn-out components will be viewed seriously either by putting penalty or by dismissing the total group of students from the lab for the semester/year	
10	Completed lab assignments should be submitted in the form of a Lab Record in which you have to write the algorithm, program code along with comments and output for various inputs given	

2. Laboratory Specific Instructions

SNo	Specific Instructions	Remarks
1	Start computer	
2	Open the text editor	
3	Select new file.	
4	Write the program	
5	Save the program with .c extension.	
6	Compile the program F9	
7	Execute the program F10	

C. OBE PARAMETERS

1. Laboratory Outcomes

Expt.	Lab Code #	COs / Experiment Outcome	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
-	-	**At the end of the experiment, the student should be able to . . .**	-	-	-	-	-
1	15CSl76.1	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis.	4	Classification of Machine Language.	Demonstrate	Assignment	L4
2	15CSl76.2	implement and demonstrate the Candidate-Elimination algorithm.	4	Category Learning.	Demonstrate	Assignment	L4

3	15CSl76.3	demonstrate the working of the decision tree based ID3 algorithm.	4	Statistics on Objects	Demonstrate	Assignment and Slip Test	L4
4	15CSl76.4	Build an Artificial Neural Network by implementing the Back-propagation algorithm	4	Predictive Modeling			L4
5	15CSl76.5	implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file.	4	Weightage of Neural Network			L4
6	15CSl76.6	use the naïve Bayesian Classifier model	4	Errors on Objects	Tutorial	Assignment	L4
7	15CSl76.7	construct aBayesian network considering medical data	4	Predicting of objects.	Demonstrate	Assignment	L4
8	15CSl76.8	Apply EM algorithm to cluster a set of data stored in a .CSV file	4	Estimating accuracy on Hypothesis.	Demonstrate	Assignment	L4
9	15CSl76.9	implement*k*-Nearest Neighbour algorithm	4	Used to find the Dependencies	Demonstrate	Assignment	L4
	15CSl76.10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.	4	Used to find the Dependencies	Demonstrate		L4
-		**Total**	**40**	**-**	**-**	**-**	**-**

Note: Identify a max of 2 Concepts per unit. Write 1 CO per concept.

2. Laboratory Applications

Expt.	Application Area	CO	Level
1	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis.	CO1	L4
2	implement and demonstrate the Candidate-Elimination algorithm.	CO2	L4
3	demonstrate the working of the decision tree based ID3 algorithm.	CO3	L4
4	Build an Artificial Neural Network by implementing the Back-propagation algorithm	CO4	L4
5	implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file.	CO5	L4
6	use the naïve Bayesian Classifier model	CO6	L4
7	construct aBayesian network considering medical data	CO7	L4
8	Apply EM algorithm to cluster a set of data stored in a .CSV file	CO8	L4
9	implement*k*-Nearest Neighbour algorithm	CO9	L4
10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.	CO10	L4

Note: Write 1 or 2 applications per CO.

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.
To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Expt.	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	**CO**	**PO**	**-**	**'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'**	**-**
1	CO1	PO1	L4	Knowledge of classification problems is required to implement programs	L2
	CO1	PO2	L4	Analyze programs in windows/unix operating system using compile time & run time limits	L3
	CO1	PO3	L4	Design new program using the knowledge of compile time & run time	L6

				limits	
	CO1	PO12	L4	Learning in the context of technology changes in different editors	
	CO2	PO1	L4	Knowledge of concept learnig is required to implement different data set.	
	CO2	PO12	L4	Learning in the context of technology changes in different editors	
	CO3	PO1	L4	The knowledge of data set types are used to solve complex engineering problems.	
	CO3	PO12	L4	Life long learning is required to explore new python tools	
	CO4	PO1	L4	The knowledge of data set are used to solve complex engineering problems.	
	CO4	PO2	L4	Analyze programs written using different data set.	
	CO4	PO3	L4	Design new programs using the knowledge of data set.	
	CO4	PO12	L4	Life long learning is required to explore new python tools	
	CO5	PO1	L4	knowledge of bayes classifier is applied to solve complex engineering problems.	
	CO5	PO2	L4	Analyze programs written for multiuser operating system	
	CO5	PO3	L4	Design different programs using the knowledge of data set.	
	CO5	PO4	L4	Investigate & interpretation of new programs can be done using different learning mechanism.	
	CO5	PO12	L4	Learning in the context of technology changes in different editors.	
	CO6	PO1	L4	Knowledge of naive bayes classifier is required to implement the model.	
	CO6	PO2	L4	Analyze the accuracy, precision.	
	CO6	PO3	L4	Design programs which shows the accuracy, precision.	
	CO6	PO4	L4	Investigate different programs written	
	CO6	PO12	L4	Learning in the context of technology changes in different editors.	
	CO7	PO1	L4	Knowledge of bayesian network.	
	CO7	PO2	L4	In order to identify, formulate and analyse engineering problems students make use of medical data.	
	CO7	PO3	L4	Design programs to Bayesian network.	
	CO7	PO12	L4	Learning in the context of technology changes in different editors.	
	CO8	PO1	L4	The knowledge of the cluster to demonstrate em algorithm are analyzed are examined to solve complex engineering problems	
	CO8	PO2	L4	Analyze different set of data stored in a .CSV file	
	CO8	PO3	L4	Design different programs using classification examples.	
	CO8	PO12	L4	Learning in the context of technology changes in different editors	
	CO9	PO1	L4	Knowledge of k nearest required to implement regression problems.	
	CO9	PO2	L4	Design programs using different regression examples.	
	CO9	PO3	L4	In order to design solutions for complex engineering problems and design system components or processes for open ended engineering problems considering health and safety risks students can make use of data set.	
	CO9	PO4	L4	Investigation of the iris data set. Print both correct and wrong predictions. The knowledge of classify methods are used to provide valid conclusions.	
	CO9	PO12	L4	Learning in the context of technology changes in different editors.	
	CO10	PO1	L4	Knowledge of non-parametric Locally Weighted Regression is required to implement Regression algorithm in order to fit data points	
	CO10	PO2	L4	Analyze regression algorithm in order to fit data points	
	CO10	PO3	L4	Design Locally Weighted Regression algorithm.	
	CO10	PO12	L4	Learning in the context of technology changes in different editors.	

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Experiment Outcomes	Program Outcomes														-
Expt.	CO.#	**At the end of the experiment student should be able to . . .**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	Level
1	15CSl76.1	Implement and demonstrate the FIND-S algorithm for finding the	3	3	3	-	-	-	-	-	-	-	-	1	L4			L2

		most specific hypothesis.																
2	15CSl76.2	implement and demonstrate the Candidate-Elimination algorithm.	3	3	3	-	-	-	-	-	-	-	1	L4			L2
3	15CSl76.3	demonstrate the working of the decision tree based ID3 algorithm.	3	3		-	-	-	-	-	-	-		L4			L2
4	15CSl76.4	Build an Artificial Neural Network by implementing the Back-propagation algorithm	3		3	-	-	-	-	-	-	-	1	L4			L3
5	15CSl76.5	implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file.	3	3	3	-	-	-	-	-	-	-	1	L4			L2
6	15CSl76.6	use the naïve Bayesian Classifier model	3	3		-	-	-	-	-	-	1	1	L4			L2
7	15CSl76.7	construct aBayesian network considering medical data	3	2		-	-	-	-	-	-	-	-	L4			L3
8	15CSl76.8	Apply EM algorithm to cluster a set of data stored in a .CSV file	3	2	3	-	-	-	-	-	-	-	1	L4			L2
9	15CSl76.9	implement*k*-Nearest Neighbour algorithm	3	3	3	-	-	-	-	-	-	-	1	L4			L2
10	15CSl76.10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.	3	3	3	-	-	-	-	-	-	-	1	L4			L3
-																		-
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*																

5. Curricular Gap and Experiments

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Expt	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

Note: Write Gap topics from A.4 and add others also.

6. Experiments Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Expt	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					
6					
7					
8					
9					

10					
11					
12					
13					
14					
15					

D. COURSE ASSESSMENT

1. Laboratory Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Unit	Title	Teaching Hours	No. of question in Exam							CO	Levels
			CIA-1	CIA-2	CIA-3	Asg-1	Asg-2	Asg-3	SEE		
1	FIND-S algorithm	03	1	-	-	-	-	-	1	CO1	L4
2	Candidate-Elimination algorithm.	03	1	-	-	-	-	-	1	CO2	L4
3	Decision tree based ID3 algorithm.	03	1	-	-	-	-	-	1	CO3	L4
4	Back-propagation algorithm	03	1	-	-	-	-	-	1	CO4	L4
5	naïve Bayesian classifier f	03	1	-	-	-	-	-	1	CO5	L4
6	the naïve Bayesian Classifier model	03	1	-	-	-	-	-	1	CO6	L4
7	Bayesian network	03	1	-	-	-	-	-	1	CO7	L4
8	EM algorithm	03	-	1	-	-	-	-	1	CO8	L4
9	*k*-Nearest Neighbour algorithm	03	-	1	-	-	-	-	1	CO9	L4
10	LocallyWeightedRegression algorithm	03	-	1	-	-	-	-	1	CO10	L4
-	**Total**	**30**	**7**	**8**	**5**	**5**	**5**	**5**	**20**	**-**	**-**

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Evaluation	Weightage in Marks	CO	Levels
CIA Exam – 1	20	CO1, CO2, CO3, CO4	L23, L3
CIA Exam – 2	20	CO5, CO6, CO7,	L1, L2, L3 . .
CIA Exam – 3	20	CO8, CO9	L1, L2, L3 . .
Assignment - 1	05	CO1, CO2, CO3, CO4	L2, L3, L4 ...
Assignment - 2	05	CO5, CO6, CO7, CO8, CO9	L1, L2, L3 ...
Assignment - 3	05	CO8, CO9	L1, L2, L3 ...
Seminar - 1	05	CO1, CO2, CO3, CO4	L2, L3, L4 . ..
Seminar - 2	05	CO5, CO6,CO7,CO8, CO9	L2, L3, L4 . ..
Seminar - 3	05	CO8, CO9	L2, L3, L4 . ..
Other Activities			
Final CIA Marks	**20**		

-

SNo	Description	Marks
1	Observation and Weekly Laboratory Activities	04 Marks
2	Record Writing	08 Marks for each Expt
3	Internal Exam Assessment	08 Marks
4	Internal Assessment	20 Marks
5	SEE	80 Marks
-	**Total**	**100 Marks**

E. EXPERIMENTS
D. EXPERIMENTS

Experiment 01 : FIND-S algorithm

-	**Experiment No.:**	1	**Marks**	8	**Date Planned**	14/8/18	**Date Conducted**	14/8/18
1	Title	FIND-S algorithm						
2	Course Outcomes	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis.						
3	Aim	Exercise on FIND-S algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Read the training data from a .CSV file,Classification of Machine Language.						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	• step 1: start • step 2: write programming • step 3: save the program • step 4: compile • step 5:if error then correct the errors • step 6:run • step 7:stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	• - • - • -						
8	Observation Table, Look-up Table, Output	• well come to python - anaconda • this is the first program in ml lab						
9	Sample Calculations	• - • - • -						
10	Graphs, Outputs	• - • -						
11	Results & Analysis	• Maximally Specific set **[['Sunny', 'Warm', '?', 'Strong', '?', '?']]**						
12	Application Areas							
13	Remarks							
14	Faculty Signature with Date							

Experiment 02 : Candidate-Elimination algorithm.

-	**Experiment No.:**	2	**Marks**	8	**Date Planned**	18/8/18	**Date Conducted**	18/8/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Category Learning						
6	Procedure, Program, Activity, Algorithm, Pseudo	Step 1: start Step 2: read Step 3: initialize						

	Code	Step 4: perform the operation Step 5: print the result step 6: stop
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	[('sunny', 'warm', 'normal', 'strong', 'warm', 'same')] [('sunny', 'warm', 'normal', 'strong', 'warm', 'same')] [('sunny', 'warm', '?', 'strong', 'warm', 'same')] [('?', '?', '?', '?', '?', '?', '?')][('sunny', '?', '?', '?', '?', '?'), ('?', 'warm', '?', '?', '?', '?'), ('?', '?', '?', '?', '?', 'same')] [('sunny', 'warm', '?', 'strong', 'warm', 'same')] [('sunny', 'warm', '?', 'strong', '?', '?')] [('sunny', 'warm', '?', 'strong', '?', '?')][('sunny', '?', '?', '?', '?', '?'), ('?', 'warm', '?', '?', '?', '?')]
12	Application Areas	
13	Remarks	
14	Faculty Signature with Date	

Experiment 03 : Decision tree based **ID3 algorithm**

-	**Experiment No.:**	3	**Marks**	8	**Date Planned**	21/8/18	**Date Conducted**	21/8/18
1	Title	decision tree based ID3 algorithm						
2	Course Outcomes	Implement and demonstrate the decision tree based ID3 algorithm.						
3	Aim	Exercise on decision tree based ID3 algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Statistics on Objects						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output							
9	Sample Calculations							
10	Graphs, Outputs							
11	Results & Analysis	outlook overcast b'yes' rain wind b'strong' b'no'						

		b'weak' b'yes' sunny humidity b'high' b'no' b'normal' b'yes
12	Application Areas	
13	Remarks	
14	Faculty Signature with Date	

Experiment 04 : the **Backpropagation algorithm**

-	**Experiment No.:**	4	**Marks**	8	**Date Planned**	28/8/18	**Date Conducted**	28/8/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Predictive Modeling						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output							
9	Sample Calculations							
10	Graphs, Outputs							
11	Results & Analysis	Input: [[0.66666667 1.] [0.33333333 0.55555556] [1. 0.66666667]] Actual Output: [[0.92] [0.86] [0.89]] Predicted Output: [[0.89559591] [0.88142069] [0.8928407]]						
12	Application Areas							
13	Remarks							
14	Faculty Signature with Date							

Experiment 5 : the **naïve Bayesian classifier**

-	**Experiment No.:**	5	**Marks**	8	**Date Planned**	9/10/18	**Date Conducted**	9/10/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Weightage of Neural Network						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output							
9	Sample Calculations							
10	Graphs, Outputs							
11	Results & Analysis	confusion matrix is as follows [[17 0 0] [0 17 0] [0 0 11]] Accuracy metrics precision recall f1-score support 0 1.00 1.00 1.00 17 1 1.00 1.00 1.00 17 2 1.00 1.00 1.00 11 avg / total 1.00 1.00 1.00 45						
12	Application Areas							
13	Remarks							
14	Faculty Signature with Date							

Experiment 6 : the **naïve Bayesian Classifier** model

-	**Experiment No.:**	6	**Marks**	8	**Date Planned**	23/10/18	**Date Conducted**	23/10/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Errors on Objects						
6	Procedure,	Step 1: start						

	Program, Activity, Algorithm, Pseudo Code	Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	Accuracy metrics Accuracy of the classifer is 0.8 Confusion matrix [[2 1] [0 2]] Recall and Precison 1.0 0.666666666667
12	Application Areas	
13	Remarks	
14	Faculty Signature with Date	

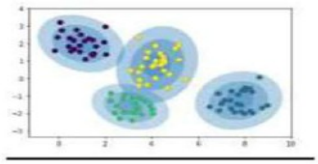
Experiment 7 : **Bayesian network**

-	**Experiment No.:**	7	**Marks**	8	**Date Planned**	30/10/18	**Date Conducted**	30/10/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Predicting of objects						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output							
9	Sample Calculations							
10	Graphs, Outputs							
11	Results & Analysis	**Learing CPDs using Maximum Likelihood Estimators...**						

		Inferencing with Bayesian Network: 1.Probability of HeartDisease given Age=20 **heartdisease | phi(heartdisease)** **heartdisease_0 | 0.6791** **heartdisease_1 | 0.1212** **heartdisease_2 | 0.0810** **heartdisease_3 | 0.0939** **heartdisease_4 | 0.0247** **2. Probability of HeartDisease given chol (Cholestoral) =100** **heartdisease | phi(heartdisease)** **heartdisease_0 | 0.5400** **heartdisease_1 | 0.1533** **heartdisease_2 | 0.1303** **heartdisease_3 | 0.1259** **heartdisease_4 | 0.0506**
12	Application Areas	
13	Remarks	
14	Faculty Signature with Date	

Experiment 8 : **EM algorithm**

-	**Experiment No.:**	8	**Marks**	8	**Date Planned**	13/11/18	**Date Conducted**	13/11/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Estimating accuracy on Hypothesis.						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop						

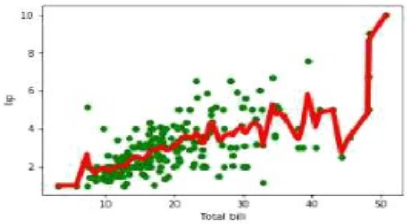
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	**[[1 ,0, 0, 0]** **[0 ,0, 1, 0]** **[1 ,0, 0, 0]** **[1 ,0, 0, 0]** **[1 ,0, 0, 0]]** 
12	Application Areas	
13	Remarks	
14	Faculty Signature with Date	

Experiment 9 : *k*-Nearest Neighbour algorithm

-	**Experiment No.:**	9	**Marks**	8	**Date Planned**	20/11/18	**Date Conducted**	20/11/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Used to find the Dependencies						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output							
9	Sample Calculations							
10	Graphs, Outputs							
11	Results & Analysis							
12	Application Areas	**Confusion matrix is as follows** **[[11 0 0]** **[0 9 1]** **[0 1 8]]**						

		Accuracy metrics **0 1.00 1.00 1.00 11** **1 0.90 0.90 0.90 10** **2 0.89 0.89 0,89 9** **Avg/Total 0.93 0.93 0.93 30**
13	Remarks	
14	Faculty Signature with Date	

Experiment 10 : **Locally Weighted Regressionalgorithm**

-	**Experiment No.:**	10	**Marks**	8	**Date Planned**	20/11/18	**Date Conducted**	20/11/18
1	Title	Candidate-Elimination algorithm						
2	Course Outcomes	Implement and demonstrate the Candidate-Elimination algorithm.						
3	Aim	Exercise on Candidate-Elimination algorithm						
4	Material / Equipment Required	Lab Manual						
5	Theory, Formula, Principle, Concept	Used to find the Dependencies						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read Step 3: initialize Step 4: perform the operation Step 5: print the result step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output							
9	Sample Calculations							
10	Graphs, Outputs							
11	Results & Analysis							
12	Application Areas							
13	Remarks							
14	Faculty Signature with Date							

F. Content to Experiment Outcomes

1. TLPA Parameters

Table 1: TLPA – Example Course

Expt-#	Course Content or Syllabus (Split module content into 2 parts which have similar concepts)	Content Teaching Hours	Blooms' Learning Levels for Content	Final Blooms' Level	Identified Action Verbs for Learning	Instruction Methods for Learning	Assessment Methods to Measure Learning
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
1	Implement and demonstratethe FIND-Salgorithm	4	- L2 - L3 - L4	L4	- -	- Lecture - -	- Slip Test - -
2	Implement and demonstrate the Candidate-Elimination algorithm	4	- L2 - L3 - L4	L4	- -	- Lecture - Tutorial -	- Assignment - -
3	demonstrate the working of the decision tree based ID3 algorithm	4	- L2 - L3 - L4	L4	- -	- Lecture -	- Assignment -
4	Implementing the Backpropagation algorithm	4	- L2 - L3 - L4	L4	- -	- Lecture -	- Slip Test -
5	Implement the naïve Bayesian classifier	4	- L2 - L3 - L4	L4	- -	- Lecture -	- Slip Test -
6	the naïve Bayesian Classifier model	4	- L2 - L3 - L4	L4	- -	- Lecture - Tutorial -	- Assignment - -
7	construct a Bayesian network	4	- L2 - L3 - L4	L4	- -	- Lecture - Tutorial -	- Assignment - -
8	EM algorithm and *k*-Means algorithm	4	- L2 - L3 - L4	L4	- -	- Lecture - Tutorial -	- Assignment - -
9	Implement *k*-Nearest Neighbour algorithm	4	- L2 - L3 - L4	L4	- -	- Lecture - -	- Assignment - -
10	Implement the non-parametric Locally Weighted Regression algorithm	4	- L2 - L3 - L4	L4	- -	- Lecture - -	- Assignment - -

2. Concepts and Outcomes:

Table 1: Concept to Outcome – Example Course

Expt - #	Learning or Outcome from study of the Content or Syllabus	Identified Concepts from Content	Final Concept	Concept Justification (What all Learning Happened from the study of Content / Syllabus. A short word for learning or outcome)	CO Components (1.Action Verb, 2.Knowledge, 3.Condition / Methodology, 4.Benchmark)	Course Outcome **Student Should be able to ...**
A	*I*	*J*	*K*	*L*	*M*	*N*
1	- -	- -	Classification of Machine Language.	-Choose the learning techniques	-Analyze -Machine Language	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis.
2	- -	- -	Category Learning.	-examine the concept learning	-Analyze - Candidate Algorithm	implement and demonstrate the Candidate-Elimination algorithm.
3	- -	- -	Statistics on Objects	Identify the characteristics of decision tree and solve problems associated with	-Apply - statistics -decision tree	demonstrate the working of the decision tree based ID3 algorithm.
4	- -	- -	Predictive Modeling	-Apply different data sets on inductive bias mdeling	-Apply -data set - inductive bias modeling	Build an Artificial Neural Network by implementing the Back-propagation algorithm
5	- -	- -	Weightage of Neural Network	Apply effectively neural networks for appropriate applications	-Analyze -candidate neuron's -neural networks	implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file.
6	- -	- -	Errors on Objects	-Analyze the different errors on objects using back propogation	-Analyze -backpropagation algorithm	use the naïve Bayesian Classifier model
7	- -	- -	Predicting of objects.	Apply Bayesian techniques for different data sets	- examine bayes theorem	construct aBayesian network considering medical data
8	- -	- -	Estimating accuracy on Hypothesis.	- derive effectively learning rules using EM alogirthm	-analyze EM algorithm	Apply EM algorithm to cluster a set of data stored in a .CSV file
9	- -	- -	Used to find the Dependencies	Evaluate hypothesis and investigate instant based learning and reinforced learning	-Evaluate - Neural networks -Learning algorithm	implement*k*-Nearest Neighbour algorithm
10			Used to find	Evaluate	-Evaluate	Implement the non-

			the Dependencies	hypothesis and investigate instant based learning and reinforced learning	- Neural networks -Learning algorithm	parametric Locally Weighted Regressionalgorithm