Department of Computer Science & Engineering

LAB MANUAL

INTELLIGENT SYSTEM LAB (CS 1763)

(B. Tech VII Semester, CSE)

SMU SIKKIM MANIPAL UNIVERSITY

Established under Govt.of Sikkim, Act 9 of 1995, recognised under 2(f) of the UGC Act, 1956

Sikkim Manipal Institute of Technology
Majitar, Rangpo, East Sikkim

Sikkim Manipal Institute of Technology
Sikkim Manipal University-737136
Department of Computer Science & Engineering

CERTIFICATE

This is to certify that Ms./Mr.……...
Reg. No.:……Section:……Roll No.:……has satisfactorily completed the laboratory exercises prescribed for **Intelligent System Laboratory (CS1763)** of Final Year (4th) B. Tech Degree in Computer Science and Engineering at SMIT, in the Academic Year 2019-2020.

Date: ……..

Signature of Faculty In charge

Signature of The HOD

List of Experiments

Sl.	Program Title (Description of the program)	Date	Page No.	Remark	Sign.
1.	Write a program to implement the concepts of regression learnt in class via polynomial curve fitting.				
2.	Write a program to experiment with the use of SVMs for a multiclass classification problem, and understand the effects of varying various parameters therein.				
3.	Write a program to explore the use of unsupervised learning methods for clustering data, and also for obtaining lower dimensional representations				
4.	Implement Back-propagation algorithm to experiment with the use of Neural Networks for a multiclass classification problem, and try and interpret high-level or hidden representations learnt by it.				
5.	Write a program to implement the naïve 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.	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.				
7.	Write a program to implement *k*-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.				
8.	Write your own GMM implementation, using the EM algorithm for parameter learning. Learn a GMM with 10 components on your data in PCA space.				
9.	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				
10.	Write a program to demonstrate the working of decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.				

11.	Implement Auto-encoder for dimensionality reduction and image de-noising on MNIST data set.				
12.	Implement LSTM network for sentiment analysis reviews of the movie on IMDB data set.				
13.	Train a simple CNN model of two level layers, that is, a feature layer and a classification layer on the first 5 digits (0 to 4) of the MNIST dataset, then apply transfer learning to freeze the features layer and fine-tune dense layers for the classification of digits 5 to 9				
14.	Implement CNN using keras with theano backend CIFAR10/MNIST dataset				

Index (Additional Problems)

Sl.	Program Title (Description of the program)	Date	Page No.	Remark	Sign.

Course Objective

At least 12 experiments making use of data sets in implementing machine learning and deep learning algorithms and their applications to be carried out using any suitable language of choice of the subject concerned to get insight into the practical applications of the theoretical studies.

Course Outcomes

CO1	Understand Understand the implementation procedures for the machine learning/deep learning algorithms.
CO2	Design and describe Python programs/Matlab/Java for various Learning algorithms
CO3	Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate machine learning algorithm for their solution.
CO4	Apply appropriate data sets to the Machine Learning/ Deep Learning algorithms
CO5	Identify and apply Machine Learning/ Deep Learning algorithms to solve real world problems

Evaluation Plan

EVALUATION WEIGHTAGE	
Continuous Internal Evaluation: 60%	End Semester Evaluation: 40%
CONTINUOUS INTERNAL EVALUATION *	
Minimum number of labs to be conducted	12
Marks for each lab (including lab manual evaluation)	10+1.5 =11.5 marks
*Final Internal Marks shall consist of sum of marks from all the labs which is then reduced to 60 marks. *The assessment will be based on punctuality, program execution, maintaining observation note and Viva-voce.	

INSTRUCTIONS TO THE STUDENTS

Pre-Lab Session Instructions

1. Students should carry the Lab Diary Book and the required stationery to every lab session.
2. Be in time and follow the institution dress code.
3. Must Sign in the log register provided (during 1st lab only).

4. Make sure to occupy the allotted seat and answer the attendance.
5. Adhere to the rules and maintain the decorum.

In-Lab Session Instructions

- Follow the instructions on the allotted exercises.
- Show the program and results to the instructors on completion of experiments.
- On receiving approval from the instructor, copy the program and results in the Lab record.
- Prescribed textbooks and class notes can be kept ready for reference it required.

General Instructions for the exercises in Lab

- Implement the given exercise individually and not in a group.
- The programs should meet the following criteria:
    - Programs should be interactive with appropriate prompt messages, error messages if any, and descriptive messages for outputs.
    - Programs should perform input validation (Data type, range error, etc.) and five appropriate error messages and suggest corrective actions.
    - Comments should be used to give the statement of the problem and every member function should indicate the purpose of the member function, inputs and outputs.
    - Statements within the program should be properly indented.
    - Use meaningful names for variables, classes, interfaces, packages and methods.
    - Make use of constant and static members wherever needed.
- Plagiarism (copy from others) is strictly prohibited and would invite severe penalty in evaluation.
- The exercises for each week are divided under three sets:
    - Solved exercise
    - Lab exercises- to be completed during lab hours
    - Additional Exercises – to be completed outside the lab or in the lab to enhance the skill.
- In case a student misses a lab class, he/she must ensure that the experiment is completed during the repetition class with the permission of the faculty concerned but credit will be given only to one day's experiment(s).
- Questions for lab tests and examination are not necessarily limited to the questions in the manual, but may involve some variations and/or combinations of the questions.
- A Sample note preparation is given as a model for observation.

Conduction of Internal Examination:

• All laboratory experiments are to be included for Internal examination. Students are allowed to pick one experiment from the lot.

• Strictly follow the instructions as printed on the cover page of answer script

Marks distribution: Procedure + Execution + Viva: 10 + 10 +05 (25)

• Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.

The students should not

- Bring mobile phones or any other electronic gadgets to the lab.
- Go out of the lab without permission.