Department of Computer Science and Engineering, JUST
CSE 3202, Artificial Intelligence and Machine Learning Lab
3rd Year 2nd Semester, 2019-20, Laboratory Problem Sets
Exam Date 27.12.23

Artificial Intelligence Problems

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file

2. Write a program in python to implement water jug problem using DFS algorithm

3. Write a program in python to solve 8 puzzle problem using A* algorithm

Machine Learning Problems

N.B: To prepare lab manual use sample datasets and a dataset will be provided for test.

1. Draw and demonstrate linear regression and polynomial regression line using python for a given datasets.

2. 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.

3. Classifying Data Using Support Vector Machines (SVMS): SVM-RBF Kernels. Plot the dataset and predicted value using matplotlib.

4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets. (AND Gate or XOR gate or any other examples)

5. 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

6. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Python ML library classes can be used for this problem.

7. Show that how your script run on a GPU. Create an object representing a GPU device, move a tensor from CPU to GPU or directly creating a tensor on GPU and run all functions and methods on GPU tensor. (show the utilization of GPU in your scripts)

8. We are given the following two-dimensional data points for a binary classification problem:

Pt. No.	X1	X2	y
1	1	0	-1
2	0	1	-1
3	0	-1	-1
4	-1	0	1
5	0	2	1
6	0	-2	1
7	-2	0	1

A nonlinear transformation is used to transform the input vector $X = (x_1, x_2)$, to a transformed space $Z = (\Phi_1(x_1, x_2), \Phi_2(x_1, x_2))$. Where $\Phi_1(x_1, x_2) = x_2^2 - 2x_1 + 3$, and $\Phi_2(x_1, x_2) = x_1^2 - 2x_2 + 3$.

Load the above dataset. Create a scatter plot. Apply a Gaussian kernel function and transform the data into 3D. Create a 3D scatter plot and observe the change.