Vivekanand Education Society's Institute of Technology

Approved by AICTE & Affiliated to University of Mumbai

AI and Data Science Department

Lab Plan

Year: 2023-24

Lab Code : **ADL701**	**Year/ Semester** : B.E.(AI and DS)/ Sem VII
Name Of the Lab : Deep Learning	**Class** : D16AD
Lab Teacher : Sangeeta Oswal	**Subject Teacher** : Sangeeta Oswal
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Prerequisite: Python Programming, Engineering Mathematics

Lab Objectives:

1	To implement basic neural network models for simulating logic gates.
2	To implement various training algorithms for feedforward neural networks.
3	To design deep learning models for supervised, unsupervised and sequence learning.

Lab Outcomes: At the end of the course, the students will be able to

1	Implement basic neural network models to learn logic functions.
2	Design and train feedforward neural networks using various learning algorithms.
3	Build and train deep learning models such as Auto encoders, CNNs, RNN, LSTM etc.

LO/PO Mapping

LO	PO1	PO2	PO3	PO4	PO5	PO6	PO12	PSO1	PSO2
LO1	3	2	2	1	1	1	2	2	1
LO2	3	3	3	3	3	2	3	2	2
LO3	3	3	3	3	3	3	3	3	3

AI and Data Science Department

Sr No	List of Experiments	LO's	Bloom's levels
1	1) Implement Multilayer Perceptron algorithm to simulate XOR gate. 2) To explore python libraries for deep learning e.g. Theano, TensorFlow etc.	LO1	1,2

2.	3) Apply any of the following learning algorithms to learn the parameters of the supervised single layer feed forward neural network.
	  o Stochastic Gradient Descent
	  o Mini Batch Gradient Descent
	  o Momentum GD
	  o Nestorev GD
	  o Adagrad GD
	  o Adam Learning GD
	
	4) Implement a backpropagation algorithm to train a DNN with at least 2 hidden layers.
	5) Design and implement a fully connected deep neural network with at least 2 hidden layers for a classification application. Use appropriate Learning Algorithm, output function and loss function.
		LO1, LO2	1,2,3

3	6) Design the architecture and implement the autoencoder model for Image Compression. 7) Design the architecture and implement the autoencoder model for Image denoising.	LO3	2,3
4	8) Design and implement a CNN model for digit recognition application. 9) Design and implement a CNN model for image classification	LO3	2,3
5	10) Design and implement LSTM for Sentiment Analysis. 11) Design and implement GRU for classification on text data. 12) Design and implement RNN for classification of temporal data	LO2 LO3	2,3

Note: * indicates newly added experiments this year.

Bloom's Taxonomy:-

Level	Descriptor	Level of Attainment
1	Remembering	Recalling from memory of previously learned material
2	Understanding	Explaining ideas or concepts
3	Applying	Using information in another familiar situation
4	Analyzing	Breaking information into part to explore understandings and relationships
5	Evaluating	Justifying decision or course of actions
6	Creating	Generating new ideas, products or new ways of viewing things

Software Tools used : Python and Tensor flow , Keras Library

Text Books

1	Ian Goodfellow, Yoshua Bengio, Aaron Courville. ―Deep Learning‖, MIT Press Ltd, 2016
2	Li Deng and Dong Yu, ―Deep Learning Methods and Applications‖, Publishers Inc.
3	Satish Kumar "Neural Networks A Classroom Approach" Tata McGraw-Hill.
4	JM Zurada ―Introduction to Artificial Neural Systems‖, Jaico Publishing House
5	M. J. Kochenderfer, Tim A. Wheeler. ―Algorithms for Optimization‖, MIt Press.

Reference Books

1	Buduma, N. and Locascio, N., ―Fundamentals of deep learning: Designing next-generation machine intelligence algorithms" 2017. O'Reilly Media, Inc.".
2	François Chollet. ―Deep learning with Python ―(Vol. 361). 2018 New York: Manning.
3	Douwe Osinga. ―Deep Learning Cookbook‖, O'REILLY, SPD Publishers, Delhi.
4	Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc
5	S.N.Sivanandam and S.N.Deepa, Principles of soft computing-Wiley India

Web Resources

1	https://nptel.ac. https://deeplearning.cs.cmu.edu/S21/index.html
2	http://www.cse.iitm.ac.in/~miteshk/CS6910.html
3	https://nptel.ac.in/courses/106/106/106106184/

4	https://www.deeplearningbook.org/

Evaluation:

- Experiments are evaluated based on viva taken on experiments.
- Evaluation is based on following table:-

Range	Grade
80 and above	Outstanding (O)
75.00 – 79.99	Excellent (A)
70.00 – 74.99	Very Good (B)
60.00 – 69.99	Good (C)
50.00 – 59.99	Fair (D)
45.00 – 49.99	Average (E)
40.00 – 44.99	Pass (P)
Less than 40.00	Fail (F)

Program Execution	3
Documentation	3
Timely Checked	2
Viva	2
Total	10
Mini project Execution	3
Documentation	3
Timely Checked	2
Viva	2
Total	10

Name of Lab Teacher: **Name of Subject Teacher:**

 Signature   :   **Signature :**