Department of Computer Science and Engineering
Premier University CTG

Lesson Plan

Course Title: Neural Network & Fuzzy Logic Laboratory | **Course Code: CSE 452**
Level/Term: 4/1 | **Section: 7E**
Credit: 01 | **Contact Hours: 26**
Prerequisite: CSE 111-Structured Programming Language | **Type: Core**
Session: Fall 2024

Instructor: Salman Farsi, Lecturer, DCSE | **Room No: 907**
Lab schedule: Tuesday (8.30 am-9.45 am)

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Rationale: This course tends to help the learners to gain knowledge about design and working principle of artificial neural network and its relation to biological neuron. It helps to develop and design different neuron models according to the problem, introduces artificial intelligence and its application areas, application and evaluation of fuzzy logic and fuzzy set theories.

Course Objective:

The objective of the course is:

- Help students to break into one of the most cutting-edge research fields of Machine Learning namely Artificial Neural Networks (NN) or Deep Learning.
- To teach students the foundations of implementing NN's through using modern tools and libraries. Deep learning engineers are highly sought after, and mastering deep learning will give students numerous new career opportunities.
- To provide a strong focus on practice in a way that students will be able to learn how Deep Learning actually works. So, after completing it, students will be able to apply deep learning in order to solve real-world problems.
- To disseminate the knowledge of how to appropriately report on the experiments they run, as it is done in academic publications.

Course Outcomes:

Upon successful completion of this course, students will be able to:

CO1	**Setup python environment and use different packages necessary for implementing, evaluating, and showing the performance of the neural network.**

CO2	**Understand how to read, preprocess and divide the dataset into train/dev/test sets**
CO3	Build a simple NN using Tensorflow/Keras and extend it by adding multiple layers to it to **understand** how Multi-layer NN works.
CO4	Implement neural network for classification and regression problems.

Assessment:

Attendance (10), Performance(10), Assignment (30), Assignment Report (20), Quiz(20), Viva(10)

References:

1. "Deep Learning with Python" – By Francois Chollet.
2. "Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow", O'Reilly, 2nd Ed. (2019) – By Aurélien Géron.
3. "Deep Learning from Scratch: Building with Python from First Principles" – By Seth Weidman.
4. Dive into Deep Learning – By Amazon Research Scientists.
5. TensorFlow's Curated Curriculums.

Course Content:

SL NO	Topic	Teaching Strategy	Assessment Strategy	COs
1	Environment Setup: General Issues, Setting-up Anaconda/CoLab, Recap of Python Containers and Collection Modules, Numpy Basics.	Lecture & Laboratory Demonstration		CO1

2	Introduction to the different data sources, reading, preprocessing, and splitting the data into training and test set.	Lecture & Laboratory Demonstration		CO2

3	**Performance test on week 2.**		**Coding Task**	
4	Building A Simple NN using Tensorflow/Keras.	Lecture & Laboratory Demonstration		CO3
5	Performance test on week 3.		Coding Task	
6	Compiling Multi-Layer NN and Parameter/Hyper Parameter Tuning.	Lecture & Laboratory Demonstration		CO3
7	Plotting loss and accuracy curve of training and validation set, Performance Measure	Lecture & Laboratory Experiments		CO1
8	Regression using Neural Networks	Lecture & Laboratory Demonstration		CO4
9	Coding assignment evaluation on regression		Coding Test, Report	

10	Classification using Neural Networks	Lecture & Laboratory Demonstrate		CO4
11	Coding assignment evaluation on classification		Coding Test, Report	

12	**Final Exam**		**Quiz**	**CO1-CO4**
13	Final Exam		Viva	CO1-CO4