MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

II Semester M. Tech Computer Science & Engineering

CSE 5245 Deep Learning & Applications Lab [0 0 3 1]

LABORATORY MANUAL

Department of Computer Science & Engineering
Manipal Institute of Technology, Manipal, India
January 2025

COURSE OUTCOMES (COs)

	At the end of this course, the student should be able to:	No. of Contact Hours	Marks
CO1	Use the tools involved in building a deep neural network model.	9	30
CO2	Train and test deep learning models.	15	30
CO3	Apply deep learning models for solving real-life problems.	12	40
	Total	36	100

ASSESSMENT PLAN

Components	Continuous Evaluation	End semester Examination
Duration	3 Hours per week	150 Minutes
Weightage	60%	40%

Pattern	• 2 evaluations of 20 marks each: 2 * 20 = 40 marks, out of which:
	   ☐ Record : 6 marks,
	   ☐ Program execution : 7 marks,
	   ☐ Quiz : 7 marks
	• Mini project = 20 marks
		Model Performance Analysis : 15 marks, Program execution : 25 marks.

Instructions to students:

1. Students must document their code, explaining the purpose of each component and function.
2. Provide comments within the code to enhance readability.
3. Write a report summarizing the training process, challenges faced, and results obtained.

Submission:

1. Students are required to submit their code in GitHub.
2. Optionally, present their findings in a short presentation, discussing insights and potential improvements, whenever asked.

LESSON PLAN

Week No	TOPICS	Course Outcome Addressed
Week 1	Getting Started with IDE, NumPy, Pandas, SciKit Learn, Matplotlib, Plotting, tensors and setting up working environment	CO1
Week 2	Implementation of Neural Networks	CO1
Week 3	Introduction to PyTorch and Tensors	CO1

Week 4	Implementation of Convolutional Neural Networks (CNNs)	CO2
Week 5	Comparing Convolutional Neural Networks (CNN) Vs Fully Connected Neural Networks for Image Classification	CO2
Week 6	Mini Project Evaluation first phase	CO3
Week 7	Implementation of Recurrent Neural Networks (RNNs)	CO2
Week 8	Implementation of LSTM	CO2
Week 9	Implementation of Transfer Learning	CO3
Week 10	Mini project	CO3
Week 11	Mini project	CO3
Week 12	End-term lab examination	
Week 13	Mini project Evaluation	

REFERENCES

1   Aurelien Geron, "Hands-On Machine Learning with Scikit-Learn, Keras & Tensorflow, OReilly Publications

2   François Chollet, "Deep learning with Python", Manning press 2021

3   Ian Goodfellow, Yoshua Bengio and Aaron Courville, " Deep Learning", MIT Press, 2017.

4   Josh Patterson, Adam Gibson "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017

5   www.machinelearningmastery.com

6   www.pyimagesearch.com

WEEK-1: Getting Started

Objective:
The primary goal of this lab is to familiarize students with the essential programming tools for deep learning, emphasizing Python programming and the NumPy library. By the end of this lab, students should have a solid foundation in using Python for numerical computations, which is crucial for implementing and understanding deep learning algorithms.

1. Installation of IDE and setting up working environment.
2. Brief overview of Python programming language.
3. Introduction to the NumPy library for numerical operations in Python.
4. Creating NumPy arrays and basic array operations.
5. Indexing and slicing arrays.
6. Simple numerical exercises to reinforce Python and NumPy concepts.
7. Implementing basic mathematical operations on arrays.