PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)
Kanuru, Vijayawada-520007

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (Data Science)

III B. Tech – II Semester CSE (Data Science)

Deep Learning Lab

Course Code	20DS3652	**Year**	III	**Semester**	II
Course Category	PCC Lab	**Branch**	CSE (Data Science)	**Course Type**	Practical
Credits	1.5	**L-T-P**	0-0-3	**Prerequisites**	Python programming
Continuous Internal Evaluation	15	**Semester End Examination**	35	**Total Marks**	50

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Demonstrate experimental procedures through oral communication and submit comprehensive documentation reports.	**L2**
CO2	Apply CNN, RNN and GANs techniques for developing predictive and descriptive models.	**L3**
CO3	Analyze Deep learning problems, and critically assess their performance and limitations.	**L4**
CO4	Evaluate the performance of Deep learning models using suitable metrics	**L5**

Contribution of Course Outcomes towards achievement of Program Outcomes& Strength of correlations (3: High,2: Medium, 1: Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2									2				
CO2					3							3	2	
CO3		3										3		
CO4				3								3		

Syllabus		
Expt No	**Contents**	**Mapped CO**
1	Implement a simple Neural Network for the MNIST handwritten Digit Recognition Task. Analyze the impact of Different Network Architectures by varying the number of hidden layers and neurons, and compare their performance.	CO1 to CO4
2	Implement a Deep Neural Network for the MNIST handwritten Digit Recognition task. Explore the impact of different activation functions (e.g., sigmoid, tanh, ReLU, leaky ReLU) on the model's performance by training and evaluating the model with each activation function.	CO1 to CO4
3	Build a custom CNN for CIFAR-10 Image Classification. Explore how filter count, size, and padding, along with pooling type (max/average) and size, affect learned representations visualized throughout the network.	CO1 to CO4
4	Evaluate transfer learning for image classification on your custom dataset by comparing fine-tuning a pre-trained LeNet model with feature extraction. Analyze accuracy, precision, and recall to see which approach generalizes better. Additionally, compare the fine-tuned model's performance to a model trained from scratch to understand the benefit of pre-trained knowledge.	CO1 to CO4
5	Implement and train popular CNN Architectures, such as AlexNet and VGGNet on a large-scale Image Classification dataset (e.g., ImageNet, CIFAR-100). Gain a deep understanding of the architectural components and design choices of these models, including the number and types of layers, filter sizes, and connectivity patterns.	CO1 to CO4
6	Implement and train popular CNN architectures, such as GoogLeNet and ResNet on a large-scale image classification dataset (e.g., ImageNet, CIFAR-100). Gain a deep understanding of the architectural components and design choices of these models, including the number and types of layers, filter sizes, and connectivity patterns.	CO1 to CO4
7	Implement Gated Recurrent Unit (GRU), for sequence modeling tasks such as text generation or sentiment analysis.	CO1 to CO4
8	Implement an attention mechanism for sequence-to-sequence tasks, such as machine translation or text summarization.	CO1 to CO4
9	Implement a Generative Adversarial Network (GAN) for Image generation tasks on datasets such as MNIST or CIFAR-10. Gain a Deep understanding of the GAN architecture, including the generator and discriminator networks, the adversarial training process, and the minimax objective function.	CO1 to CO4
10	**Capstone Project 1: Image Classification and Object Detection** Use convolutional neural networks (CNNs) and transfer learning techniques to build an image classification system for real-world datasets (e.g., medical imaging, satellite imagery, or product recognition). Extend the system to perform object detection and localization tasks.	CO1 to CO4
11	**Capstone Project 2: Natural Language Processing (NLP)** Develop a sentiment analysis model using recurrent neural networks (RNNs) or attention-based models like BERT to analyze customer reviews or social media data. Build a language translation system using sequence-to-sequence models with attention mechanisms.	CO1 to CO4

12	**Capstone Project 3: Generative Adversarial Networks (GANs) for Image Generation** Implement various GAN architectures (e.g., DCGANs, CycleGANs) to generate realistic synthetic images, such as faces, landscapes, or product images. Explore applications in data augmentation, creative design, or privacy-preserving data synthesis.	CO1 to CO4

Learning Resources
Text Books
1. Navin Kumar Manaswi ,Deep Learning with Applications Using Python Chatbots and Face, Object, and Speech Recognition With TensorFlow and Keras , First Edition, 2018, Apress. 2. Deep Learning with Python" by François Chollet, Second Edition, 2022, Manning Publications
Reference Books
1. Josh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", First Edition, 2017, O'Reilly Media. 2. Dive into Deep Learning" by Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola, 2024, Cambridge University Press
e- Resources & other digital material
1. https://www.tensorflow.org/tutorials 2. https://pytorch.org/tutorials/