PVP 23

PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)
Kanuru, Vijayawada-520007

DEPARTMENT OF CSE (Data Science)

III B Tech – II Semester

Deep Learning Lab

Course Code	23DS3651	**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**	Machine Learning
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes		
Upon Successful completion of 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 using tools.	**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 across various datasets.	**L5**

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

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

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Syllabus		
Exp. 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 Recurrent Neural Network (RNN) architectures, including Long ShortTerm Memory (LSTM) and Gated Recurrent Unit (GRU) for sequence modeling tasks such as text generation or sentiment analysis and compare their performance	CO1 to CO4
8	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
9	Build and train an autoencoder to remove noise from images (e.g., MNIST or CIFAR-10 dataset).	CO1 to CO4
10	**Capstone Project:** Use convolutional neural networks (CNNs) and transfer learning techniques to build an image classification system for real-world datasets (e.g., medical	CO1 to CO4

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	imaging, satellite imagery, or product recognition). Extend the system to perform object detection and localization tasks.	

Learning Resources
Text Books
1. Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville, First Editiom 2016, MIT Press 2. Dive into Deep Learning, By Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola,First Edition, 2024, Cambridge University Press
References
1. Machine Learning, Tom M. Mitchell, First Edition, 2017, McGraw Hill Education 2. Machine Learning for Absolute Beginners, Oliver Theobald, Third Edition, 2024, Sanage Publishing House LLP 3. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 2012, MIT Press
E-Recourses and other Digital Material
1. Deep Learning: https://deeplearning.mit.edu/ 2. Deep Learning: https://nptel.ac.in/courses/106106184 3. Deep Learning https://nptel.ac.in/courses/106105215