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SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Department of Computer Engineering / Information Technology

Ph.D Semester 1/2
(CO / IT Engineering)

Subject Name: Deep Learning **Subject Code:** PTCO13105

Type of course: PhD Credit Course
Prerequisite: Knowledge of Linear Algebra, Probability theory

Rationale: Deep Learning has received a lot of attention over the past few years to solve a wide range of problems in Computer Vision. The availability of huge volume of Image and Video data over the internet has made the problem of data analysis and interpretation a really challenging task. Deep Learning has proved itself to be a possible solution to such Computer Vision tasks. This course covers learning approaches and then moves to the modern Deep Learning architectures like Convolutional Neural Networks, Autoencoders etc

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
4	0	0	4	60	25	15	0	0	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Total Hrs
1	Introduction to Neural Network : Expressing linear perceptron as neurons, Linear neurons and their limitations, Non linear functions, Multilayer Perceptron, Feed Forward Neural Networks, Loss function, Propagation Learning, Supervised and Unsupervised learning.	15

2	Training Feed forward neural network: Gradient Descent, batch optimization, back propagation algorithm, Test set, Validation Set, Overfitting in deep neural network.	7
3	Introduction to Deep Learning: Bayesian Learning, Decision Surfaces, Linear Classifiers, Feature descriptor, Discriminate function.	8
4	Convolutional Neural Network (CNN) : Shortcomings of feature selection, Filters and Feature Maps, Building blocks of CNN - Convolution layer, Max pooling, Visulizing learning in CNN. Popular CNN architecture: LeNet, AlexNet, VGG16, GoogleNet, ResNet etc., Vanishing Gradient, Transfer Learning, Auto encoder.	20
5	Effective training in Deep Net, L2 regularization, Early stopping, Dataset augmentation, Applications of Deep Learning.	10

Course Outcomes (CO):

Sr. No.	CO statement	Marks % weightage
CO-1	Explain Neural network architecture, key concepts and back propagation learning algorithm	15
CO-2	Use building blocks of CNN for Deep neural network	25
CO-3	Apply transfer learning concept for different applications using different CNN architectures..	15
CO-4	Examine various optimization techniques to make Deep learning models efficient.	20
CO-5	Design deep learning model for the real world application.	25

Reference Books:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Artificial Neural Networks	B. Yegnanarayana	Prentice- Hall of India	2006	
2	Pattern Recognition and Machine Learning	Bishop, Christopher M.	Springer Verlag, New York	2013	
3	Fundamentals of Deep Learning	Buduma Nikhil	Shroff Pubg.& Dist.Pvt Ltd.	2017	

List of Online Learning Resources:

1. NPTEL course on: Deep Learning (IIT Kharagpur, Prof. P. K. Biswas (https://nptel.ac.in/courses/106105215)
2. NPTEL course on:Deep Learning- Part 1, IIT Ropar (https://nptel.ac.in/courses/106106184)