Deep Learning

Course Code	20CS4701A	**Year**	IV	**Semester**	I
Course Category	Program Elective - IV	**Branch**	CSE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Machine Learning
Continuous Internal Evaluation:	30	**Semester End Evaluationn:**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Understand the fundamental concepts of Deep learning.	**L2**
CO2	Apply concepts of deep networks to analyze various architectures.	**L3**
CO3	Apply deep learning models to build applications in various domains.	**L3**
CO4	Analyze the given problem and apply suitable deep learning algorithm.	**L4**

Micro Syllabus

Unit No	**Contents**	**Mapped CO**
I	• **Fundamentals of Deep Networks** ➢ Defining Deep Learning ➢ What Is Deep Learning • **Common Architectural Principles of Deep Networks:** ➢ Parameters, Layers ➢ Activation Functions [Linear Function, Sigmoid Function, Tanh Function, Rectified Linear Unit, Leaky ReLU] ➢ Loss Functions ➢ Loss Vs Accuracy Measures ➢ Hyper parameters.	**CO1**
II	• **Building Blocks of Deep Networks** ➢ RBMs ➢ Phases of RBF ➢ Applications of RBF ➢ Autoencoders ➢ Hyper parameters of Autoencoders	**CO1, CO2, CO4**

	➢ Variational Autoencoders. • **Major Architectures of Deep Networks** ➢ Unsupervised pretrained networks ➢ Deep Belief Networks ➢ Generative Adversarial Networks.	
III	• **Convolutional Neural Networks (CNNs)** ➢ The Convolution Operation, ➢ Motivation ➢ Pooling ➢ Convolution and Pooling as an Infinitely Strong Prior ➢ Variants of the Basic Convolution Function ➢ Structured Outputs ➢ Data Types ➢ Efficient Convolution Algorithms ➢ Random or Unsupervised Features ➢ The Neuroscientific Basis for Convolutional Networks, Applications.	**CO1, CO3, CO4**
IV	• **Sequence Modeling – Recurrent and Recursive Nets** ➢ Unfolding Computational Graphs ➢ Recurrent Neural Networks ➢ Encoder-Decoder Sequence-to-Sequence Architectures ➢ Deep Recurrent Networks ➢ Recursive Neural Networks ➢ The Long Short-Term Memory and Other Gated RNNs, and Applications.	**CO1, CO3, CO4**
V	• **Deep Learning applications** ➢ Computer Vision. ➢ Speech Recognition. ➢ Natural Language Processing. ➢ Other Applications.	**CO1, CO3, CO4**

Learning Resources
Text books
1. Josh Patterson and Adam Gibson, ―Deep learning: A practitioner's approach‖, O'Reilly Media, First Edition, 2017. 2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, ―Deep Learning‖, MIT Press, 2016. 3. Deep learning,Amit Kumar Das,Saptarsi Goswami, Pabitra Mitra, Amlan Chakrabarti, First Edition,2021, Pearson.
References

4. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O_Reilly, Shroff Publishers, 2019.
5. Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O_Reilly, Shroff Publishers, 2019.
6. Deep learning Illustrated A Visual Interactive Guide to Artificial Intelligence,Jon Krohn,Grant Beyleveld,Aglae Bassens,First Edition,2020, Pearson.

e-Resources and other Digital Material

1. https://www.deeplearningbook.org/
2. https://onlinecourses.nptel.ac.in/noc20_cs62/preview
3. https://www.udemy.com/share/101X6W/ (or) https://www.udemy.com/course/deep-learning-advanced-nlp/
4. https://www.youtube.com/watch?v=5tvmMX8r_OM&list=PLtBw6njQRU-rwp5_7C0oIVt26ZgjG9NI

Course Coordinators

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