ProgramElective-IV

Deep Learning

CourseCode	19CS4701A	**Year**	IV	**Semester**	I
CourseCategory	Program Elective - IV	**Branch**	CSE	**CourseType**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Machine Learning, Neural Networks
ContinuousInternalEvaluation:	30	**Semester EndEvaluation:**	70	**TotalMarks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Understand the fundamental techniques and principles of deep learning.	**L2**
CO2	Apply concepts and major architectures of deep networks to build solutions for variety of problems.	**L3**
CO3	Apply Deep learning techniques to build applications in various domains.	**L3**
CO4	Analyze CNN techniques to classify images and detect objects and prepare an effective report.	**L4**

Syllabus		
Unit No	**Contents**	**Mapped CO**
I	**A Review of Machine Learning –** The Learning Machines, How Can Machines Learn? Biological Inspiration, What Is Deep Learning?,**Fundamentals of Deep Networks** – Defining Deep Learning, What Is Deep Learning? Common Architectural Principles of Deep Networks: Parameters, Layers, Activation Functions, Loss Functions, Hyperparameters.	**CO1, CO2**
II	**Building Blocks of Deep Networks –** RBMs, Autoencoders, Variational Autoencoders. **Major Architectures of Deep Networks:** Unsupervised	**CO1, CO2**

	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, 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, Applications.	**CO1, CO3**
V	**Deep Learning applications –** Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.	**CO1, CO3**

Learning Resources

Text books

1. Deep learning: A practitioner's approach,Josh Patterson and Adam Gibson, First Edition, 2017, O'Reilly Media.
2. Deep Learning,Ian Goodfellow, YoshuaBengio, Aaron Courville, 2016, MIT Press.

References

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly,
2. Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O'Reilly, 2019,Shroff Publishers.

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