Deep Learning: From Basics to Practice

Course Title	Deep Learning: From Basics to Practice
Course Category	Specialized Skills
Relevant Discipline(s)	All Engineering and Science disciplines (familiarity with MATLAB is required)
Duration of course in equivalent integer no. of days (min 3 days, 1 day = 6 hrs of lectures/hands on sessions)	Five full days – 930am to 530pm
Proposed dates	Dec 26 to 30, 2020 (5 full days)

Brief Course Description and Course Contents

Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) are the buzz words in today's world, be it for working professionals, academicians or students. These fields of computational science, have made a spectacular impact in divergent areas, such as Advertising, Asset Management, Automobile, Aviation, Defense, Education, Energy, EPC, Finance, Healthcare, Human Resources & Recruitment, Manufacturing, Transportation, and Space.

IIT Bombay brings to the academia, industry and individuals an introductory course on Deep Learning. This course is designed to introduce the participants to the exciting area of Deep Learning. Starting from the basics of Neural Networks, powerful architectures and techniques in deep learning are introduced, such as Recurrent Neural Nets, Convolution Neural Nets, Adversarial Nets, and Reinforcement learning. The emphasis is on providing insight and feel for each technique, rather than the theory.

A crucial part of this course is the hands-on sessions. The hands-on sessions show how to program and implement various deep learning techniques in different real-world applications. MATLAB is used throughout the course for software exercises.

Course Contents
- Introduction to Neural Networks
- Introduction to Deep Networks and Utility Layers
- Introduction to Recurrent Neural Networks (RNN): Long Short-Term Memory (LSTM) networks.
- Introduction to Convolution Neural Networks
- Convolution Process, Convolution Layers, Example ConvNets
- CNN applications to feature extraction and image classification
- Introduction to Reinforcement Learning (RL)

- RL applications: Grid word exploration, RL Control of Water tank system, RL control of inverted pendulum
- Introduction to Autoencoders (AEs) & Variational Autoencoders (VAEs)
- VAEs for feature reduction, denoising, generating new images
- Introduction to Generative Adversarial Networks (GANs)
- Understanding GAN through generation of new image

Instructor Details			
S. No.	Name of the Instructor	Department	Email
1.	Prof. P. S. V. Nataraj	Syscon	nataraj@sc.iitb.ac.in