Course 2: Deep learning & Applications 27th – 31st May 2019

Prospective external Experts- (i) Industry support from NVidia, MathWorks (MATLAB) (ii) Dr. Anupama Ray, IBM (iii) Dr. Ritu, Intel, (iv) Prof. R. Venkatesh Babu, IISc Banglore (v) Dr. Biplab Banerjee IITB
Experts from host institutes- (iii) Prof. R. Balasubramanian, IITR (iv) Prof. Aparajita Ojha, IIITDMJ (v) Dr. Partha Pratim Roy, IITR

Contents of modules of Deep Learning & Applications

S.No.	Module Name	Topics
1.	**Artificial Neural Networks (ANNs)**	Introduction to Deep Learning and Motivation. Brief introduction of Artificial Neural Networks (ANN), Perceptrons, Multilayer perceptron (MLP), Back propagation training for MLP, Stochastic gradient descent. Applications to some practical classification problems. Hands on: Demonstration and implementation of Shallow and Deep architecture, introduction to Python, Tensorflow and Keras.
2.	**Regularization, Hyperparameter Tuning and Autoencoders**	Deep Feed forward Networks - Regularization - drop out, Minibatch gradient descent, RMSProp and Adam optimization. Autoencoders and Their Types Hands on: Hyper parameter tuning and regularization practice, Minibatch gradient descent, Autoencoders
3.	**Convolutional Networks**	The Convolution Operation, Pooling, Basic architecture of a Convolution Neural Network, Variants of the Basic Convolution Model, Evolution of Convolution NN Architectures - AlexNet, ResNet and other architectures. Hands on: Convolution neural network application using Tensorflow and Keras, Autoencoders using CNN, Building an application for classification and feature extraction.
4.	**Sequence Modeling**	Recurrent and Recursive Nets - Unfolding Computational Graphs, Recurrent Neural Networks, The Long Short-Term Memory and Other Gated RNNs. Hands on: Language modeling and machine translation, Chatbots.
5.	**Generative Adversarial Networks, Object Detection Algorithms**	GAN and their variants- R-CNN , YOLO and SSD Hands on– Object detection, Realistic Image Generation and face recognition

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