1/4/2019 – 2/4/2019

Introduction to Deep Learning with NVIDIA GPUs

# Day 1

Introductory to machine learning and deep neural networks

## Introduction to Machine Learning.

### The formative definition of machine learning.

### Types of learning.

### How to identify problems in machine learning context?

## History of Neural Networks and neurons.

### The intuition behind simulating human brain.

### Understanding the neurons.

### How does neural network work?

### How does neural network learn?

## Single Perceptron hands-on. (Calculations + Coding)

### Participants will be given a simple mathematical problem and learn how neural network solve the problem.

### Participants will be building simple single perceptron and visualize the learning.

## Activation Functions.

### Types of activation functions.

### Characteristics of activation functions.

## Multilayer Neural Networks.

### What does neural networks learn?

### Feedforward versus backpropagation.

### How to determine learning rate?

### Gradient Decent.

### Solving minimization problem.

## Evaluating neural network performance.

### How to evaluate performance?

### What are the used measures?

### Classification metrics.

### Regression metrics.

### How to improve model’s performance?

## The desirable state to achieve.

### Overfitting versus underfitting.

### Variance & Bias tradeoffs.

### How to avoid overfitting?

## Artificial Neural Network hands-on (using scikit-learn/Keras).

### Building multilayer neural network.

### Using different activation functions.

### Building the schema of dense neural networks.

## Brief introduction to Deep Learning and Convolution.

### The XOR problem.

### The vanishing gradient.

### The emergence of Deep Architectures of Neural networks.

# Day 2

## The Convolution.

### What is convolution?

### How does the convolution layer works?

### Parameters of the convolution.

### Why convolution instead of fully connected layers?

## Types of layers.

### Pooling layer.

### Feature maps.

### Pooling techniques.

## Building Convolution Neural network hands-on.

### Participants will be using KERAS deep learning framework.

### Building CNN and exploring the layers.

### Perform training on MNIST dataset.

## Fully Convolutional Neural Networks.

### What is FCN?

### Where does FCN perform the best?

### Characteristics of FCN.

### FCN Variants.

## FCN and Semantic segmentation.

### What is hard about semantic segmentation?

### How to evaluate FCN performance?

## FCN hands-on.

### Building FCN8 variant architecture using KERAS.

### Evaluating FCN8 performance.