

**SSIP**

**Two Day Workshop**

**on**

**Machine Learning (ML) and Artificial Intelligence (AI)**  
**(August 9-10, 2019)**



**Organized by:**

**Indian Institute of Information Technology Vadodara (IIITV)**

**C/o Block No.9, GEC, Sector-28, Gandhinagar, Gujarat - 382028**

**Industry Expert**

**Dr. Pallab Maji**

**Senior Technical Lead**

**Mercedes-Benz R&D India (MBRDI)**

**Bangalore, India**

**Organizing Committee**

**Patron**

**Prof. S. K. Patra**

**(Director, IIIT Vadodara)**

**Coordinators**

**Dr. Pratik Shah, Dr. Kamal Kishor Jha, Dr. Satyendra Singh Yadav**

# Workshop on ML/AI

Theory, Practical and Demo

## Overview

This workshop is addressed to participants who are beginners in the field of Machine Learning. The major focus here will be to provide its participants with the core concepts in the field of Machine Learning, allowing them to think about solutions in real life. However, we will also delve into understanding some of the current state of the art algorithms and analyze them for their applicability. The field of machine learning is vast and in this short span, it will not be possible to cover all topics. However, we will be delving into topics which are most relevant in industries and research today. For hands-on exercises, we will be using Keras and Tensorflow libraries.

## Topics

1. Introduction
  - a. Spectrum of Artificial Intelligence
  - b. What is Machine Learning?
  - c. Types of Machine Learning
    - i. Supervised - Linear Regression, Logistic Regression
    - ii. Unsupervised - Clustering, Gaussian Mixture Model
    - iii. Reinforcement Learning - Q-Learning
  - d. Generative vs Discriminative Models
  - e. Principles of Machine Learning
    - i. Optimization
    - ii. Bias-Variance
    - iii. Regularization
    - iv. Concentration Inequalities
    - v. Generalization and Uniform Convergence
    - vi. VC-dimension
2. Machine Learning Modeling
  - a. Modeling Neural Networks
    - i. Perceptron model
    - ii. Activation Functions
    - iii. Loss functions and optimization
    - iv. Back Propagation
  - b. Hands-on training
    - i. ANN Model - SONAR dataset
    - ii. MLP - Digit Classification

- c. Introduction to Deep Learning
  - i. Traditional Machine Learning vs Deep Learning
  - ii. Applications specific Deep Architectures
  - iii. Working with Pretrained Models
3. Convolutional Neural Networks
  - a. Basic Layers
  - b. State-of-art deep architecture modules
  - c. Classification Detection and Segmentation networks
  - d. Hands-on
    - i. Training Image Classification Network
    - ii. Live Demo on Object Detection
4. Recurrent Neural Networks
  - a. Understanding the Backpropagation Through Time (BPTT) algorithm and the vanishing gradient problem
  - b. Basic Layers
  - c. State-of-art deep architecture modules - GRU, LSTM
  - d. Hands-on
    - i. Word Prediction
    - ii. Application Screening Problem
    - iii. Sentiment Analysis
5. Summary

## Pre-requisites

- An open mind to learn
- Basic understanding of Linear Algebra, Probability and Statistics
- A laptop with Python, Tensorflow and Keras installed. I recommend using Anaconda Distribution.
- Preferably Linux OS, but windows or mac will still work