

Training Course Outline

MLDL-I: Machine Learning and Deep Learning - I

Class	Discussion Topic	Practical Implementation
1	Introduction to Supervised Learning: Supervised classification: feature vector, training, testing, validation, K nearest neighbor (KNN) Linear regression, cost function, gradient descent.	Learning the use of Colab platform Learning the use of Kaggle platform Learning Python Programming Basic submission using Pandas on Kaggle Assignment : Complete code for Titanic submission using Linear Reg. & KNN.
2	Supervised Learning Methods: Logistic regression Support vector machine (SVM) Maximum likelihood (ML) Decision Trees and XGBoost	Implementation of Linear Regression with Gradient Descent How to use SVM, XGB, RF etc Ensembling (Bagging, Boosting) Assignment: None
3	Neural Network & Unsupervised learning: Intro to Deep Learning Multi-layer perceptron Batching, SGD, Adam K-means clustering Hierarchical clustering.	Introducing Tensorflow and Keras Model building with MLP Digit Recognition with MLP Clustering Assignment: Competition
4	Convolutional Neural Network: Types of convolutions, Padding, stride, dilation, augmentation, pooling, activation function.	Construction of basic CNN blocks Adding layers, Intermediate layer's output, Debugging CNN architecture Edge detection using CNN
5	CNN Classification Architecture: Bias/variance theory, hyperparameter tuning, learning curve, regularization, cross-validation, data-split, error analysis, attention mechanism,	CNN based classification architecture Bias/Variance in practice Learning Rate analysis Train Test Split
6	Traditional CNN Architectures: Performance improvement of CNN architecture, Base Model, ResNet, Inception Net, Mobilenet, Efficientnet Transfer learning	Deep neural network based classification architecture using traditional models, implementation a transfer learning.
7	CNN Segmentation Architecture: Segmentation, encoder-decoder, Unet	Implementing image segmentation using Unet
8	Application of ML-DL: An application details using image/video data.	Individual presentation from the trainee presenting a complete work with results.