CSE Department Organises Workshop on

Machine Learning Algorithms & Applications using TensorFlow

during 03-07 July 2018

Machine learning is a paradigm of learning from past experience to improve the future predictive performance. The primary focus of machine learning is to automate the learning. Machine Learning (ML) has evolved from the endeavour of a few computer enthusiasts exploiting the possibility of computers learning to play games and computational approaches to design decision support systems. Machine learning has progressively been emerged as an independent research discipline that has given the necessary base for statistical – computational principles. Further wide research community of machine learning has developed various algorithms that are explored for classification problem.

In this five day workshop, Dr. Byun, Department of Computer Engineering, Jeju National University, Korea has focused on the concepts of Regression analysis, logistic regression, and exploring of classification problem with different flavours of neural network classifiers such as Multilayer Neural Networks, Convolutional Networks and Deep Learning. He has discussed on various kinds of learning, and caterogized them as supervised, semi-supervised, unsupervised, reinforcement, and transduction methods.

Artificial Neural Networks are considered as non-linear models and they are used to discover complex associations between input and output data. There are some more modernised versions of ANNs that capitalise on the profuse supply of everyday data. They utilise larger neural networks to solve semi – supervised problems where major portion of an abound data is unlabelled or not classified.

Dr. Byun will further discuss all those advanced topics such as how to adjust linear decision boundary, place holder problem, XOR problem and also conceptualize the 3-layer neural network and how it resolves thenonlinearity of its decision boundary.

He is also going to discuss on basics of deep learning concepts such as: Computational graph and parameters influence, merging gates, local gradient, Imagination of computational graph for a 3-layer NN, vanishing gradient, and ReLU.

Resource Person Details:

Dr. Byun Yung-Cheol,
Professor & Director,
Department of Computer Engineering,
Jeju National University, Korea

Detailed Schedule of the Workshop:

Date/ Time	10.10 – 11.00 AM	11.10 – 12.00 Noon	12.10-1.00 PM	2.00 – 3.30 PM	3.30 – 4.30 PM
03/07/2018 **Tuesday**	**Introduction to Jeju, Jeju National University, and Some ML-related Events** ✓ Jeju and Jeju National University ✓ Global Machine Learning Camp ✓ Asian University ML Camp ✓ International conference	**Artificial Intelligence and Brain (1/2)** ✓ Intelligence ✓ AI applications ✓ 4th Industrial Revolution ✓ Brain ✓ Neurons and connections	**Artificial Intelligence and Brain (2/2)** ✓ What happens in the brain ✓ Neural networks ✓ Synapse ✓ Learning ✓ Function of a neuron	**Practical Session**	Interaction with **Artificial Intelligence Research Group**
04/07/2018 **Wednesday**	**Linear Regression & Backpropagation (1/2)** ✓ A neuron and regression ✓ Hypothesis and a loss/error function ✓ Learning and updating weights ✓ The meaning of Gradient/Slope ✓ Thinking the loss/error graph	**Linear Regression & Back propagation (2/2)** ✓ Automatic updating weights ✓ Programming using Tensor Flow ✓ Computational graph ✓ Forward propagation ✓ Back propagation and chain rules	**Logistic Regression & Classification (1/2)** ✓ Logistic regression and linear decision boundary ✓ Examples of classification ✓ Design of loss function for classification ✓ Computational graph ✓ Forward propagation and Back propagation	**Practical Session**	Interaction with **Machine Learning Research Group**
05/07/2018 **Thursday**	**Logistic Regression & Classification (2/2)** ✓ TensorFlow programming for logistic regression ✓ Neuron inputs and linear decision boundary ✓ Multiple categories classification ✓ One-hot and softmax function ✓ New loss function for multiple categories	**Multi-Layer Neural Networks & non-linear decision boundary** ✓ Learning and how to adjust linear decision boundary ✓ Place holder ✓ XOR problem ✓ 3-layer neural network and nonlinearity of it's decision boundary ✓ Decision boundary as you wish	**Deep Learning (1/2)** ✓ Computational graph and influence of parameters ✓ Merging gates and local gradient ✓ Imagination of computational graph for a 3-layer NN ✓ Vanishing gradient ✓ ReLU	**Practical Session**	Interaction with **Image Processing Research Group**
06/07/2018 **Friday**	**Deep Learning (2/2)** ✓ MNIST classification ✓ DNN having 4 layers ✓ TensorFlow programming ✓ DNN having 6 layers ✓ Over-fitting and solution	**Python programming & modularization** ✓ Hello, World using Python ✓ Abstraction and Function ✓ OOP using classes and objects ✓ OOP with Tensor Flow ✓ Modularization for reuse	**Convolution Neural Networks (1/2)** ✓ The meaning of convolution ✓ Drawbacks of the neural networks discussed ✓ Feature extraction using filters ✓ How to convolve an input image	**Practical Session**	Interaction with **Networks Research Group**
07/07/2018 **Saturday**	**Convolution Neural Networks (2/2)** ✓ MNIST using CNN ✓ CNN programming ✓ Theoretical background of CNN ✓ Case studies ✓ Recurrent Neural Networks	**CNN/RNN & its applications** ✓ How much electricity will be produced? ✓ Road CNN: I know you well, Road. ✓ Traffic Prediction using Recurrent Neural Networks ✓ Crowd funding Scams: Analysis and Classification with Transfer Learning	**Discussion (if necessary)**	**Wrap-Up**	