Neural Networks Theory
신경망 이론

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1. Class Information

수강반 번 호	교과 목명	신경망 이론	학과	컴퓨터 공학	학년	대학원	학점/ 시수	3/3	담당 교수	변영철
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2. Subject Overview

Neural networks is a core part for Deep Learning. Deep learning is part of a broader family of machine learning methods based on learning data representations, as opposed to task-specific algorithms. Learning can be supervised, partially supervised or unsupervised. Technically, deep learning refers some core issues including activation function, weight initialization methods, some optimization algorithms and successful neural networks to make learning possible using those. In this class, we will study those aspects especially from the view point of applications using deep neural networks.

3. Text

구분	저자명	서 명	출판사	발행년도
교재		Handout		
참고 도서				

4. Weekly details

Week	Subject	Contents
1 (9/07)	Introduction	Introduction of the class
2 (9/14)	AI & Brain	We learn what artificial intelligence means, how neurons and the brain work, and what learning means in biology
3 (9/21)	Linear Regression and BP1	We learn Meaning of regression, the relationship between a neuron and regression, understanding regression using Desmos tool, what hypotheses is, synapses and error functions.
4 (9/28)	Linear Regression and BP2	We learn the way to update synapses using gradient, computational graph of the error function, forward propagation and back-propagation.
5 (10/05)	Logistic Regression & Classification1	We learn logistic regression and classification, the meaning of decision boundary, error functions for logistic regression and computational graphs
6 (10/12)	Logistic Regression & Classification2	We study the meaning of parameters in neural networks, neural networks with multiple neurons, softmax and new error function.
7 (10/19)	**Invited Talk (초청 특강)**	Title: **Segmentation in Video Using Adaptive N-Frames Ensemble** Speaker: Prof. **Jonathan Kim**, CHRIST University, India
8 (10/26)	Multiple NN and non-linear decision boundary	We study the number of input of neural networks and decision boundary, XOR problem and the solutions, deep and wide neural networks for nonlinearity.
9 (11/02)	**Invited Talk (초청 특강)**	Talk: Challenge and Opportunity for Autonomous Vehicles beyond Level 5.0 Speaker: Prof. **Siho Kim**, Yonsei University
10	**Invited Talk**	Talk: AI and Platform

(11/09)	**(초청 특강)**	Speaker: Prof. **Soo-Yong Park**, Sogang University
11 (11/16)	Deep Learning	We learn the problems with the sigmoid function in the computational graph of multiple neural networks, ReLU activation function, over-fitting and drop-out.
12 (11/23)	Convolutional Neural Networks	We study the drawbacks of fully-connected neural networks, how to find the feature using filters, what is activation map, polling, and some case studies.
13 (11/30)	**Invited Talk** **(초청 특강)**	Talk: AI for everyone Speaker: **Dr. Sung Kim**, Upstage
14 (12/07)	Project Presentation1	Students present their works using deep neural networks and discuss the main issues in the research.
15 (12/14)	Project Presentation2	Students present their works using deep neural networks and discuss the main issues in the research.

5. Personal Project and Evaluation

Title		Pages	Due date	Ev. Ratio (%)
(Any topics)		more then 10 pages using A4	TBA	100
Comments	Neural networks application development (personal project)			
Eval.	Presentation(30%) + Completeness(40%) + Difficulty(30%)			