METU - Department of Computer Engineering
CENG 793 –Advanced Deep Learning
2016-2017 Spring

Web: http://user.ceng.metu.edu.tr/~emre/ADL.html

Emailing List: METUClass page of the course

Instructors: Emre Akbaş (B202) & Sinan Kalkan (B-207)
[Office hours: by appointment]

Lectures: Thursday, 13:40-16:30, BMB-4

Credits: METU: 3 Theoretical, 0 Laboratory; ECTS: 8.0

Catalog: Advanced deep learning problems and methods; Working with sequential data using Recurrent Neural Networks; Specialized Recurrent Neural Networks such as Elman, Jordan and Echo State Networks; Long Short Time Memory and its variants; Memory networks; Deep Neural Turing Machines; Deep Reinforcement Learning.

Textbook: We will mainly follow the state of the art with papers. However, the following might be handy at times:

- Y. Bengio, I. Goodfellow and A. Courville, "Deep Learning", MIT Press, 2016.

Grading:

Paper Presentation	15%
Paper Quizzes	25%
Project	30%
Paper Writing	30%

Prerequisite: CENG 783 or consent of the instructor.

Tentative Schedule:

Week & Date		Topic
1	**23 Feb**	**Review of Fundamental Deep Learning Methods** [Problem Definition; Overview of Approaches; Autoencoders; Convolutional Neural Networks; Deep/Restricted Boltzmann Machines]
2	**2 Mar**	**Review of Fundamental Deep Learning Methods** [Problem Definition; Overview of Approaches; Autoencoders; Convolutional Neural Networks; Deep/Restricted Boltzmann Machines]
3	**9 Mar**	**Review of Fundamental Deep Learning Methods** [Problem Definition; Overview of Approaches; Autoencoders; Convolutional Neural Networks; Deep/Restricted Boltzmann Machines]
4	**16 Mar**	**Recurrent Neural Networks** [Unfolding; Backpropagation Through Time; Elman & Jordan Networks; Echo State Networks; Long Short Time Memory and its variants]
5	**23 Mar**	**Recurrent Neural Networks** [Unfolding; Backpropagation Through Time; Elman & Jordan Networks; Echo State Networks; Long Short Time Memory and its variants]
6	**30 Mar**	**Memory Networks** [Dynamic Memory Networks; Hierarchical Temporal Memory Networks; Sparse Distributed Memory]
7	**6 April**	**Memory Networks** [Dynamic Memory Networks; Hierarchical Temporal Memory Networks; Sparse Distributed Memory]
8	**13 April**	**Deep Turing Machines** [Turing Machine; Neural Turing Machine; Neural Random Access Machine]
9	**20 April**	**Deep Turing Machines** [Turing Machine; Neural Turing Machine; Neural Random Access Machine]
10	**27 April**	**Deep Reinforcement Learning** [Reinforcement Learning; Deep Reinforcement Learning]
11	**4 May**	**Deep Reinforcement Learning** [Reinforcement Learning; Deep Reinforcement Learning]
12	**11 May**	**Why does it work?** [Different perspectives from biology and physics]
13	**18 May**	**Discussion** [Deep Learning: Problems, Solutions, Open Issues and Directions]
14	**25 May**	**Project demos**