

BLG 561E Deep Learning

Lecture 0: Class Logistics

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Professors



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Course Description

- This is an **introductory** course on Deep Learning
- We are going to cover basic design principles and applications for
 - Machine Learning Review
 - Feedforward (Fully Connected) Neural Networks
 - Convolutional Neural Networks
 - Autoencoders
 - Recurrent Neural Networks
 - Generative Networks
 - A brief introduction to Deep Reinforcement Learning
- Applications will cover a wide array of topics from computer vision, audio processing, time series prediction and more....

Course Objectives

- The specific aims of the course are:
 1. To introduce main techniques in Deep Learning
 2. To understand the mathematical principles of optimization and regularization of deep learning methods
 3. To be able to design deep neural networks for various problems in artificial intelligence
 4. To implement solutions to learning problems using various deep neural network techniques using Python/Pytorch

Prerequisites

- A good understanding of basic linear algebra and probability theory
 - We can point you to references in case you need to brush up on these subjects
- At least an introductory exposition to machine learning
 - We will do a review of ML, but it might not help a lot if you have no background Machine Learning
- Basic coding (Python) skills
 - We will start by writing a lot of code for basic and important concepts in the course, then we can start using our own code as well as relying on libraries for our custom applications

Course Outline

Week	Date	Topic	Assignments
1	Sep 18	Deep Learning: Introduction	
2	Sep 25	Review of Machine Learning	
3	Oct 02	Short Review : Optimization Artificial Neural Networks	
4	Oct 09	Backpropagation Regularization Techniques	HW1 assigned: FCN

Course Outline

Week	Date	Topic	Assignments
5	Oct 16	Convolutional Neural Networks Training Networks	
6	Oct 23	Supervised Methods, Discriminative Networks Examples	
7	Oct 30	Classification Applications: Pattern and / or Speech Recognition Pytorch tutorial	HW2 assigned: CNN+AE
X	Nov 6	FALL BREAK WEEK	

Course Outline

Week	Date	Topic	Assignments
8	Nov 13	Unsupervised Methods and Autoencoders	
9	Nov 20	Deep Generative Networks: Adversarial methods	
10	Nov 27	Applications of Unsupervised techniques: Sound and/or Image Synthesis	HW3 assigned: GAN

Course Outline

Week	Date	Topic	Assignments
11	Dec 4	Sequence Models: Recurrent Neural Networks, LSTMs,...	
12	Dec 11	Time Series Prediction Application	HW4 assigned: RNN
13	Dec 18	Midterm Week	
14	Dec 25	Introduction to Deep RL	

References

- We will not follow a textbook strictly. Some references for deep learning are:
 - Deep Learning, I. Goodfellow, Y. Bengio, A. Courville, 2016, MIT Press.
 - Deep Learning with Python, F. Chollet, 2017, Manning.
 - Fundamentals of Deep Learning Designing Next-Generation Machine Intelligence Algorithms, Nikhil Buduma, Reilly
 - neuralnetworksanddeeplearning.com
 - Coursera Deep Learning Online Course Series
 - Stanford CS231N Deep Learning /Computer Vision Course videos
 - Python/numpy tutorial: <http://cs231n.github.io/python-numpy-tutorial/>
 - <https://github.com/muupan/deep-reinforcement-learning-papers>

Evaluation

Midterm Exam	30%
Homework Assignments (4)	40%
Final Project (50% Accuracy, 30% Presentation/Jury, 20% Report)	30%

The final project will be an object detection challenge/competition for autonomous driving

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Details soon...

