جامعة الملك عبدالله للعلوم والتقنية
King Abdullah University of Science and Technology

Course Syllabus: Deep Learning for Visual Computing - CS 323

Offering Department	Computer Science
Course Number	CS 323
Course Title	Deep Learning for Visual Computing
Academic Semester	Spring 2022/2023
Semester Start Date	01/22/2023
Semester End Date	05/17/2023
Class Schedule (Days & Time)	Deep Learning for Visual Computing Lecture CS 323 Tue,Wed 08:00 - 09:25, Building 9 - Room 3223

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Bernard Semaan Ghanem	Bernard.Ghanem@kaust.edu.sa		2125, 1, Al-Khawarizmi (bldg. 1)	

Teaching Assistant(s)

Name	Email
Hasan Abed Al Kader Hammoud	hasanabedalkader.hammoud@kaust.edu.sa
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Course Information

Course Description	This course provides an overview of deep learning applications in visual computing. We will cover some basics of deep learning (e.g. optimization, network architecture, and training best practices) as well as selected applications (e.g. image/video classification, object detection, semantic segmentation, and point cloud segmentation). The selection of the applications is expected to change with different course offerings and will be adapted to the latest research papers in computer vision and computer graphics.
Learning Outcomes	The goals of the course are to learn: (i) the basics of deep neural networks and their training (ii) applications of neural networks in visual computing (iii) the implementation of neural networks that solve visual computing problems in practice
Textbook/Materials	CS231n course lectures/tutorials; http://cs231n.github.io/ Deep Learning, MIT Press, https://www.deeplearningbook.org/ Pre-recorded lectures

Method of Assessments	85.00% - Homework /Assignments 15.00% - Scientific review article presentation
Nature of the Assignments	Each homework/assignment will be a mini-project that will include programming exercises and a report.There will be a regular reading assignment, where each student ultimately summarizes a set of papers into a comprehensive related work study.
Course Policies	All homework assignments are required. If a student disputes their grade on any homework, they must provide to the instructor (within 48 hours of receiving the graded homework) sufficient evidence for the need to re-grade the homework. Incomplete (I) grade for the course will only be given under extraordinary circumstances such as sickness, and these extraordinary circumstances must be verifiable.
Additional Information	Required Knowledge: Python programming skills Machine Learning Visual Computing (Vision or Graphics) experience

Tentative Course Schedule
(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Tue 01/24/2023 Wed 01/25/2023	Course Introduction and Convolutional Neural Network Examples
2	Tue 01/31/2023 Wed 02/01/2023	Image Classification
3	Tue 02/07/2023 Wed 02/08/2023	Loss Functions and Optimization
4	Tue 02/14/2023 Wed 02/15/2023	Backpropagation
5	Tue 02/21/2023	Convolutional Neural Networks
6	Tue 02/28/2023 Wed 03/01/2023	Activation functions, initialization, dropout, normalization
7	Tue 03/07/2023 Wed 03/08/2023	Update rules, ensembles, data augmentation, transfer learning
8	Tue 03/14/2023 Wed 03/15/2023	Neural Network Architectures
9	Tue 03/21/2023 Wed 03/22/2023	Recurrent Neural Networks; Transformer
10	Tue 03/28/2023 Wed 03/29/2023	Generative Adversarial Networks and Encoders
11	Tue 04/04/2023 Wed 04/05/2023	Generative Adversarial Networks and Encoders
12	Tue 04/11/2023 Wed 04/12/2023	Visualizing and Understanding Neural Networks
13	Tue 04/18/2023 Wed 04/19/2023	Graph Convolutional Networks and Point Cloud Processing
14	No schedule	Network Inversion
15	Tue 05/02/2023 Wed 05/03/2023	Network Robustness and Certification

Week	Lectures	Topic
16	Tue 05/09/2023 Wed 05/10/2023	Guest Lectures

Note
The instructor reserves the right to make changes to this syllabus as necessary.