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

Course Syllabus: Machine Learning - CS 229

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	CS 229
Course Title	Machine Learning
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (Days & Time)	10:30 AM - 12:00 PM | Mon Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Xiangliang Zhang	Xiangliang.Zhang@kaust.edu.sa	+966128080313	4413, 1, Al-Khawarizmi (bldg. 1)	

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	Machine Learning is a science of getting machines to learn, more specifically, designing algorithms that allow computers to learn from empirical data. In the past decade, Machine Learning has successfully made computers to recognize speeches and hand-written characters, to convert spoken words to text, to effectively search our needed information, and to recommend products/books/movies that we potently like. In this class, you will learn the most important machine learning techniques, not only the theoretical foundations of these techniques, but also the practice implementation of them. The main topics will include linear and non-linear regression, nonparametric methods, Bayesian methods, support vector machines, kernel methods, Artificial Neural Networks, deep network, model selection, learning theory, VC dimension, clustering, EM, dimensionality reduction, PCA, SVD, and reinforcement learning.
Course Description from Program Guide	Topics: linear and non-linear regression, nonparametric methods, Bayesian methods, support vector machines, kernel methods, Artificial Neural Networks, model selection, learning theory, VC dimension, clustering, EM, dimensionality reduction, PCA, SVD, and reinforcement learning.
Goals and Objectives	Students will understand the most important machine learning techniques, and be able to implement and apply these techniques on solving real problems.
Required Knowledge	Students should know linear algebra and basic probability and statistics. Familiarity with artificial intelligence recommended. Students should also know programming, at least be good at one programming skill.
Reference Texts	Pattern Recognition and Machine Learning, Chris Bishop, 2006. The lectures may not be compatible with the textbook. Reading literatures coupling with the course content will be post on-line, as well as the slides.
Method of evaluation	**30.00**% - Course Project(s) **70.00**% - Homework /Assignments

Nature of the assignments	The homework will be assigned after the conclusion of each topic (see the homework assignment and due date at the course webpage). If submitting the homework after the due date, the homework will be graded for correctness, but not credited. The homework will consist of both conceptual questions and practical exercises, which require programing works in C/C++, or Matlab, or Java, etc. Each homework has 100 pts. The final homework score will be the average taking on all assigned homework. The project of CS 229 should be an implementation of what you learned from the course. It can be a work 1. designing a novel algorithm for supervised or unsupervised learning; 2. extending, improving, or speeding-up some existing algorithms; 3. comparing and discussing a bunch of machine learning algorithms; etc. The project will be evaluated by: Technical quality (30) + significance (30) + novelty/impact (20) + report/ presentation (20)?
Course Policies	Only one homework deadline extension is allowed for each student. Students should notify the instructor in advance of missing any class or as soon as possible thereafter. Any absence without notification will be reported to Graduate affair.
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Mon 01/29/2018 Wed 01/31/2018	Regression
2	Mon 02/05/2018 Wed 02/07/2018	Regression
3	Mon 02/12/2018 Wed 02/14/2018	Regression
4	Mon 02/19/2018 Wed 02/21/2018	Discriminative Algorithms
5	Mon 02/26/2018 Wed 02/28/2018	Bayesian classifier
6	Mon 03/05/2018 Wed 03/07/2018	Decision Tree Learning
7	Mon 03/12/2018 Wed 03/14/2018	Neural Networks
8	Mon 03/19/2018 Wed 03/21/2018	Deep Learning
9	Mon 03/26/2018 Wed 03/28/2018	Support Vector Machine
10	Mon 04/02/2018 Wed 04/04/2018	SVM and VC-Dimension
11	Mon 04/09/2018 Wed 04/11/2018	K-means and EM
12	Mon 04/16/2018 Wed 04/18/2018	Clustering
13	Mon 04/23/2018 Wed 04/25/2018	PCA Learning
14	Mon 04/30/2018 Wed 05/02/2018	SVD
15	Mon 05/07/2018 Wed 05/09/2018	Reinforcement Learning
16	Mon 05/14/2018 Wed 05/16/2018	Project presentation
17	Mon 05/21/2018 Wed 05/23/2018	
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Note

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