King Saud University
CS462: Machine Learning
1446-1

1. Course Basics

1.1 Prerequisite

CSC 361 - Artificial Intelligence

1.2 Instructors

1.3 Textbook & References

1. Data Mining: Practical Machine Learning Tools and Techniques 4th Ed., Ian H. Witten, Eibe Frank, Mark A. Hall, Christopher J. Pal ,2016
2. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 3rd Edition, by by Aurélien Géron (Textbook).
3. The Hundred-Page Machine Learning Book by Andriy Burkov. (Textbook).
4. Introduction to Machine Learning, third edition by Ethem Alpaydin.
5. The Elements of Statistical Learning Book by Jerome H. Friedman, Robert Tibshirani, and Trevor Hastie.
6. Machine Learning, Tom Mitchel, 1997,

1.4 Blackboard

- Course schedule, announcements, lecture slides, assignments.
- Grades will be posted to LMS.
- Homework/assignments will be submitted (per published deadlines) via LMS.

2. Course Overview

2.1 Course Description

This course gives an overview of machine learning concepts, techniques, and algorithms. Topics include Linear Regression, Logistic Regression, Support Vector Machine, Decision Tree Learning, k-Nearest Neighbors, Gradient Descent, Feature Engineering, Cross Validation, Underfitting and Overfitting, Regularization, Model Performance Assessment, Neural Networks, Backpropagation, Convolutional Neural Networks, Ensemble Learning, K-Means & DBSCAN Clustering, and practical examples.

2.2 Course Learning Outcomes

After completing this course successfully, student should have the following capabilities:

1. Understand the fundamentals of machine learning algorithms, including supervised and some unsupervised learning techniques.
2. Learn how to prepare data for machine learning models utilizing techniques such as feature engineering.
3. Develop critical thinking and problem-solving skills to identify and address common challenges in machine learning, such as overfitting, underfitting, and biased data.
4. Know how to evaluate the performance of machine learning models using appropriate metrics and techniques.
5. Gain practical experience implementing machine learning algorithms using popular machine learning libraries and frameworks, such as scikit-learn and TensorFlow.

2.3 Course Topics

No	List of Topics
1	Introduction to Machine Learning
2	Feature Engineering
3	Regression
4	Logistic Regression
5	Regularization
6	Model Performance Assessment, Cross Validation
7	Neural Networks, Backpropagation
8	Loss Function
9	Convolutional Neural Networks
10	Support Vector Machine
11	Underfitting and Overfitting, Diagnostics
12	Decision Tree Learning
13	k-Nearest Neighbors
14	Principal Component Analysis
15	Unsupervised learning: K-Means & DBSCAN Clustering
16	Ensemble Learning
17	Imbalanced Datasets
18	[time-permitting] Working With Text in ML, Large Language Model (LLM)
19	[time-permitting] AutoML, Cloud Computing ML Services

2.4 Assessment

Category	Percent
Homework	10%
Term Project	10%
Midterms (2)	40%
Final Exam	40%

There will be no make-up or extra-credit assignments at the end of the semester; your grade should be a measure of your semester-long progress.

4. Course Policies

4.1 Exam Policies

- Make-up exams for Midterms will be considered only with evidence and the approval of the CCIS Exam Committee. The student is fully responsible for following-up her request.
- Please arrive early to your exam room.
- Mobiles are NOT allowed in the exams.
- Borrowing is not allowed in the exams; please bring your complete kit.
- All exams are closed book. Do not bring any external notes or papers.
- More than one answer is not acceptable for a single question.
- Academic dishonesty is strictly prohibited, and both parties will be penalized and will be given "zero".

4.2 Deadline Policy

- All assignments and projects will be given with a strict deadline. Students are required to submit their assignments and projects on or before the deadline. Late submissions will not be accepted. In case of extenuating circumstances, students are advised to contact their lecturer as soon as practical. Exams, quizzes, assignments, and projects must be student's individual work.

4.3 Attendance Policy

- Students are encouraged to participate actively in class discussion and presentation.
- The attendance policy follows the guidelines stated in the KSU Catalogue (http://www.KSU.edu.sa/). Any student with absence of 25% or more will be barred from entering the final exam, NO EXCEPTIONS will be made.
- All work missed because of absences will receive a grade of zero. Excused absences are those resulting from the student's participation in a University-sponsored activity, from recognizable emergencies, or from serious illness. (upon approval).
- An excuse for being absent is accepted only if it is legitimate and submitted within one week of the absence date.

4.5 Honor Code:

- All students are expected to abide by the KSU Student Conduct Code. This policy is rigorously enforced. Sharing, collaboration, or looking at any code or algorithm for the programming projects that is not your own, including resources from Internet, is considered cheating.

4.6 Email Guidelines

- Your email header must start with [CSC462]
- Use your student email address.
- Please write your name and your ID at the end of the email.