ISE 529 Predictive Analytics

Section : 31546D
Spring 2024 Mon,Wed 12:00 – 1:50 PM; OHE 100D

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Required textbooks

1. Learning from Data (optional), by Yaser S. Abu-Mostafa, Malik Magdon-Ismail, and Hsuan-Tien, Lin (http://amlbook.com)

2. Machine Learning: A Probabilistic Perspective (optional), The MIT Press, by Kevin P. Murphy

3. Neural Networks and Deep Learning (optional): A Textbook, Springer, by Charu Aggarwal

Workload

● Roughly ten homework assignments for the semester
● No late homework will be accepted
● Start your homework assignments early
● Some quizzes are class activities. The quiz will also possibly count as extra credit.

Examinations

● Two projects: 1 Midterm exam, 1 Final exam

Grade Distribution

● Homework 70%; Projects 30%

Goals

This course aims to learn fundamental machine learning methods for practical implementations and experimentation.

Upon successful completion of this course, students will be able to:

● SLO1: Students will be able to demonstrate the different types of machine learning algorithms.

- SLO2: Students will be able to demonstrate using linear models for regression and classification estimations.
- SLO3: Students will be able to recognize and explain why support vector machine (SVM) is a powerful and versatile machine learning model.
- SLO4: Students will be able to implement an end-to-end machine-learning project
SLO5: Students will be able to describe the main approaches for dimensionality reduction.
- SLO6: Students will be able to analyze the impact of unsupervised learning models on real-world application
SLO7: Students will be able to identify the architectures of neural networks and implement basic deep learning networks.

SCHEDULE

**Subject to Change

Class days	Date assigned	Topic
Jan 8		Introduction / Syllabus
Jan 10	HW 1 Processing Mining	Introduction to Machine Learning & Process Mining
Jan 15		**No Class (MLK Day)**
Jan 17		Preprocessing and process mining project
Jan 22	HW 2 Feature Scaling	Data Preprocessing
Jan 24		Simple Linear Regression and Multiple/Polynomial Linear Regression
Jan 29		Support Vector Regression, Decision Tree, RandomForest
Jan 31	HW3 Regression	Logistic Regression
Feb 5		Quiz 1 (Class activity)
Feb 7		KNN & SVM
Feb 12	HW4 Regression 2	**No class (Presidents Day)**
Feb 14		Naïve Bayes
Feb 19		XGBoost, CatBoost
Feb 26	HW5 Classification	NLP

Feb 28		K-means
Mar 4		Quiz 2 (Class activity)
Mar 6	HW 6 NLP	**Midterm Exam**
Mar 11		**No Classes (Spring Break)**
Mar 13		**No Classes (Spring Break)**
Mar 18	HW 7 Clustering	K-means cont. Clustering
Mar 20		Neural Networks
Mar 25		Neural Networks
Mar 27	HW 8 ANN	CNN
Apr 1		CNN
Apr 3		Imbalanced data
Apr 8	HW 9 Imbalanced	HandlingOutliers
Apr 10		Dimension reduction
Apr 15		Interview Questions Session 1
Apr 17	HW 10 CNN	Interview Questions Session 2
Apr 22		Quiz 3(class activity)
Apr 24		Final Review
Apr 29		**Final Exam**

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific- misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu or to the Department of Public Safety http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call engemannshc.usc.edu/counselingFree and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call suicidepreventionlifeline.org Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, seven days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call engemannshc.usc.edu/rsvp Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776
Dsp.usc.edu Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test-taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu Information on events, programs, and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various student resources.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenues to report a crime. Latest updates regarding safety, including how instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
Dps.usc.edu
Non-emergency assistance or information.