COEN140 Machine Learning and Data Mining (Spring 2021)

Course Syllabus

Instructor: Dr. Ying Liu, email: yliu15@scu.edu
Homepage: http://www.cse.scu.edu/~yliu1/

Office Hours: Thursday, 10:30AM - 11:30AM, Online, or by appointment

TA: Xuyang Wu, email: xwu5@scu.edu

Lectures: COEN140 Monday, Wednesday, Friday, 10:30AM - 11:35AM, Online
Labs: COEN140L-01 Wednesday, 2:15PM - 5:00PM, Online
COEN140L-02 Thursday, 2:15PM - 5:00PM, Online

Course Description:

Machine learning as a field has become increasingly pervasive, with applications from the Web (search, advertisements, and recommendation) to national security, from analyzing biochemical interactions to traffic and emissions to astrophysics. This course presents an introduction to machine learning and data mining, the study of computing systems that improve their performance through learning from data. This course is designed to cover the main principles, algorithms, and applications of machine learning and data mining. Prerequisites: a grade of C- or better in AMTH 108, MATH 53, and COEN 12. (4 units)

References:

1. "Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, by Aurélien Géron, ISBN-13: 978-1491962299, ISBN-10: 1491962291.
2. "Pattern Recognition and Machine Learning", 1st Edition, by Christopher M. Bishop, Springer, 2006. ISBN-13: 978-0387310732.
3. "Learning Python", 5th Edition, by Mark Lutz, O'Reilly Media, Inc., 2013. ISBN: 978-1-449-35573-9.
4. Pattern Classification, 2nd Edition, by R. O. Duda, P. E. Hart, and D. G. Stork, Wiley 2001. ISBN-13: 978-0471056690
5. Machine Learning: A Probabilistic Perspective, by Kevin P. Murphy, The MIT Press, 2012. ISBN-13: 978-0262018029.
6. Website: http://cs231n.stanford.edu/

Learning Outcomes:

1. Ability to identify various use cases of supervised learning and unsupervised learning.
2. Ability to understand model overfitting and regularization.
3. Ability to apply maximum likelihood estimation for parameter estimation of machine learning models.
4. Ability to implement gradient descent algorithm.
5. Ability to evaluate machine learning techniques using appropriate metrics.

Schedule (subject to change):

Week 1: Introduction, Linear Algebra Review.

Week 2: Regression.

Week 3: Gradient Descent, Clustering.

Week 4: Logistic Regression.

Week 5: Neural Network.

Week 6: Deep Learning.

Week 7: Maximum Likelihood Estimator, Bayesian Classifier.

Week 8: Decision Trees.

Week 9: Principal-Component Analysis, Linear Discriminant Analysis.

Week 10: Review.

Grading (Lecture session and lab session will be given the same letter grade)

	Percentage (100%)
Homework Assignments	20%
Lab Assignments	20%
Midterm Exam	25%
Final Exam	35%

Late homework/lab assignment submission and make-up exam policies:

Late homework or lab assignment will be accepted after it is due with a penalty of 20% of the maximum score value for the assignment per day late.

Make-up exams will not be given except for legitimate reasons with supporting documents (such as a medical reason with a doctor's official note) with prior approval from the instructor.

Academic Integrity:

The Academic Integrity pledge is an expression of the University's commitment to fostering an understanding of -- and commitment to -- a culture of integrity at Santa Clara University. The Academic Integrity pledge, which applies to all students, states:

I am committed to being a person of integrity. I pledge, as a member of the Santa Clara University community, to abide by and uphold the standards of academic integrity contained in the Student Conduct Code.

Students are expected to uphold the principles of this pledge for all work in this class. For more information about Santa Clara University's academic integrity pledge and resources about ensuring academic integrity in your work, see http://www.scu.edu/academic-integrity.

Disabilities Resources:

If you have a documented disability for which accommodations may be required in this class, please contact The Office of Accessible Education (OAE), Benson 1, https://www.scu.edu/oae/ as soon as possible to discuss your needs and register for accommodations with the University.