CSE 5523: Machine Learning and Statistical Pattern Recognition

Introduction to basic concepts of machine learning and statistical pattern recognition; techniques for classification, clustering and data representation and their theoretical analys

Details

Tuesday, Thursday, 11:10-12:30

Place: Dreese 480

Instructor: Alan Ritter (ritter.1492@osu.edu)

Office Hours: Tuesday 4-5pm, Dreese 595

TA: Shi Zong (zong.56@buckeyemail.osu.edu)

Office Hours: Wednesday 3-4pm Dreese 176

Textbooks:

Kevin Murphy Machine Learning: a Probabilistic Perspective (http://www.cs.ubc.ca/~murphyk/MLbook/index.html)

Hal Daume III A Course in Machine Learning (http://ciml.info/) (free online)

There will be other readings as well

Grading

Grading will be based on:

Participation (10%)

You will receive credit for asking and answering thoughtful questions related to the homework on Piazza and engaging in class discussion.

Homeworks (50%)

The homeworks will include both written and programming assignments. Homework should be submitted to the Dropbox folder in Carmen (https://carmen.osu.edu/) by 11:59 on the day it is due (unless otherwise instructed). Each student will have 3 flexible days to turn in late homework throughout the semester. As an example, you could turn in th first homework 2 days late and the second homework 1 day late without any penalty. After that you will loose 20% for each day the homework is late. Please email your homework to the instructor in case there are any technical issues with submission.

Midterm (20%)

There will be an in-class midterm on Ocbober 30.

Final Projects (20%)

The final project is an open-ended assignment, with the goal of gaining experience applying the techniques presented in class to real-world datasets. Students should work in groups of 3-4. It is a good idea to discuss your planned project with the instructor to get feedback. The final project report should be 4 pages and is due on December 10. The report should describe the problem you are solving, what data is being used, the proposed technique you are applying, how you plan to evaluate your solution in addition to w baseline is used to compare against.

Resources

- Piazza (discussion, announcements and restricted resources). https://piazza.com/class/jl02j1py12v28l?cid=1 (https://piazza.com/class/jl02j1py12v28l?cid=1)
- Carmen (homework submission + grades). https://osu.instructure.com/courses/46947 (https://osu.instructure.com/courses/46947)

Academic Integrity

Any assignment or exam that you hand in must be your own work (with the exception of group projects). However, talking with others to better understand the material is strongly encouraged. Copying a solution or letting someone copy your solution is cheating. Everything you hand in must be your own words. Code you hand in must be writte by you, with the exception of any code provided as part of the assignment. Any collaboration during an exam is considered cheating. Any student who is caught cheating will reported to the Committee on Academic Misconduct. Please don't take a chance - if you are having trouble understanding the material, let us know and we will be happy to h

Homeworks

- Homework 1 (5523_hw/hw1.pdf) (Due 8/30, hand in a paper copy at the beginning of class)
- Homework 2 (https://github.com/aritter/5523_decision_trees) (Due 9/11 submit to Carmen by 11:59pm)
- Homework 3 (5523_hw/hw3.pdf) (Due 9/27 hand in a papaer copy at the beginning of class)
- Homework 4 (https://github.com/aritter/5523_linear_brain) (Due 11/8, turn in to the dropbox on Carmen)
- Homework 5 (https://github.com/aritter/5523_gmm) (Due 12/5, turn in to the dropbox on Carmen)

Anonymous Feedback

https://goo.gl/forms/ajvb9dJaTHsWh7sS2 (https://goo.gl/forms/ajvb9dJaTHsWh7sS2)

Tentative Schedule:

https://docs.google.com/spreadsheets/d/1wDjARgTT-vvlsKtm02c9Hk8VAr1IkjDJ-wAOKTebGRI/edit?usp=sharing (https://docs.google.com/spreadsheets/d/1DHeXN1zsABMSAnhzJW77fAoN61CnmdRf_KgXbHKiFY0/edit#gid=0)

Reading Assignments

Date	Topic	Required Reading	Suggeste
8/21	Course Overview (5523_slides/introduction.pdf)	Murphy Chapter 1 (http://www.cs.ubc.ca/~murphyk/MLbook/pml-intro-22may12.pdf)	Probabilit v=Tk4ubu Linear Alg (https://w
8/23	Decision Trees (5523_slides/dtrees.pdf)	CIML Chapter 1 (http://ciml.info/dl/v0_9/ciml-v0_9-ch01.pdf)	Murphy 1
8/30	Guest Lecture (Wei Xu)		Extracting (https://ta
9/4	Statistical Estimation (https://github.com/aritter/aritter.github.io/raw/master/courses/5523_slides/estimation.pdf)	Murphy Chapter 3.1-3.4	
9/6	Statistical Estimation (cont)	Murphy Chapter 3.4-3.5	CIML Cha
9/11	Dirichlet-Multinomial + Naive Bayes (5523_slides/dirichlet_nb.pdf)	Murphy Chapter 3.4-3.5	CIML Cha
9/13	Linear Regression (5523_slides/linear_regression.pdf)	Murphy Chapter 7.1-7.3, 7.5	7.4, 7.6
9/18	Logistic Regression (5523_slides/logistic_regression.pdf)	Murphy 8.1,8.2,8.31,8.32	Tom Mitch (http://ww
9/18 @ 4pm	Guest Lecture by Eunsol Choi (University of Washington) (https://cse.osu.edu/events/2018/09/guest-speaker-eunsol-choi)		QuAC Pap
9/19 @ 4:30pm	Guest Lecture by Mark Yatskar (Allen Institute for Artificial Intelligence) (https://cse.osu.edu/events/2018/09/guest-speaker-eunsol-choi)		Gender Bi (http://ma
9/20	Logistic Regression (5523_slides/logistic_regression.pdf)	Murphy 8.3.7, 8.5, 8.6.1	Ng & Jord discrimina
9/24	Perceptron (5523_slides/perceptron.pdf)	CIML Chapter 4 (http://ciml.info/dl/v0_99/ciml-v0_99-ch04.pdf)	
9/26	Instance-Based Learning (5523_slides/ibl.pdf)	CIML Chapter 3 (http://ciml.info/dl/v0_99/ciml-v0_99-ch03.pdf)	
10/2	Kernel Methods (5523_slides/kernels.pdf)	CIML 11.1, 11.4 (http://ciml.info/dl/v0_99/ciml-v0_99-ch11.pdf)	
10/4	SVMs (5523_slides/svm.pdf)	CIML Chapter 7 (http://ciml.info/dl/v0_99/ciml-v0_99-ch7.pdf)	Murphy 1
10/15	Course Project (5523_slides/project.pdf) + Boosting (cont) (5523_slides/boosting.pdf)	CIML Chapter 13 (http://ciml.info/dl/v0_99/ciml-v0_99-ch13.pdf)	Murphy 1
	Boosting (5523_slides/boosting.pdf)	Murphy 16.4	

	Neural Networks (5523_slides/nn.pdf)	Murphy 16.5	CIML Cha Learning E (http://ww
10/25	Midterm Review (5523_slides/midterm_review.pdf)		
11/13	Expectation Maximization / Unsupervised Learning (5523_slides/em.pdf)	Murphy Chapter 11	CIML Cha
11/19	Convolutional Neural Networks (5523_slides/cnn.pdf)	Deep Learning Book Chapter 9 (http://www.deeplearningbook.org/contents/convnets.html)	
11/28	Recurrent Neural Networks (5523_slides/rnn.pdf)	Deep Learning Book Chapter 10 (http://www.deeplearningbook.org/contents/rnn.html)	
12/4	Generative Models (5523_slides/generative_models.pdf)		