Machine Learning and Computational Statistics (DS-GA 1003)

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Logistics

- Class webpage: https://davidrosenberg.github.io/ml2015
 - Syllabus on the website
- Piazza: https://piazza.com/nyu/spring2015/dsga1003
 - Ask questions here
- Required Lab Session
 - Thursdays: 6:10pm 7pm (WWH 109)
 - First session: Guest lecture on differentiating w.r.t matrices and vectors
 - Lab instructor: TBD

Lab Sessions

- Supplemental Topics
- Mathematical topics (e.g. subgradients, matrix derivatives, SVD)
- Demonstrations or examples related to lecture
- Answer common questions from Piazza
- Midterm review
- Meeting with project advisors

Evaluation

- About 8 to 10 homeworks (60%)
- Midterm Exam (20%)
 - In 10th week of class, after spring break
- Project (20%)
- Extra Credit Opportunities
 - Up to (2%) for answering questions on Piazza
 - Optional problems or competitions on the homework

Homework (60%)

- First assignment out tonight Due in one week.
- Submit with NYU Classes: https://newclasses.nyu.edu
- Late homework: Accepted up to 48 hours late with 20% penalty
- Collaboration is fine, but
 - Write up solutions and code on your own
 - List names of who you talked to about each problem
- Graders:
 - Hao Xu, Ran Bi, Prasoon Goyal

Midterm (20%)

- Late midterm: 10th week of term (April 8th)
- In class during lecture

Projects (20%)

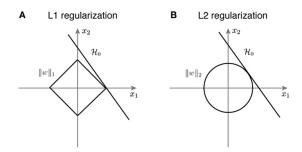
- Find some new data or new approach to old data
- Project philosophy the same as in these courses:
 - http://cs.nyu.edu/~dsontag/courses/ml14/assignments/ projects.html
 - http://web.stanford.edu/class/cs221/project.html
- Logistics:
 - 2 students per group
 - First meeting with advisors March 12th
 - Project proposal due after Spring Break: March 26th
- Advisers:
 - Kurt Miller, Gideon Mann, plue one or two more TBD

Prerequisites

- Introduction to Data Science (DS-GA 1001)
- Math
 - Multivariate Calculus
 - Linear Algebra
 - Probability Theory
 - Statistics
- Python programming (numpy)

General Philosophy

- Mastery vs Performance
 - (understanding vs "getting the grade")
- Don't confuse "kind of understanding" with "actual understanding"
- Can you explain this picture?



Course Topics

- Frequentist Approaches
 - ERM, regularization, SVM, kernels, ensemble methods, neural networks
- Probabilistic Models
 - GLM, Bayesian networks, Gaussian mixture models, EM algorithm, HMM
- Bayesian Approaches
 - priors/posteriors, hierarchical models, sampling methods, Bayesian model selection
- Misc. and Advanced Topics
 - dimensionality reduction, structured prediction

Questions?

- What are you looking to get out of the course?
- Questions for me?