Course Logistics

CS698X: Topics in Probabilistic Modeling and Inference

Piyush Rai

Course Logistics

- Course Name: Topics in Probabilistic Modeling and Inference (TPMI) – CS698X
- Usually 2 lectures every week in form of videos (hosted on mooKIT)
  - Posted on Tuesday/Thursday evening
  - mooKIT URL: https://hello.iitk.ac.in/cs698x2021/ (CC id and password for login)
- An additional discussion session every Tuesday, 6:15pm-7:30pm (via Zoom)
  - Login details will be shared soon
- All material (readings etc) will be posted on the mooKIT page for the course
- Q/A and announcements on Piazza. Please sign up
  - Link: https://piazza.com/iitk.ac.in/secondsemester2021/cs698x

Course Team

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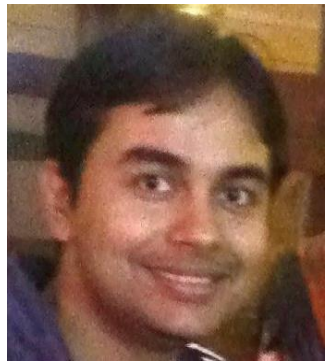

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Workload and Grading Policy

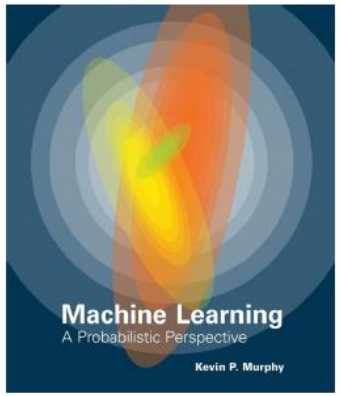
- 4 Homeworks (theory+programming): 40%
  - Must be typeset in LaTeX. To be uploaded on Gradescope (login details will be shared)
- Mid-sem exam: 15% (held online, February 21-27)
- End-sem exam: 25% (held online, May 3-12)
  - Will have a viva component as well
- 4 quizzes (held online) OR course project: 20%
  - Need to inform us which of the two options you will take
  - Projects have to be done in groups of 4 (no exceptions)
  - We will give you some possible project topics
  - However, you should choose project option only if you have a prior experience of working on ML projects, ideally involving some probabilistic modeling and inference

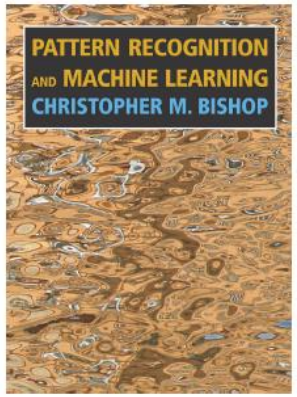
Tentative dates for release of homeworks: Feb 4, Feb 18, March 18, April 8

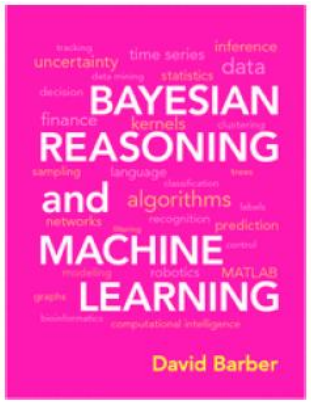
Tentative dates for quizzes: Feb 4, March 16, April 6, April 22

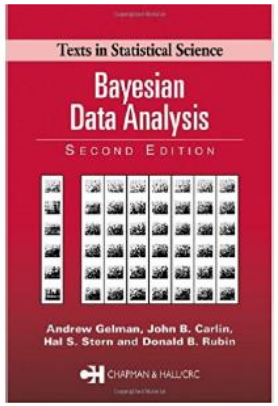
Textbook and Readings

- Textbook: No official textbook required
- Required reading material will be provided
- Some books that you may use as reference
  - Kevin Murphy, Machine Learning: A Probabilistic Perspective (MLAPP), The MIT Press, 2012.
  - Christopher Bishop, Pattern Recognition and Machine Learning (PRML), Springer, 2007.
  - David Barber. Bayesian Reasoning and Machine Learning (BRML), Cambridge Univ. Press, 2012.
  - Andrew Gelman et al. Bayesian Data Analysis (BDA), Chapman & Hall/CRC, 2013









Course Policies

- Policy on Homeworks
  - Homework solutions must be in your own words
  - Must cite sources you have referred to or used in preparing your HW solutions
  - No requests for deadline extension will entertained. Plan ahead of time
  - Late submissions allowed up to 3 days with 10% penalty per 24 hour delay (hourly basis)
  - Every student entitled for ONE late homework submission without penalty (use it wisely)
  - Discussion forums (e.g., Piazza) not to be used to extract answers to homework problems

- Policy on collaboration/cheating
  - Punishable as per institute's/department's rules
  - Plagiarism from other sources will also lead to strict punishment
  - Both copying as well as helping someone copy will be equally punishable

Background Expected

- Basic concepts from probability theory (see prob-stats refresher on webpage)
  - Random variables, various discrete/continuous distributions
  - PDF, CDF, expectation, variance, mutual information, entropy, KL divergence
- Basic methods for parameter estimation for probability distributions (e.g., MLE)
- Familiarity with basic probabilistic models in machine learning, e.g.,
  - Probabilistic view of linear regression, logistic regression, generative classification
  - Latent variable models (e.g., Gaussian mixture model, probabilistic PCA)
- Familiarity with standard machine learning models, e.g.,
  - Nearest neighbors, kernel methods, logistic regression, SVM
  - Standard algos for clustering, dimensionality reduction, matrix factorization
- Familiarity with basic optimization methods, e.g.,
  - Gradient descent, stochastic gradient descent, alternating optimization
  - Basic opt. algos for latent variable models (e.g., expectation maximization)
- Programming in Python

Coming Up Next

- Introduction to Probabilistic Modeling and Inference