

Introduction to Machine Learning

(CS 412)

3 or 4 credit hours

Prerequisites: CS 251; and IE 342 or STAT 381; or consent of instructor

Fall 2017

Instructor: Dr. Xinhua Zhang	CRNs: 38992, 38993
SEO 1237	Lectures: TuTh 9:30-10:45AM
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Teaching Assistant: Vignesh Ganapathiraman	
Office location: SEL 4029	
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Office hours start from week 2 (week of Sept 4).

Course webpage: Blackboard, and <https://piazza.com/uic/fall2017/cs412/home>

Course description:

Machine learning is the study of systems that improve automatically based on past experience. This course will introduce common machine learning tasks (e.g., classification, density estimation, clustering, bandit learning) and some of the successful machine learning techniques and broader paradigms that have been developed for these tasks. The course is programming-intensive and a large emphasis will be placed on tying machine learning techniques to specific real-world applications through hands-on experience.

COURSE MATERIALS

Required Texts (available electronically via UIC library or web)

Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. MIT Press, 2012.

Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani. An Introduction to Statistical Learning. Spring, 2013.

Eligibility

At the second lecture of the course, a quiz will be given to evaluate students' background in linear algebra, probability/statistics, and data structure and algorithm. A threshold will be set for eligibility in the course. Anyone can attend the quiz, with no need of registration.

COURSE POLICIES

Collaboration Policy

Discussion of homework assignments and solutions with other students is permitted. However, each student must submit his or her own write-up for the homework assignment and fully understand what he or she submits. Each student should be prepared to explain his or her homework assignment submissions to the instructor and teaching assistant if his or her “full understanding” is in doubt.

For computer programs, if for some reason we cannot determine who copied from whom, we may, at our discretion, give failing grades to both students. It is the responsibility of all engineering and computer science professionals to safeguard their company’s “trade secrets.” An employee who allows trade secrets to be obtained by competitors will almost certainly be fired. So, YOU are responsible for making sure that your directories have permissions set so that only you can read your files, for being sure to log out at the end of working in the computer lab, etc.

Policy for Missed or Late Work

Each student is allowed up to three (3) late days total for all homework assignments (not 3 late days for each homework assignment) with no penalty. Beyond these “free” late days, late submissions of homework will be penalized up to 50% if received within three (3) days of the deadline. No credit will be awarded for homework submitted beyond three (3) days after the deadline without prior permission for extenuating circumstances.

Electronic Communication

Blackboard will contain all materials relevant to the class, syllabus, assignments, lecture notes etc. You can also see you own grades there. We will use Piazza for discussions. Please post general questions about the course content, assignments, etc. to Piazza (after reading existing discussions). Questions of a personal nature (e.g., involving grading of specific assignments) should be sent via email to both TA and professor.

Academic Integrity Policy

Academic misconduct will be handled according to UIC's Student Disciplinary Policy: <http://dos.uic.edu/conductforstudents.shtml>

RELIGIOUS HOLIDAYS

Students who wish to observe their religious holidays shall notify the faculty member by the tenth day of the semester of the date when they will be absent. The faculty member shall make every reasonable effort to honor the request, not penalize the student for missing the class, and if an examination or project is due during the absence, give the student an exam or assignment equivalent to the one completed by those students in attendance. If the student feels aggrieved, he/she may request remedy through the campus grievance procedure.

<http://oae.uic.edu/docs/ReligiousHolidaysFY20152017.pdf>

Statute of Limitations: Three weeks! No grading questions or complaints — **no matter how justified**

— will be listened to **three** weeks after the item in question has been returned.

COURSE TOPICS, METHODS OF EVALUATION, & GRADING POLICIES

Course Topics

- **Tree & instance-based learning** – Decision trees, nearest neighbors
- **Directed graphical models** – Naive Bayes, Bayes nets, hidden Markov models
- **Margin-based learning** – Support vector machines
- **Potential field models** – logistic regression, conditional random fields
- **Unsupervised & semi-supervised learning** – k-means, clustering

Programming languages: Matlab, Octave, or Julia

Evaluation Criteria

Student understanding of course material and synthesis of knowledge shall be evaluated using typed/written homework assignments, a midterm examination, a final examination and a course project.

Four homework assignments will be due approximately every 3 weeks.

A midterm examination is scheduled to be held in-class on October 12.

The two lectures in the final week (Dec 5 and 7) will be for course project presentation. The report will be due on Dec 8, and maximum 6 pages (template will be provided). Proposal due on Nov 14.

A final examination is scheduled according to UIC policy on Wednesday Dec 13, 10:30-12:30 AM (double confirm later).

Grading Policy

The overall course grade of each student will be determined based on:

Homework assignments: 30%

Midterm exam: 25%

Final exam: 30%

Course Project: 15%

Letter grade assignments will be based on a curved grading scale to reflect the difficulty of the homework assignments and examinations. This curve will be different for undergraduate and graduate students.