



Carnegie Mellon University Course Syllabus

18-794: Pattern Recognition Theory

Fall Semester, 2015

Course Personnel:

Professor:

Marios Savvides

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Email: msavvid@ri.cmu.edu

Office Hours: Fridays 3:30PM to 5:00PM

Teaching Assistants:

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Course Management Assistant:

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Class Schedule:

Lectures: Fridays 12:30PM to 3:20PM in HH B131

Recitations: Mondays 4:30PM to 5:20PM in MM A14

TA Office Hours: TBD

Pre-requisites: 36-217, or equivalent introductory probability theory and random variables course and an introductory linear algebra course and senior or graduate standing.

Undergraduate Course Area: Signals and Systems

Graduate Area: Signal Processing and Communications

Course Description:

Decision theory, parametric and non-parametric density estimation, linear discriminant functions, supervised and unsupervised learning, feature extraction, dimensionality reduction, support vector machines, artificial neural networks, clustering and pattern recognition applications (e.g., face recognition, fingerprint recognition, automatic target recognition, etc.).

Textbook: Pattern Classification, 2nd Edition, *Duda, Hart, Stork*, ISBN 0-471-05669-3

Course Blackboard:

In order to access the course blackboard from an Andrew Machine, go to the login page at: <http://www.cmu.edu/blackboard>. You should check the course blackboard daily for announcements. Students are encouraged to use the blackboard to provide feedback about the course.

Tentative Course Calendar (To be finalized)::

Date	Day	Class Activity
September		
2	F	Introduction & Statistical Decision Theory I
9	F	Statistical Decision Theory II & III
16	F	Principal Component Analysis
23	F	Linear Discriminant Analysis
30	F	Advanced Correlation Filters
October		
7	F	Parametric Density Estimation
14	F	Nonparametric Density Estimation
21	F	<i>Mid-semester Break – No Classes</i>
28	F	Support Vector Machines & Kernels
November		
4	F	Perceptron Learning & Artificial Neural Networks
11	F	Midterm Exam
18	F	Image Processing & Feature Extraction Methods
25	F	<i>Thanksgiving – No Classes</i>
December		
2	F	Advanced Topics: Convolutional Neural Networks & Deep Learning
TBA	TBA	Project Poster Session & Final Project Papers Due

Grading Algorithm (To be finalized):

The final grade will be computed using the below weighting scheme:

- a. Homework Assignments – 28%
- b. Pattern Recognition Hackathon – 10%
- c. Midterm – 20%
- d. Project – 42% (+Bonus 5%)
 - i. 7% Feasibility Study
 - ii. 5% Mid-Progress Review
 - iii. 20% Paper (Conference submissions are encouraged)
 - iv. 10% Poster Session (Demos are encouraged)
 - v. Bonus 5% for novelty and potential of future impact.

Final Project:

The final project represents a big part of this course. It will constitute a team effort (teams of 2 or 3) and will include a written feasibility report, a written progress review, an IEEE-style final paper, a poster presentation and an optional live demo.

Class Pattern Recognition Hackathon:

There will be a 1-day or 2-day hackathon during the class. The aim of the hackathon will be to build the best performing pattern recognition engine for a given task, in a short period of time. More details of this hackathon, including grading scheme, team forming, date, task, etc. will be announced during class hours at a later date.

Homework Policy:

Homework is due at the beginning of class on the date stated on each assignment, unless otherwise mentioned. If you wish to submit your homework early, hand it in to one of the TA's. The written part of the homework does not have to be typeset, however, please write legibly, provide full justification and circle/box your final answers.

Late Homework Policy:

You have a total of 3 late homework days without penalty for the entire semester. You can use all three days on one homework or one day on 3 different homeworks. You cannot use half-days or any other fractions. You cannot use your late days to meet any project deadlines. After you've used up all your late days, your homework will be worth half credit if it is up to 24 hours late, and worth zero credit after that.

Collaboration Policy:

Homework should reflect an individual effort. Each student must hand in his/her own answers. Each student must also write his/her own code for the programming assignments. If you get help from a fellow classmate, indicate with whom you collaborated at the top of your homework. You should take the responsibility to personally understand all the material you hand in.

Academic Integrity:

Students at Carnegie Mellon are engaged in preparation for professional activity of the highest standards. Each profession constrains its members with both ethical responsibilities and disciplinary limits. To assure the validity of the learning experience a university establishes clear standards for student work.

In any presentation, creative, artistic, or research, it is the ethical responsibility of each student to identify the conceptual sources of the work submitted. Failure to do so is dishonest and is the basis for a charge of cheating or plagiarism, which is subject to disciplinary action.

Cheating includes but is not necessarily limited to:

1. Plagiarism, explained below.
2. Submission of work that is not the student's own for papers, assignments or exams.
3. Submission or use of falsified data.
4. Theft of or unauthorized access to an exam.
5. Use of an alternate, stand-in or proxy during an examination.

6. Use of unauthorized material including textbooks, notes or computer programs in the preparation of an assignment or during an examination.
7. Supplying or communicating in any way unauthorized information to another student for the preparation of an assignment or during an examination.
8. Collaboration in the preparation of an assignment. Unless specifically permitted or required by the instructor, collaboration will usually be viewed by the university as cheating. Each student, therefore, is responsible for understanding the policies of the department offering any course as they refer to the amount of help and collaboration permitted in preparation of assignments.
9. Submission of the same work for credit in two courses without obtaining the permission of the instructors beforehand.

Plagiarism includes, but is not limited to, failure to indicate the source with quotation marks or footnotes where appropriate if any of the following are reproduced in the work submitted by a student:

1. A phrase, written or musical.
2. A graphic element.
3. A proof.
4. Specific language.
5. An idea derived from the work, published or unpublished, of another person.

This policy applies, in all respects, to 18-794.

As a final note:

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call [412-268-2922](tel:412-268-2922) and visit their website at <http://www.cmu.edu/counseling/>. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.