CSE 802 ~ Pattern Recognition & Analysis
Spring 2021
Michigan State University

Note:

1. *All lectures will be conducted via Zoom: https://msu.zoom.us/j/93760871214 (password: cse802)*
    a. *Please sign into Zoom using your MSU authentication credentials. Please set up your picture on your Zoom account: https://msu.zoom.us/*
    b. *Carefully read the instructions at https://www.cse.msu.edu/Students/Current_Undergrad/UsingZoom.php in order to familiarize yourself with the Zoom interface.*
    c. *Please follow the net etiquette guidelines posted at https://www.cse.msu.edu/Students/Current_Undergrad/Netiquette.php*
    d. *As much as possible, please turn on your cameras during the lecture.*
    e. *When asking questions or when called on to speak during the lecture, please turn on your camera.*
    f. *It is easy to be distracted with other tasks in an online learning environment. But please stay focused during the online lecture. Otherwise, it may negatively impact your learning experience.*
2. *Course related material will be hosted at the following D2L website: https://d2l.msu.edu/d2l/le/content/1066492/Home.*
3. *If you have any questions or concerns, please feel free to reach out to the Instructor.*
4. *Let's work together to make this a successful and productive semester for each one of you!*

Instructor and Office Hours:
Dr. Arun Ross (rossarun@cse.msu.edu)
Online Office Hours: Thursdays 1:00pm – 2:00pm or by appointment only
Office Hours Zoom Link: https://msu.zoom.us/j/97663856391 (password: cse802)

Lecture Details:
Time: Monday and Wednesday, 12:40pm – 2:00pm
Lecture Zoom Link: https://msu.zoom.us/j/93760871214 (password: cse802)

Textbook:
Pattern Classification by Duda, Hart and Stork, Second Edition, ISBN: 9-780471-056690.

Prerequisites:
CSE 232, MTH 314, and STT 441, or equivalent courses.
An undergraduate level understanding of probability, statistics and linear algebra is assumed. Programming knowledge in Python or Matlab or R or C/C++ is expected.

Course Description:
This course will introduce a graduate audience to salient topics in statistical pattern recognition. These include concepts in **Bayesian decision theory**, **parametric and non-parametric density estimation schemes**, **linear discriminant functions**, **neural networks** and **unsupervised clustering**. Topics in dimensionality reduction and ensemble classifiers will also be visited. The project component of this course will test the student's ability to design and evaluate classifiers on datasets.

Course Topics:

- Introduction to pattern recognition
- Bayesian decision theory
- Density estimation schemes
- Nearest-neighbor rule
- Linear discriminant functions
- Neural networks
- Clustering
- Dimensionality reduction
- Ensemble Classifiers

Grading:

The tentative weight associated with each grading component is as follows:

- Homework - 50%
- Project - 15%
- Midterm exam - 15%
- Final exam - 20%

Final grades will be assigned based on the following scale:

- 90 and above: 4.0
- 85 - 89: 3.5
- 80 - 84: 3.0
- 70 - 79: 2.5
- 60 - 69: 2.0
- Below 60: 0.0

Assignments and exams will be based on (a) topics covered during lectures, (b) PowerPoint files used in lectures, (c) contents of the textbook, and (d) reading material assigned by the instructor. **Students are expected to take down notes during the lecture.**

Grading Policy:

- Assignments have to be turned in before lecture begins on the due date. Late assignments will not be accepted.
- Make-up for exams will only be granted under exceptional circumstances. Instructor reserves the right to deny requests for make-up.

Course Outcomes:

1. A good knowledge of Bayesian decision theory and Bayesian learning.
2. Fundamental understanding of classifiers such as linear discriminant function, quadratic discriminant function, nearest neighbor rule, neural network and SVM.
3. A good understanding of feature selection algorithms.
4. Ability to evaluate the performance of various classifiers on real-world datasets.

Academic Integrity:

Article 2.III.B.2 of the Academic Freedom Report states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the Department of Computer Science and Engineering adheres to the policies on academic honesty as specified in General Student

Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, projects, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; for example, you may not submit course work you completed for another course to satisfy the requirements for this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the Academic Integrity webpage.)

Examples of academic dishonesty include (but are not limited to):

- *Copying another student's code, assignment solutions or quiz/exam answers*
- *Using code implemented by someone else intended to solve this class's assignments (i.e., don't get someone else to do your assignment for you)*
- *Using code independently implemented by someone else without attributing credit (i.e., you can use tools, libraries, or code snippets from the web, but only with proper citation and with permission of the instructor where appropriate)*
- *Using websites and sources, whose purpose is to provide assignment solutions*
- *Distributing course content without instructor permission*
- *Providing false information to the instructor about matters related to the course.*
- *Facilitating another student in any of these activities.*

The Spartan Code of Honor Academic Pledge

As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor in ownership is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.
