Maching Learning COSC6590.001
Department of Computer Science
Summer 2020

A. COURSE INFORMATION

Course number/section: COSC6590.001
Class meeting time: MW: 10:00 – 11:55am
Class location: TBA
Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Minhua Huang
Office location: EN316L
Office hours: M: 9:00am – 10:00am
Telephone: (316)825-3265
e-mail: minhua.huang@tamucc.edu
Appointments: by e-mail

C. COURSE DESCRIPTION

Catalog Course Description

The major topics covered in this course:

- Bayes Rule, Conditional Independence, Naïve Bayes, Bag of Words
- Logistic Regression, Maximizing Conditional Likelihood, Gradient Descent
- Decision Tree Learning
- Kernels, Kernelizing Algorithms, Kernelixing Preceptron
- Surport Vector Machines
- Neural Networks, Backpropagation
- Convolution, Convolutional Neural Networks, LeNet-5 Architecture.

D. PREREQUISITES AND COREQUISITES

Prerequisites
COSC6334 and COSC 5321 and MATH 2432, 2305, and 3311

Corequisites
MATH 2432 and 2305
E. **REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES**

**Required Textbook(s)**
None

**Optional Textbook(s) or Other References**


**Supplies**
None

F. **STUDENT LEARNING OUTCOMES AND ASSESSMENT**

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

- Understand the Bayes rule and the conditional independence
- Understand the logistic regression
- Understand the concepts of the decision tree learning
- Understand the kernels and kernelizing algorithms.
- Understand the Support Vector Machines
- Understand the concepts of neural networks and the backpropagation
- Understand the concepts of convolution and convolutional Neural Networks.

By the end of this course, students should be able to:

1. Apply machine learning knowledge learned from the class to design a computer-based system, process, component, or program
2. Apply machine learning knowledge learned from the class to implement and test a computer-based system, process component, or program to meet desired needs.

Assessment of objectives will be conducted through homework assignments, quizzes, project and exams.
G. INSTRUCTIONAL METHODS AND ACTIVITIES

This course will be a mixture of lectures and discussions. The student is expected to actively participate in all class and lab activities. The student is also expected to read the book and do outside work on assignments.

H. MAJOR COURSE REQUIREMENTS AND GRADING

This is an selected-topic course. This is a difficult course that demands all students attend all classes! Regular completion of all reading, homework, and other outside assignments, are absolutely essential for success in this course. Your course grade will be decided on your performance in the lab activities, homework assignments, quizzes, two mid-term exams, and the final exam. The distribution of points is as follows:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams</td>
<td>40</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15</td>
</tr>
<tr>
<td>Homework</td>
<td>15</td>
</tr>
<tr>
<td>Attendences</td>
<td>10</td>
</tr>
<tr>
<td>Project</td>
<td>20</td>
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</tbody>
</table>

I. COURSE CONTENT/SCHEDULE

- **Grading scale:** A: 100-90, B: 89-80, C: 79-70, D: 69-60, and F: 59-0.
- **Homework Assignments:** there are 3 homework assignments before the midterm.
- **Weekly quizzes.**
- **The first exam will be given on July 1, 2020,** and the final exam will be given on **Aug 5 2020.**
<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction Data Estimating and Probabilities</td>
<td>Chapter 1  Chapter 2’</td>
<td>Assignment 1</td>
</tr>
<tr>
<td>2</td>
<td>Data Estimating and Probabilities Naïve Bayes and Logistic Regression</td>
<td>Chapter 2’  Chapter 3’</td>
<td>Assignment 2</td>
</tr>
<tr>
<td>3</td>
<td>Naïve Bayes and Logistic Regression Decision Tree Learning</td>
<td>Chapter 3’  Chapter 3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Decision Tree Learning Kernels</td>
<td>Chapter 3  Chapter 6(BS)</td>
<td>Assignment 3</td>
</tr>
<tr>
<td>5</td>
<td>Kernels Exam1</td>
<td>Chapter 6(BS)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Exam 1 Support Vector Machines</td>
<td>LectureNotes</td>
<td>Project</td>
</tr>
<tr>
<td>7</td>
<td>Support Vector Machines Artificial Neural Networks</td>
<td>LectureNotes  Chapter 4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Artificial Neural Networks</td>
<td>Chapter 4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Deep Networks</td>
<td>Chapter 9(GF)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Deep Networks Final Exam</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

**J. COURSE POLICIES**

**Attendance/Tardiness**
You must attend all classes and labs. While in class or lab attendance will not directly affect the grade, you are responsible for any materials covered or handed out or announcements made for the tests and assignments in your absence. Records of your attendance will be maintained and reported to the university. Students found missing classes without the instructor's permission will be automatically withdrawn from the course.

**Late Work and Make-up Exams**
Assignments will significantly build on the material from the lectures. They will be posted on the course web page or hard copies are handed out in the class during the lecture or lab sessions. Please refer to the handout on programming assignments for complete details on submission requirements. (Details decided per assignment). All the assignments are due at the beginning of the class on the due date. If the student is absent on the assignment due date,
it is the student’s responsibility to see to it that the assignment is submitted on the designated date. An assignment that is turned in after the class on the due date is considered one day late. There is a penalty for late submissions. 10% penalty for 1 day late, 25% penalty for 2-3 days late, 50% penalty for 4-5 days late, and 100% penalty (i.e. no credit) if submitted after 5 days. If you have not completed your assignment by the due date, you should submit the work you have done for partial credit. No work will be accepted once the graded work has been returned or the solution has been disclosed to the class, except for unusual circumstances which the instructor feels reasonable. Be sure to backup copies of all your programs. Note that any kind of hardware or software failure or machine unavailability in the lab does not merit an extension on the assignment. Diskettes upon which major examinations, assignments, projects or papers submitted may be retained by the instructor as a permanent record of the student’s work.

Extra Credit
There is no EXTRA CREDIT

Cell Phone Use
Cell phones and pagers must be turned off during class. First violation receives a warning. All succeeding violations result in a ten points deduction on the last exam. Any violation during a quiz or exam results in a ten percent deduction off the corresponding paper. No warnings for quizzes or exams.

Laptop Use
Laptops, Tablets cannot be used in the class.

Food in Class
No food in the class or labs.

Missed Exam
In the event, if you cannot attend the class to take the exam due to some emergency or some unavoidable situation (such as serious illness, death in the family, participation in university sports, religious observations, and so on) you must notify me as soon as possible before the exam and also you must validate your absence by providing me a document (e.g., with a letter from your doctor). Once your cause is validated a make-up exam will be given.

K. COLLEGE AND UNIVERSITY POLICIES

- Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic
misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. **Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course.** Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C0.03, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is required to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C0.03, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at
http://academicaffairs.tamucc.edu/rules_procedures/assets/13.02.99.e0.03_student_grade_appeals.pdf). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Civil Rights Complaints**
  Texas A&M University-Corpus Christi is committed to fostering a culture of caring and respect that is free from discrimination, relationship violence and sexual misconduct, and ensuring that all affected students have access to services. For information on reporting Civil Rights complaints, options and support resources (including pregnancy support accommodations) or university policies and procedures, please contact the University Title IX Coordinator, Sam Ramirez (Samuel.ramirez@tamucc.edu) or Deputy Title IX Coordinator, Rosie Ruiz (Rosie.Ruiz@tamucc.edu) x5826, or visit website at Title IX/Sexual Assault/Pregnancy.

**Limits to Confidentiality.** Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees, including instructors, are not able to maintain confidentiality when it conflicts with their responsibility to report alleged or suspected civil rights discrimination that is observed by or made known to an employee in the course and scope of their employment. As the instructor, I must report allegations of civil rights discrimination, including sexual assault, relationship violence, stalking, or sexual harassment to the Title IX Coordinator if you share it with me.

These reports will trigger contact with you from the Civil Rights/Title IX Compliance office who will inform you of your options and resources regarding the incident that you have shared. If you would like to talk about these incidents in a confidential setting, you are encouraged to make an appointment with counselors in the University Counseling Center.
• **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. **OTHER INFORMATION**

• **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.