CSCI 560 01W, Neural Networks and Deep Learning

COURSE SYLLABUS: Spring 2020

INSTRUCTOR INFORMATION

Instructor: Derek Harter, Ph.D., Professor
Office Location: Science 355
Office Hours: T, Th 1 – 3:30 pm
University Email Address: Derek.Harter@tamuc.edu
Preferred Form of Communication**:** e-mail

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Most materials, work and readings will be assigned using freely available online textbooks and resources. We will be using the following as textbooks for the course:

- Deep Learning with Python by Francois Challet
  https://www.manning.com/books/deep-learning-with-python
- Neural Networks and Deep Learning by Michael Nielson
  http://neuralnetworksanddeeplearning.com

Course Description

In this course the theory and practice of neural computation for machine learning are introduced. Artificial neural networks are used for many real-world problems: classification, time-series prediction, regression, pattern recognition. The class starts with an introduction to feed forward neural networks. More complicated multi-layered "deep" networks are then covered. Basic backpropagation, gradient descent and modern regularization techniques are implemented in assignments. The class will look at modern deep learning techniques: convolutional neural networks, deep belief networks and deep recurrent neural models such as LSTM nets. Readings and current results from the literature on neural network research will be discussed.
Prerequisites: CSCI 574.

The syllabus/schedule are subject to change.

Student Learning Outcomes

1. Understand intuitively the mathematical and geometrical basis of how NN work and learn.
2. Be able to use multi-layer feed forward networks to classification and regression machine learning problems.
3. Be introduced to so called deep learning neural networks and their applications.
4. Look at some of the uses and advantages of recurrent neural networks.
5. Be familiar with other types of NN architectures and their uses.

Learning outcomes will be measured through mapping assignment and test questions to specific outcome items, as well as through exit surveys of student experiences with the outcome familarity.

COURSE REQUIREMENTS

Minimal Technical Skills Needed

Students should be proficient in a high level programming language, like C++, Python or Java.

Instructional Methods

All materials, assignments and tests will be conducted through the D2L MyLeo Online learning system.

Student Responsibilities or Tips for Success in the Course

To plan a minimum of three hours of outside preparation for each hour of class is a safe time allocation for successfully completing the course.

GRADING

Final grades in this course will be based on the following scale:

A = 90%-100%
B = 80%-89%
C = 70%-79%
D = 60%-69%
F = 59% or Below

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Assignments: There will be regularly assigned homework problems and programming problems. Assignments will be given and returned via the online MyLeo Online (D2L) system as a convenience to the students and the instructor. I

Assessments

Two Exams: 50% (25% each)
Labs / Programming Assignments (appx. 6-8): 45% (evenly distributed)
Quizzes and Participation: 5% (through MyLeo Online D2L)

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

YouSeeU Virtual Classroom Requirements:
https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

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COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

The instructor's communication response time and feedback on assessments are stated clearly.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies
Attendance/Lateness, Late Work, Missed Exams and Quizzes and Extra Credit

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook. http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: https://www.britannica.com/topic/netiquette

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01. http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

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http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Graduate Student Academic Dishonesty 13.99.99.R0.10

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

Students with Disabilities-- ADA Statement

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 have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu

Website: Office of Student Disability Resources and Services

http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

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Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

COURSE OUTLINE / CALENDAR

1. Week 1: Introduction to Python and Scientific Libraries (NumPy, SciPy, Matplotlib, Pandas). Anaconda and Jupyter Notebook system setup.
2. Week 2-3: Machine Learning review, simple models of neural computation.
3. Week 4-8: Simple Feed forward neural networks. Regression and classification with feed forward networks.
4. Week 9-12: Recurrent Neural Networks.
5. Week 13-16: Deep Learning Systems.

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