CSCE 5218: Deep Learning

General Information
Instructor: Tong Shu  Office: Discovery Park F277
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Course Description
This course aims to cover the basics of modern deep neural networks. Specifically, the first part will introduce the fundamental concepts in neural networks including network architecture, activation function, loss, optimization, etc. Then, the second part will describe specific types of deep neural networks such as convolutional neural networks (CNNs) and graph neural networks (GNNs).

Prerequisite
1) CSCE 5215 - Machine Learning
2) Python Programming

Required Book

Recommended Supplemental Books

Course Syllabus
Tentative Schedule:
- An introduction to neural networks
- The backpropagation algorithm
- Machine learning with shallow neural networks
- Deep learning: principles and training algorithms
- Convolutional neural networks
- Graph neural networks
This syllabus is subject to change based on the needs of the class.

Evaluation
Grading components:
Grading scale (based on 100 points):

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Score</th>
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<tbody>
<tr>
<td>Quizzes (open-book)</td>
<td>10%</td>
</tr>
<tr>
<td>Homework (individual)</td>
<td>20%</td>
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<tr>
<td>Project (3-student team)</td>
<td>40%</td>
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<tr>
<td>Mid-term exam (open-book)</td>
<td>10%</td>
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<tr>
<td>Final exam (open-book)</td>
<td>20%</td>
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Late Policy:
Students are expected to complete work on schedule. Late work within 24 hours can only have 80% credit for delay penalty. Late work beyond 24 hours is not accepted with any excuse. For multiple submissions with partial delay, 80% credit is only applied to the delayed portion.

Requirements
Quiz: 4-5 quizzes on multiple-choice questions will be randomly held in class. Students are responsible for any missed quizzes.

Homework: There will be three programming exercises on CNNs as homework assignments through the semester. You will use Python, NumPy/SciPy, and PyTorch for homework and projects.
- You are expected to do homework assignments by yourselves. Even if you discuss them with your classmates, you should turn in your own. Do NOT share your code!
- Each assignment will specify the material to be turned in. All the programming assignments require using Python for implementation on Colab (Colab provides free GPU resources to complete your assignments. To use Colab, you need to have your Google account. A useful tutorial to use Colab is here: https://colab.research.google.com/github/cs231n/cs231n.github.io/blob/master/python-colab.ipynb).
- Assignments must be turned in electrically using Canvas.

Project: After a few weeks into the course, you may select from collaborative project options suggested by the instructor, but the students are free to propose, especially if they are related to...
their current research. The project is important to improve the hands-on skill of implementing deep learning models. A small team of at most three members can work on a project together (each team member will receive the same grade for the project; it is up to the team members to divide the work fairly). For the project, each team requires to include:

- **Project proposal (25%)**: On the indicated due date, teams are required to submit the proposal that consists of an abstract, introduction, related work, potential solution, datasets, and metrics for experiments, and reference.
- **Final report plus source code (75%)**: On the indicated due date, each team needs to submit a final report which is similar to a research paper. Besides all the components in the proposal, the details of the proposed approach, implementation, and experimental analysis and results should be included in the final report. The final project report includes at least 8 pages with at least 10 references, and its document format must follow the latest ACM proceedings templates at https://www.acm.org/publications/proceedings-template. For Latex users, please use the "sigconf" option. The hands-on exercises (e.g. source code) must be included in the submission package.

Mid-term/final exam: There will be open-book exams on problem-solving for this course. The exams must be taken in the classroom unless otherwise specified in advance. The final exam will be on 12/12/2023.

**Academic Integrity and Student Conduct**

*Plagiarism or cheating* behavior in any form is unethical and detrimental to proper education and will not be tolerated. All work submitted by a student (projects, programming assignments, lab assignments, quizzes, tests, etc.) is expected to be a student's own work. The plagiarism is incurred when any part of anybody else's work is passed as your own (no proper credit is listed to the sources in your own work) so the reader is led to believe it is therefore your own effort. Students are allowed and encouraged to discuss with each other and look up resources in the literature (including the internet) on their assignments, but appropriate references must be included for the materials consulted, and appropriate citations made when the material is taken verbatim.

This course follows the Department of Computer Science and Engineering Cheating Policy. If plagiarism or cheating occurs, the student will receive a failing grade on the assignment and (at the instructor’s discretion) a failing grade in the course. Specifically, students caught cheating or plagiarizing will receive a “0” for that particular assignment or exam for the first offense. Additionally, the incident may be reported to the Dean of Students, who may impose a further penalty. The second instance of cheating in this class will result in a grade of F in the class, and referral to the Department Chairperson and Dean of Engineering, whereby a dismissal hearing may be initiated by the Dean of Engineering.

Individual assignments, including laboratory exercises and programming assignments, in this course, must be the sole work of the individual student. You should not work with other students on shared program solutions or use solutions found on the Internet. Specifically, you should never copy someone else’s solution or code, and never let a classmate examine your code. If you
are having trouble with an assignment, please consult with your instructor or TA/IA assigned to this course. Failure to adhere to these strict standards may be cause for disciplinary action even leading to expulsion from the University.

Students are responsible for being familiar with the university standard for academic integrity. In the case that the above description or any in-class discussion of appropriate and inappropriate collaboration does not answer all of your questions, please meet with your instructor and look at the university Student Rights and Responsibilities web page.