

Syllabus for CSC 578: Neural Networks and Deep Learning, Fall 2021

Overview

This course focuses on the algorithms, implementation, and application of neural networks for learning about data. Students will learn how neural networks represent data and learn in supervised and unsupervised contexts with applications to language processing, classification, and regression problems. Topics include learning algorithms, and optimization methods, deep learning methods for deriving deep representations from surface features, recursive networks, Boltzmann machines and convolutional networks.

Learning Outcomes

By the end of this course you should be able to:

- Describe the mathematical foundations underlying neural networks
- Use matrix programming techniques to implement and modify a learning algorithm
- Implement deep learning techniques for dealing with structure in language and image processing applications
- Select an appropriate neural network / deep learning approach for a given task

Prerequisites

CSC 412 and (DSC 478 or CSC 480)

Important Note: This course assumes that you have mature programming abilities. You will not be taught how to make algorithms or write code. You should know that coming in. If you're unsure about your programming abilities, you should wait and take this class later.

Textbooks

- **NNDL:** [Neural Networks and Deep Learning](#), by Michael Nielsen. Available for free online.
- **DLB:** [Deep Learning Book](#), by Goodfellow, Bengio, and Courville. MIT Press. Also available for free online, or bound from your favorite bookseller. (*Note: We will use only a relatively small portion of this book.*)

Attendance

It's your responsibility to work the supplied materials, including videos and readings to make sure that you get the grade you want in the class.

Class Plan

The following class plan is tentative and subject to change as the course progresses.

- **Class 1:** (9/13) Course overview. Intro to NNs
- **Class 2:** (9/20) How NNs work
- **Class 3:** (9/27) NNs a la Nielsen's NNDL
- **Class 4:** (10/4) Improving NNs I and Intro to Deep Learning
- **Class 5:** (10/11) Deep Learning with Convolutional NNs
- **Class 6:** (10/18) Intro to Recurrent Networks
- **Class 7:** (10/25) Recurrent Neural Networks 2: Practical Details
- **Class 8:** (11/1) Attention with RNNs
- **Class 9:** (11/8) Natural Language Processing
- **Class 10:** (11/15) Deep NLP. Misc Topics. Wrap-up

Instructor Information

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|-----------|---|
| Email | peterh@cdm.depaul.edu |
| Home Page | http://reed.cs.depaul.edu/peterh/ |
| Phone | 312-362-5736 |
| Office | Via Zoom: 3:30-5:00pm Monday and Wednesday (except for 9/15, 10/6 and 11/3), or |
| Hours | by arrangement |
| Address | CDM Center 717 |

Assessment

Your final grade will be based on:

| | |
|---------------|-----|
| Homeworks | 70% |
| Final Project | 30% |

The grading scale will be:

| Percent | Grade |
|---------|-------|
| 93.3 | A |
| 90 | A- |
| 86.6 | B+ |
| 83.3 | B |
| 80 | B- |
| 76.6 | C+ |
| 73.3 | C |
| 70 | C- |
| 66.6 | D+ |
| 60 | D |
| < 60 | F |

Late submission policy

Unless otherwise stated, written assignments are due via D2L at the time and date posted on the course homepage. You are expected to complete all of the written assignments by the deadline. Late homework submissions will be accepted via D2L with the following penalty:

| If assignment is turned in... | Penalty will be... |
|--------------------------------------|---|
| within 3 days of due date | 10% of the total points for each day it is late |
| 3 days or more after due date | Will NOT be accepted |

Fairness to the whole class is an important foundation for the course.

On Plagiarism

You are encouraged to discuss all homeworks and projects with your classmates. You are, however, **required to complete the assignments on your own**. In particular, this means that you are not allowed to "cut and paste" text from anywhere else, or to paraphrase someone else's work, or to *write your answers along with someone else*. This also means that you are *not allowed to share* your solutions with anyone else. Plagiarism is a serious academic offense, and will be dealt with very seriously. It will result in at least a score of 0 on the assignment, and could result in failure from the course, or dismissal from the university.

All assignments will be submitted to "Turn it in" for automatic plagiarism testing. This system is very good at finding things that have been copied, so just don't do it.

[School policies on instructor evaluation, email, plagiarism and incompletes.](#)