San José State University
Computer Science Department
CS256: Topics in Artificial Intelligence - Spring 2018

Deep Learning

Course and Contact Information

Instructor:	Guha Jayachandran (with Shriphani Palakodety and guest speakers)
Email:	guha.jayachandran@sjsu.edu

Class Days/Time:	M/W 9-10:15AM
Classroom:	DH 450
Office Hours:	M/W 8:45-9AM in DH 450 and from 10:15AM in DH 450→282
Prerequisites:	CS156 or instructor consent

Web Page

Course materials will be made available online at http://deeplearningcourse.onai.com/.

Course Description

Introduction to topics in artificial intelligence such as problem solving methods, game playing, understanding natural languages, pattern recognition, computer vision and the general problem of representing knowledge. Students will be expected to use LISP.

Specific Description

Deep learning has revolutionized several problem domains in recent years. In this course, we will start with the fundamentals of neural networks and theory, and then proceed to look at several applications, including in image recognition, audio processing, and natural language processing. We will cover sequence data, recurrent neural networks, generative models, and reinforcement learning. Lectures will be supplemented with primary sources and student presentations.

Course Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Basic theory of neural networks and neural network elements.
2. How to train and validate a deep network.
3. How to evaluate original deep learning claims.

Required Texts/Readings

Textbook

There is no required textbook, but notes and papers will be assigned.
Deep Learning, by Ian Goodfellow, Yoshua Benjio, and Aaron Courville, is recommended as a supplement. You may read it for free online at http://www.deeplearningbook.org/ or order a print copy.

Other Readings

Links to online papers will be provided or copies will be provided.

Other technology requirements / equipment / material

Students will need a working Python environment. You will need a computer or access to a computer that can run popular deep learning packages like Keras.

Course Requirements and Assignments

Course requirements and assignments all directly contribute to the course learning outcomes listed above.

- At the end of each lecture, each student should submit a piece of paper (with your name) with at least one key fact covered that day. Before each lecture, each student should submit one question about the material covered to date.
- Most classes, there will be time set aside for questions and you're encouraged to take advantage of it to resolve any doubts.
- Readings will be assigned. Each student will orally present a reading to the class twice over the course of the course of the semester. Come show your presentation in office hours before the day you are scheduled to present, and email your presentation as a pdf by the class meeting before the class you are scheduled to present.
- There will be three homework assignments.
- Each student will contribute to a final project, presenting it as a poster and including a brief report.
- There will one examination (final exam).
- Each homework assignment, and the final project instructions, will include guidelines on working as a group.

Final Examination or Evaluation

There will be a final examination at the scheduled time of May 22 from 7:15-9:30AM.

Grading Information

Weightings and Letter Grades

Grades will be determined according to the following weights:

- Participation (learnings and questions submitted each lecture): 10%
- Homework assignments: 30% (10% for each)
- Paper presentations: 30% (15% for each)
- Final project poster/report: 15%
- Final exam: 15%

Based on the weightings above, the following conversion scale will be used to assign letter grades:

[97, 100]	A+
[93, 97)	A
[90, 93)	A-
[87, 90)	B+
[82, 87)	B
[80, 82)	B-
[77, 80)	C+
[72, 77)	C
[70, 72)	C-
[67, 70)	D+
[62, 67)	D
[60, 62)	D-
[0, 60)	F

Late Work or Rescheduling

Absent a valid excuse, a late homework assignment will be penalized 10% per class that it is late. Paper presentations, the final project, and the final exam will receive a zero if not performed on time. If you will be unable to make your scheduled paper presentation, let the instructors know at least 3 weeks in advance.

Classroom Protocol

Arrive before 9AM and submit a slip of paper (with your name) with a question about the material to date, so that it can be answered for the benefit of all. Be ready for class to start at 9. Submit at the end of the lecture a slip of paper with at least one key fact from that day's lecture. Feel free to ask questions. Lectures will be video recorded and likely will be posted publicly online but not immediately; do not expect to be able to miss attendance simply because the lecture may be posted online at a later date.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/.

Course Schedule

The initial schedule is attached.

CS256 Schedule - Spring 2018

This schedule is subject to change. Fair notice will be provided: Updates will be given in class and the schedule available on the course website will be updated.

Week	Date	Topics
1	1/24	Introduction and overview
2	1/29	Neural Networks
2	1/31	Neural Networks
3	2/5	Neural Networks
3	2/7	Neural Networks
4	2/12	Frameworks
4	2/14	Recurrent Neural Networks
5	2/19	Recurrent Neural Networks
5	2/21	Strengths and Limits
6	2/26	Images
6	2/28	Images
7	3/5	Images
7	3/7	Images
8	3/12	Natural Language
8	3/14	Natural Language
9	3/19	Audio
9	3/21	Audio
10	3/26	*Spring break*
10	3/28	*Spring break*
11	4/2	Video
11	4/4	Video
12	4/9	Generative Models
12	4/11	Generative Models
13	4/16	Generative Models
13	4/18	Generative Models
14	4/23	Structured Modeling - Graphs and Trees
14	4/25	Structured Modeling - Graphs and Trees
15	4/30	Reinforcement Learning
15	5/2	Reinforcement Learning
16	5/7	Relationships to Neuroscience

16	5/9	Relationships to Statistical Mechanics
17	5/14	Review
Final Exam	5/22	7:15 - 9:30AM