

COGNITIVE SCIENCE SEMINAR
SPRING 2024

Generative Models: Remaking the World with AI

January 22, 2024

Sections: COMP/PHIL/PSYC 7514/8514

Time: Wednesdays 2:30 pm - 5:30 pm

Place: 405 Fedex Institute of Technology

Instructor: Andrew Olney

Email: aolney@memphis.edu

Office: FedEx Institute of Technology, Room 403e

Office Hours: Monday 2:00 pm - 3:00 pm

Phone: 678-5032

Web: <https://olney.ai>

Description

Generative models are a type of artificial intelligence that can produce novel and realistic data, such as images, text, music, and speech. These models have applications in various domains, such as art, entertainment, education, and medicine. This seminar will explore how generative models work, what are their challenges and limitations, and how they are impacting society and culture.

The public portion of the seminar takes place on Wednesdays at 4pm in FIT 405. Faculty and students who would like to meet with external speakers before or after the seminar are encouraged to contact me.

Objectives

- Learn fundamental generative AI concepts
- Study previous research on generative AI
- Independently apply generative AI in an paper/project

Methods and Activities

- Reading assignments completed before class
- Prepare questions before class
- Class lecture and discussions
- Class practical/lab sessions
- Self-directed project/paper

Materials

The primary readings will come from journal articles aligned with the course schedule. Readings will be distributed via the course website on eLearn (Canvas).

Computer access is required for most project options, and laptop access during class is necessary for practical sessions. Students without laptops may consult with the instructor for alternatives. Practical sessions will use a browser (Chrome is recommended)

Grading

Grades will be on a +/- letter scale (e.g. A+/A/A-) and calculated according to the following percentages.

Research Paper/Project (80%) You must submit a final paper in APA format suitable for conference publication. The paper must report your independent work on generative AI. However, within these constraints there are several options.

Theoretical papers are acceptable and must be at least 8 pages long (not including cover page or references). These papers must contribute some original insight into generative AI. For example, one could consider the deepfake problem in a particular context or set of constraints (a deepfake is manipulated media that transforms someone's likeness). Note that though this example is theoretical, it would need to be highly specified in terms of conceptual framework and analysis.

Toolbox papers that use an existing toolbox and report independent computational work must be at least 8 pages long (not including cover page or references). Many toolboxes exist that provide an environment for generative AI, and these can simplify the process for students with less programming background. However, the model described in the paper can't be a "demo" from the toolbox, nor can it be a minor modification of a demo. The model created must be an independently created model, using the toolbox's primitives. Hint: don't think you can do this at the last minute using a toolbox, because any toolbox will take you a month to learn how to use.

Project papers that write their own code and report independent computational work may be as little as 4 pages (not including cover page or references), but all supporting source code must also be submitted. Submitted source code will also be graded.

All papers must include a literature review that describes previous work in that area and motivates the question addressed by the paper. **Prior to beginning work, contact the instructor with your paper idea and which of the 3 categories you believe it fits into.** The instructor will either accept, reject, or modify your proposal. **If you turn in a paper without the instructor's acceptance of your idea and length, your paper may not be acceptable. Unacceptable papers will receive little or no credit, resulting in a low grade for the course.** During class (see schedule for date) we will have a roundtable discussion/presentation of topics. You will be expected to give a brief 5-10 minute description of your paper (just verbally, without slides unless you prefer slides). Your paper is due on the indicated date by midnight CST in PDF form.

Response to Readings (20%) Your response will be a discussion post on the class website (eLearn AKA Canvas) BY MIDNIGHT THE DAY BEFORE CLASS that makes text-to-text, text-to-self, or text-to-world connections and discusses your opinions of these ideas. Each of the readings should be covered to some extent, but the readings can be given different weights in your entry. For instance, you can choose to expand on one reading over the others as long as you deal with all the readings in some way. You can pose a question, e.g.

"I found Transformers confusing. What is self-attention? Is it just a mathematical idea, or does it correspond to the psychological construct of attention? For example, if I..." (a brief paragraph)

or you can elaborate on the reading, e.g.

"I find Transformers interesting. It actually relates directly to the way I think AI should be conducted. For example..." (a brief paragraph)

In addition, each paper will have one “lead student” who will prepare a presentation summarizing both the reading and all the discussion posts for the rest of the class. The presentation will take place at the beginning of the class and serve as the jumping off point for class discussion. A 5-10 minute presentation with or without powerpoint is ideal. Students will bid at the start of class for the days on which they want to present at this website <https://calendly.com/aolney-cogsci2024/30min>. Students must sign up for one day. Students who sign up for multiple days will receive extra credit equal to two discussion posts.

Attendance & Make-up Policy

Work is expected to be turned in on time unless arrangements have been made prior to the due date. No credit will be given for late work. Please plan ahead and arrange to be present for all classes (listed on course schedule below). Extensions are given only under extreme circumstances and with prior permission of instructor.

Communication

You are required to activate your university e-mail account in order to be a student at the University. The University considers this account to be your official university e-mail address and will use it to disseminate information. You must either check your university e-mail account regularly or forward your university e-mail to a personal e-mail account that you will check regularly. After you have established your university e-mail account, you can use iAM, the University’s identity management service, to forward your university e-mail to a personal e-mail account.

Office Hours

If you have any difficulties during the course, let me know immediately. Office hours are the perfect opportunity to discuss teaching and research issues. Do you want to have more information on a certain topic? Do you have difficulties finding a research question or writing a paper? Do you feel uncomfortable about assignments? Are you looking for work in a research lab? Do you have suggestions or comments? See me during office hours or send me an email.

Respecting Diversity

We aspire to foster and maintain an atmosphere that is free from discrimination, harassment, exploitation, or intimidation. Academic courses will aim at providing opportunities for students to discuss issues of diversity including, but not limited to, ethnicity, gender, disability and sexual orientation as they can be related to course content. The University of Memphis has adopted policies prohibiting discrimination based upon race, sex, disability, or sexual orientation. In addition, the American Psychological Association has explicit policies regarding the issues of and writing about race, gender, class, sexual orientation, disability, ethnicity, and religion. You may find information on these standards in the APA Publication Manual or on the APA webpage: <http://www.apa.org/pi/oema/>.

If you feel that you have experienced discrimination based on culture, disability, ethnicity, gender, generation, sexual orientation, national origin, privilege, race, and different views on religion, please contact the Office for Institutional Equity at the Administration Building, Room 156 (901-678-2713). To make a report, you may fill out an online form at <http://www.memphis.edu/report>.

Students with Disabilities

If you have a disability that interferes with completion of any coursework (including tests) or difficulty in accessing any course materials, (1) notify the instructor privately during the first two weeks of the course and (2) contact Disability Resources for Students (DRS) located in 110 Wilder Tower and at 678-2880 or via email (drs@memphis.edu). DRS offers a comprehensive program of services and academic accommodations designed to provide access and opportunity to students with disabilities. The instructor will work with you and DRS to determine how best to adapt course materials or instruction. DRS also offers volunteer opportunities for students to provide copies of notes to students who have that as an approved accommodation. Scholarship, community service, and volunteer hours can be validated for this service by DRS.

Academic Integrity

Students are expected to behave in accordance with the University's Code of Student Rights and Responsibilities (https://www.memphis.edu/osa/pdfs/student_code.pdf). Students engaging in disruptive behaviors or conduct that violates the rules and regulations of the university may be removed from the course. The instructor may report misconduct to the chair of the department or the University's Office of Student Accountability. Likewise, plagiarism, cheating, and other forms of academic dishonesty will not be tolerated. Students engaging in academic dishonesty will receive a 0 on the associated assignment or exam and other possible disciplinary sanctions may also be imposed. Consistent with these regulations and policies, students are expected to behave in accordance with the American Psychological Association Code of Ethical Conduct (<https://www.apa.org/ethics/code/principles.pdf>).

Classroom Misconduct

Students are expected to behave in accordance with the university's Code of Student Rights and Responsibilities, found here: <http://www.memphis.edu/saos/pdfs/csrr.pdf>. Disruptive behavior, use of an electronic or other noise- or light-emitting device that disturbs others, and excessive use of electronic devices for text messaging, telephone, or video-based conversations during instructional time in the classroom will not be tolerated. Students engaging in disruptive behaviors or general conduct that violates the rules and regulations of the university may be removed or excluded from the classroom. The instructor may report classroom misconduct to the Department Chair or the University's Office of Student Accountability, Outreach, and Support.

University of Memphis Title IX Policy

The University of Memphis is committed to ensuring equity in its educational benefits, programs and activities. Sexual harassment includes but is not limited to sexual assault, dating violence, domestic violence, and stalking. If you or someone you know has been subjected to conduct that may be sexual harassment, you are encouraged to make a report to the Office for Institutional Equity via email (oiie@memphis.edu), by phone (901-678-2713), or you can fill out this online form (<https://www.memphis.edu/report/submit-a-report/title-ix.php>). Please note that while not all faculty are mandatory reporters, anyone in the following categories is required to report any sexual harassment they become aware of: faculty and staff who supervise employees, including student workers, student organization advisors, coaches, administrators, and any University employee who has significant responsibility for student and campus activities, included but not limited to student housing, student discipline and campus judicial proceedings. Similarly, all administrators and supervisory faculty and staff are required to report discrimination on the basis of race, color, national origin, disability, age, religion/creed, veteran status. If you want to make a CONFIDENTIAL report, you can contact the University Counseling Center, 214 Wilder Tower (901-678-2713), the Student Health Center, 200 Hudson Health Center (901-678-2287), or the Office of Victim Services (901-678-4471).

Student Health

As a student, you may experience a range of issues that can cause barriers to learning, such as physical health problems, strained relationships, increased anxiety, alcohol and drug problems, feeling down, difficulty concentrating, and lack of motivation. These mental and physical health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. The University of Memphis has a range of confidential mental and physical health services available on campus to assist you, including the Psychological Services Center in the Psychology Building, Room 126 (901-678-2147); The University Counseling Center at 214 Wilder Tower (901-678-2068); and The University Student Health Center at 200 Hudson Health Center (901-678-2287).

Campus Closure

Many public speakers will be participating via Zoom, so the public portion of the seminar will be held on Zoom regardless of campus closure. If you receive a notification that the University of Memphis is closed due to weather or for some other reason, **on-campus classes scheduled during the closure will not meet.** If you experience a situation that prevents you from attending on-campus classes and/or completing coursework on time, please contact

your instructor to work out possible alternative arrangements.

Syllabus Changes

The instructor reserves the right to make changes as necessary to this syllabus. If changes are necessitated during the term of the course, the instructor will immediately notify students of such changes both by individual email communication and posting both notification and nature of change(s) on the course website.

Course Schedule

Readings for each week are distributed on <https://elearn.memphis.edu>.

Date	Speaker
1/17/24	Andrew Olney
1/24/24	David Arps
1/31/24	Andrew Olney
2/7/24	Vasile Rus
2/14/24	Laura Weidinger
2/21/24	Deepak Venugopal
2/28/24	Yuling Gu
3/6/24	SPRING BREAK
3/13/24	Nataniel Ruiz
3/20/24	Anna Ivanova
3/27/24	Kevin Yang
4/3/24	Elliot Casal
4/10/24	Javier Snaider
4/17/24	Alex Mallen
4/24/24	Morten Christiansen