Introduction to AI Handout

During the first or second week of the course, an entire 75-minute course meeting is dedicated to introducing the students to the realm of AI. This lecture focuses on three topics:

1. What is AI and what is it capable of?
2. The Montreal Declaration on Responsible AI
3. How to use ChatGPT 3.5 for this course.

What is AI and what is it capable of?

The first section of the lecture is dedicated to ensuring that all students have a basic understanding of what AI currently is (machine learning/deep learning, ChatGPT, Apple's Siri…) and what it is not (HAL from "2001: A Space odyssey" or Skynet from the "Terminator" series). IBM gives a very straightforward outline of AI on its website that serves as a helpful resource and starting point for this discussion. Additionally, Forbes has complied a list of 15 Real-world Applications of AI in 2023 that provides interesting situations to discuss. Finally, multiple scientific articles have outlined means and methods of using AI in biomechanics. David et al. (2023) is a great editorial of the enhanced ways that AI is being used in biomechanics. Additionally, an introduction into the topic of gait recognition as a biometric (the ability to use a person's gait has a way to identify them, similar to a fingerprint but at a distance) can round out the usage of AI in biomechanics from a societal perspective.

The Montreal Declaration on Responsible AI

Following a basic grasp of what AI is and examples of various applications, the students will be introduced to the concept of ethical frameworks with the specific example of the Montreal Declaration on Responsible AI. As with all tools, AI can be used in a responsible and socially approved manner or it could be use for nefarious and malicious purposes. Ethical frameworks are used to determine proper usage of such tools. Specific frameworks have been designed for the development and use of AI. While there is no universally agreed upon framework various organizations such as UNESCO have developed comprehensive guidelines for deems something as ethical usage of AI. Additionally, the Biden Administration has outlined "AI Bill of Rights: Biden's AI Executive Order" for US based guidelines for the development of and usage of AI. This module we'll focus on using the Montreal Declaration on Responsible AI as its main criteria for determining responsible and ethical AI usage. The students will be introduced to the 10 principles of the Montreal Declaration listed below and given a detailed PDF version of the declaration.

Principles of Ethical and Responsible AI usage as outlined by the Montreal Declaration

1. Well-Being: The development and use of artificial intelligence systems (AIS) must permit the growth of the well-being of all sentient beings.

2. Respect for Autonomy: AIS must be developed and used while respecting people's autonomy, and with the goal of increasing people's control over their lives and their surroundings.
3. Protection of Privacy and Intimacy: Privacy and intimacy must be protected from AIS intrusion and data acquisition and archiving systems (DAAS).
4. Solidarity: The development of AIS must be compatible with maintaining the bonds of solidarity among people and generations
5. Democratic participation: AIS must meet intelligibility, justifiability, and accessibility criteria, and must be subjected to democratic scrutiny, debate, and control.
6. Equity: The development and use of AIS must contribute to the creation of a just and equitable society.
7. Diversity Inclusion: The development and use of AIS must be compatible with maintaining social and cultural diversity and must not restrict the scope of lifestyle choices or personal experiences.
8. Prudence: Every person involved in AI development must exercise caution by anticipating, as far as possible, the adverse consequences of AIS use and by taking the appropriate measures to avoid them.
9. Responsibility: The development and use of AIS must not contribute to lessening the responsibility of human beings when decisions must be made.
10. Sustainable: The development and use of AIS must be carried out so as to ensure a strong environmental sustainability of the planet.

The students will need a solid grasp of what these principles in tell as they will be repeatedly using this framework throughout the semester to decide if various activities outlined in the later sections of the modules are indeed ethical. Time should be set aside for a question-and-answer section to clarify that all 10 principles are understood.

How to use ChatGPT 3.5 for this course

Throughout the semester, the students will be required to use ChatGPT in various ways in conjunction with their regularly assigned coursework. Before this can happen, the students will need to create a free Chat GPT account using their school email address. At this point in the lecture, the students should have their laptops and/or tablets out with the ChatGPT website open. The students should be instructed to click the "sign up" link and follow the on-screen instructions to create an account. Once complete and logged in, the remainder of the lecture time will be used to acquaint the students with the latest free version of ChatGPT (version 3.5 at the time of print). Specific attention should be given to how to type in a message, find recent or previous chats, and how to export/download chat files as the students will need to provide such output through the semester. The images below outline how to find the export function. **NOTE**: the students will need to make sure to select the "share your name" option to identify their work.
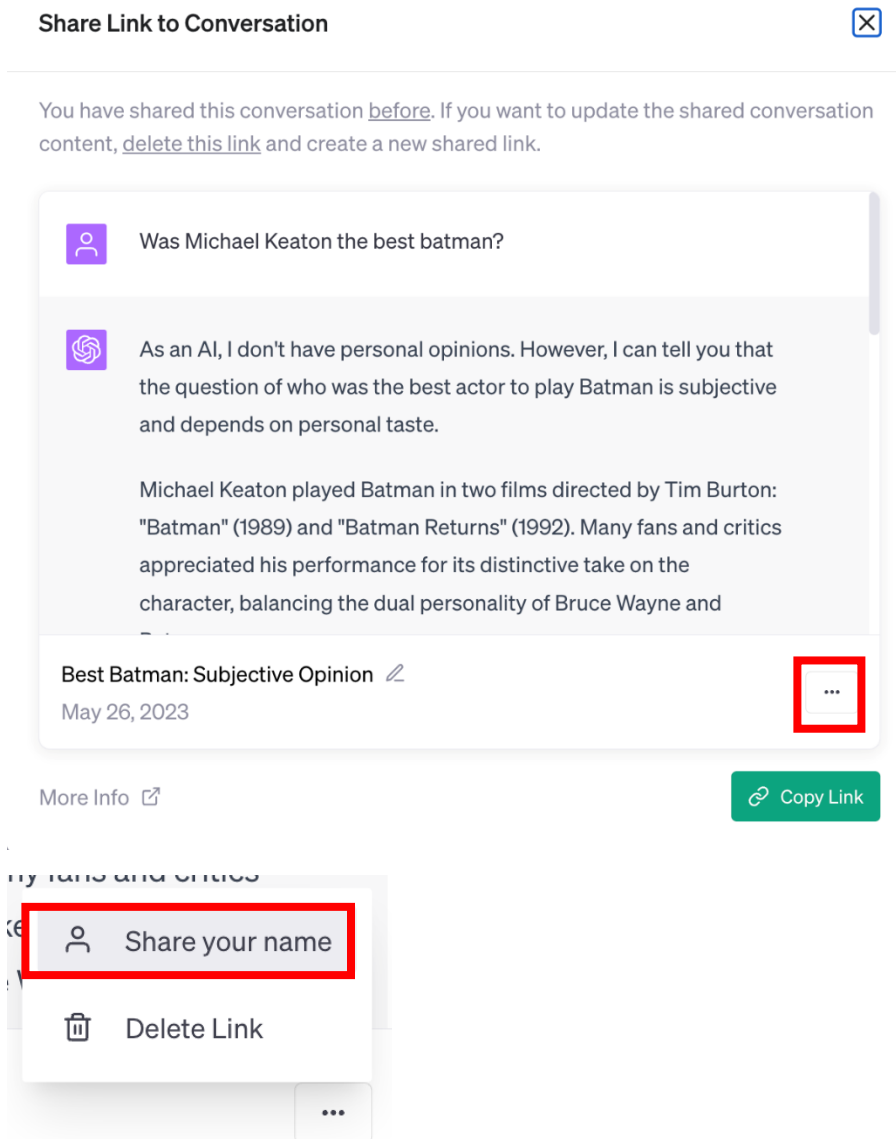
Figure 1 Finding the Share Link Feature [Source]

Figure 2 Enable the "Share Your Name" Feature [Source]

Once enabled, the share link can be distributed or submitted with assignments similarly to the link below.

https://chat.openai.com/share/355de5e8-ef6d-4066-9467-e236050e4dd5

Have the students interact with the AI by chatting with it concerning any relevant topics. Suggested topics are below. Once complete, the students can upload or submit their chat as an attendance or classroom assignment to demonstrate ChatGPT usage capabilities.

Example topics:

- What is the difference between machine learning and deep learning?
- How can AI improve the field of biomechanics?
- Can you (ChatGPT) solve complex physics problems?