Guided Exploration Module 01: AI & Ethics

Points: 25 See Rubric in Canvas
Due Date: Due date listed in Canvas but some sections will be due as class participation before. Create Calendar reminders

- Final submission will be accepted up to 24 hours after the due date with a 10% penalty. Meaning if you turn it in at 12:01 am of the next day you will be deducted 10% of the total points from your score.
- If the assignment is more than 24 hours late, it will be a 0.

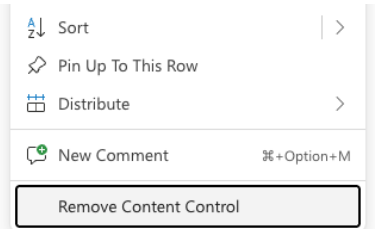
Submission: Upload document as word or pdf document with your answers in the highlighted areas unless otherwise stated.

Objectives:

- Explain algorithms and how they are used to solve problems
- Examine the societal, ethical, and cultural impacts of AI systems.
- Examine real-world AI systems into core components using the Five Big Ideas of AI framework.
- Analyze how biases in training data or algorithm design affect different communities.
- Build a custom classification model using Teachable Machine by collecting training data, labeling classes, and evaluating prediction results.
- Critique how AI design decisions include or exclude user needs

Effort: You are encouraged to collaborate to discuss concepts and explore writing code together. Write your technical documentation and answer the questions in your own words. You can use AI tools but follow CS Academic Integrity and AI Usage Policy - Harding

If you download this as a word document and you have any problems typing your answer in the tables you must click on 3 dots and remove content control.



- ☑ ~~Part 0 Intro: Learning and Collaborating~~
- ☑ ~~0.1 Working on Teams~~
- ☑ ~~0.2 Learning How to Learn~~
- ☑ ~~Part 1: Explore and Explain~~
- ☑ ~~1.1 Algorithms~~

- [x] ~~1.1.1 Hello World~~
- [ ] 1.1.2 Inputs, Process and Outputs
- [x] ~~1.2 AI Machine Learning~~
- [x] ~~Part 2 Analyze and Apply~~
- [x] ~~2.1 AI Systems~~
  - [x] ~~2.1.1 Bias~~
  - [ ] 2.1.2 AI System Case Study
- [ ] 2.2 Teachable Machine Lab: How Do Machines Learn From Us?
- [x] ~~Part 3 Reflection~~

Part 0 Learning and Collaborating Reflection

The reality of computer science is that there are so many languages, technologies and methodologies available and it is constantly evolving with new ones. So the goal is not just to understand the current technologies but developing skills to learn any new technology.

0.1 Working on Teams

In this course, we'll work together on in-class activities, labs, and discussions. Good collaboration isn't just about dividing work — it's about building understanding together. Read 10 Collaboration Skills Examples and answer the following

1 Pick two of the 10 skills that you think are strengths you bring to the team and how you will bring those strengths to the team.

Adaptability is something i have always been good at, it is very useful at figuring out problems like lack of resources or trying to save time

I also am known for having a lot of resilience, trying and trying again with no light in sight but still going. When I played football I was playing with people who played their whole life and even when I knew I wasn't going to play varsity I still did my best. This will allow me to keep going at a project no matter how many roadblocks we run into

2 Pick two of the 10 skills you think are most difficult for you and something you can do to try and improve in that area this semester.

Empathy is something i can struggle with in projects because i cam get so obsessed with getting a project done i can lose sight on other peoples emotion. This can make it so i can become rude and come off upset even when im not lowering the amount of communication and efficiency.

Giving and receiving feedback can be a problem for me as i can sometimes be over defensive, this can make some things more tense and lower communication and then lowering efficiency

0.2 Learning How to Learn

Learning how to learn is an important component of this course as your career will be full of learning something new. One of my favorite websites is Train Ugly - How To Get More Out Of Your Practice.

1 Listen to this 30 minute podcast Desirable Difficulties - The Learner Lab and answer the following.

Explain desirable difficulties and how you think it relates to the learning in this class and in your future career.

It is when you make things difficult to reach a goal, like studying in intervals while asking yourself questions. It challenges yOu to learn and make things stick better and force you to really understand the information

2 Read Bluesky CEO Jay Graber warns: If you're a student, using AI means where Bluesky CEO's Jay Graber warns that over-reliance on AI can impair critical thinking and long-term skill development and may contribute to "academic obsolescence" - declining ability to perform without AI

What skills do you risk losing if you depend on AI too early?

Solve problems independently. And create their own individual mindsets and beliefs.

I also think we lose faith in peoples words and end up over trusting AI's but thats just what i think

3 Summarize 3 Strategies you will use this semester to build skills, become a lifelong learner, and Use AI Tools in a way that supports your own thinking.
I will use spacing by taking 15 breaks between studying for intervals of 30 minutes and then switching subjects.

I will take use of kinesthetic learning which is learning while being active in order to engage more of the brain

I use a technique called repeated reading which is re reading an important paragraph in order to make sure i comprehended it completely

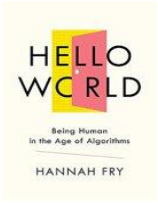
Part 1: Explore and Explain

Clearly explain key concepts from the lecture correctly in their own words containing examples from your work. Provides visuals (images, drawings, charts) and links to additional resources (videos, tutorials, etc.).

Review the lectures and links in the lectures to information. If you find you don't understand the information in the lecture reach out to **Deb or Alizah**

1.1 Algorithms

31.1.1 Hello World



"You can't just build an algorithm, put it on a shelf and decide whether you think it's good or bad completely in isolation. You have to think about how that algorithm actually integrates with the world that you're embedding in." Hannah Fry

Read Chapter 1 from Hannah Fry, "Hello World, Being Human in the Age of Algorithms" and answer the following.

Answer the following in your own words.

1. Describe an algorithm. The mechanical parts of a computer, the springs and lugs that cause things to move the way they are supposed too
2. Summarize the four main categories of real world tasks that algorithms are doing. Prioritization: It decides what is most important and chooses it Classification: Acknowledging different details and putting them int groups to be processed faster and more accurately

Association: Finding relationships between details, looking for relationships, and matching things accordingly Filtering: Removing access information in order to see things in better order
3. Explain the two main approaches taken by algorithms. Include the pros and cons. Rule based: Created by humans, dont change, step by step Learning based:
4. What can happen when we rely on machines to make decisions for us? Learn and change based off of information given over times

1.1.2 Inputs, Process and Outputs

Pick one of the following to describe the inputs, process, and outputs in your own words.

- A self-checkout machine
- A navigation app
- A weather app

What you picked from the three choices above: A self checkout mahine Link to lecture that provides information on Algorithms. https://msudenver.instructure.com/courses/111167/pages/m01-l02-artificial-intelligence-and-algorithms?module_item_id=10120304
Inputs: The is the bar code
Process (Algorithm): It scans the bar code and finds out what item it is
Outputs: Records price and removal from stock 🙂.

1.2 AI Machine Learning

Describe key ideas in your own words how machines learn and include examples. Use the lecture and resources in the lecture but put it in your own words.

1. Artificial Intelligence: A computer mocking intelligence by making educated guesses based off of data sets
2. Machine Learning (ML) Machines learning from error when making a guess from data centers, allowing it to be morer accurate
3. Dataset Files of data that catagorize thing into separate information
4. Learning Algorithm When it realises its error it corrects itself and will correct itself
5. Prediction Making guesses based off of previous data to make a finish to something like when you finish off a photo using ai it will extend the tree branches because it saw the tree branches get cut off
6. Large Language Models (LLMs): It will try to finish sentences or words based om what is most likely to be said from the previous sentence or letters
7. Neural Networks They learn from example by seing data sets that are and arent the main goal to be able to recognize other other information more accurately like telling what breed a dog is by showing pictures of that breed and showing pictures of other dog breeds and differentiating the two for the networks can learn allowing them to detect paterns
8. How do AI-driven systems differ from simple automated systems? Give an example of each. Automated systems will use a single data set and will not update itself while AI learns from multiple sets of information and will make guesses

9. Resources used such as link to lectures and websites

https://docs.google.com/presentation/d/14Cdfcg_0JAnEPNQi761sPBRM_4T3jiCMfmEwrRsyt84/edit?slide=id.g36e6ae11959_0_716#slide=id.g36e6ae11959_0_716

Part 2 Analyze and Apply

Demonstrates a clear analysis of a problem and applies relevant lecture concepts effectively. Work shows independent thinking and ethical use of AI tools or external resources.

2.1 AI Systems

2.1.1 Bias

Watch Algorithmic Bias and Fairness #18 | PBS

Compare how AI systems across different fields demonstrate bias. Read the articles from the resources, then in your own words complete the chart below by identifying:

- Bias Identified: What kind of unfairness, error, or imbalance occurred?
- What was affected: Be specific: who experienced harm or exclusion?

System and Type of AI	**Bias Identified and Who Was Affected**
Facial Recognition AI: Face detection	NIST NIST Study Evaluates Effects of Race, Age, Sex on Face Recognition Software 2019 Arxiv Review of Demographic Bias in Face Recognition2025 Bias: Higher error rates on darker-skinned faces Affected: Black women and nonwhite subjects
TikTok Feed AI Content Recommender	University of Minnesota How is TikTok affecting our mental health?2023 UCL Social media algorithms amplify misogynistic content to teens (2024) Optional Video - How TikTok's Algorithm Figures You Out | WSJ Bias: can lead to a continuous path of negative content, Affected: This can lead to a drop in peoples mental health due to

	constantly seeing negative parts of life.
Hiring Tool AI Resume screening model	Reuters Amazon scraps secret AI recruiting tool that showed bias against women 2025 University Washington 2024 Bias: it would downgrade resumes that had women in them because it noticed men where on average more qualified Affected: women resumes would be discriminated against
YouTube Recommendations AI: Content ranking model	Mozilla YouTube Algorithm Recommends Videos that Violate the Platform's Very Own Policies 2021–2024, Brookings Echo chambers, rabbit holes, and ideological bias: How YouTube recommends content to real users 2022 Bias: It can spread false or misleading information without realising it due to group polorization which is when you hear more extreme things over time causing people to become more extreme Affected: It can cause extreme political tensions due to group polorizations

1. How do biased training data or algorithms create real-world harm? It can cause people to see and hear only bad thing giving them a negative perspective on life. It can create echo chambers that make people hate eachother and lose sight of the truth in persuit of superiority
2. What role should humans play in checking for these issues? Do routine checks that make sure their isnt bias being added to the algorithim

2.1.2 AI System Case Study

Review Self Driving Cars Case Study

In this activity, you will choose a real AI system and explore how it works. You will research and explain how your AI system performs each of the five parts of intelligence: Perceive, Reason/Plan, Learn, Interact, and Impact. Then analyze the system from different perspectives

Choose one example from above or find your own example to explore how the AI system works. Here are some other examples

- ChatGPT or another chatbot
- Siri, Alexa, or Google Assistant
- AI used in medicine (AI diagnosing diseases)
- AI in gaming (AI opponents in video games)
- AI recommendation systems (Netflix, Spotify)

When searching, try typing questions like:

- "How does [AI system] work?"
- "How does [AI system] make decisions?"
- "What data does [AI system] use to learn?"
- "How does [AI system] affect people and society?"

5. AI System you chose and brief description:
CHat gpt

It is a chatbot that can annalyze images, solve problems, provide company/,

Include Resources (Ask AI for resources when using AI):
Sources provided by chat gpt itself was thought spot

6. Explain how it works for the AI big Ideas. You do not need to provide technical answers to the questions but include 2 to 3 sentences in your answers.

Chat GPT will take certain data, which is it perceiving, and will take that and break it dowm. It will then figure out what it was seeing and figure out what it was, and decide if it was asking for a specific action, figure out that action and how to respond to create the action happen to creat a final response. For example it will take a prompt like “what is 2+2” it will break it down to what it is asking and how to get the answer. It will then explain how it gets its answer and then show it. An example of a response would be “the answer to 2+2 if 4 due to the math rule of bla blah blah”.

6.1 Perception: What does the AI need to observe? What tools (text, cameras, microphones, sensors) does it use?

The AI needs some form of data to learn from, it could be text, images, sound, or currents

6.2 Representation and Reasoning: What decisions must it make? How does it figure out what to do next?

Depending on the type of input given and what it is asking for. If the prompt is break down an image it will attempt to explain what it thinks it is seeing. If you ask to write a song and give it a prompt and genre it will pull different types of music and information to create lyrics
6.3 Learning: How does it get better over time? Does it use data or feedback to improve?

Yes it does use data to help it tell what certain data means and what it doesnt

6.4 Natural Interaction: How does it take action or communicate? Does it talk, move, show results?

Normally it will give a text or image reply, depending on what you ask will very what you get

6.5 Impact: How does this AI affect people and society? What are the benefits and possible problems?

It can help increase speed of production and lower cost of manufactoring. It can help people study.

7. Impact from different perspectives. Pick at least 3 of the following perspectives to answer in 2 to 3 sentences.

Scientific: Is it accurate and reliable?

Sociological: Does it treat different social groups fairly?
Not always, it can develop biases against people due to bias input. Since it reflects the user if the user is bias so can the AI, causing it to be racist/sexist/ect
Ethical: Are privacy and fairness considered?

Economic: Who can afford it? Who profits?
A lot of AI is free but it isnt necessarily very useful. People can use it to help find songs or games they might like(like how it is used in spotify or tiktok). A lot of people can profit, from student, to corporations.
Cultural: Does it respect diverse identities?

Community: Does it help or harm local needs?
It can help people decipher local news but it can also show bias or imaginary information. It can also harm local communications as people might start talking to AI then each other but thats just speculation
Global: Can people access it worldwide?

2.2 Teachable Machine Lab: How Do Machines Learn From Us?

Feel free to collaborate to do this lab with 1 to 3 other people.
Names of collaborators:

Use the https://teachablemachine.withgoogle.com/ to create machine learning models. Choose one project type below:

- Image - Teachable Machine Tutorial: Bananameter | by Barron Webster | Medium
- Audio - Teachable Machine Tutorial: Snap, Clap, Whistle | by Barron Webster | Medium
- Pose - Teachable Machine Tutorial: Head Tilt | by Barron Webster | Medium

Train your model

1. What type of input are you training the model on (image, audio or pose)? Im going to try to get it to recognize between lightsabers so Image
2. List the categories you will teach the machine (Example: Clap vs. Whistle, Banana vs. Apple) and how many examples (recordings/photos/poses) added for each category 2.1 Category 1: Dark saber 2.2 Category 2: Count Dookus saber 2.3 Why is it important to include different versions (voices, angles, lighting, etc.)? So it can be able to recognize it from different angles. It also will catogorize it from it background .
3. Model Training 3.1 What do you think the computer is learning from your examples? What the consistent numbers are fo each category to know what information is what makes that category identifiable 3.2 What would happen if you only added one example per category? It wouldnt know if you wanted to couch or the lamp
4. Testing: 4.1 Did the model correctly identify each input when you tested it? (Yes, most of the time No, it made mistakes) No, sometimes it would thing if it was in a specific light it would choose the wrong lightsaber 4. Test with different datasets (A new image or sound, A different voice or pose) Did it still work? Why or why not? I made it so the all had different back rounds so there was only a few constants to focus on and it worked a lot better
5. Take a screenshot of your model setup and one test result. Use “snipping tool” or screenshot shortcut; paste below then crop and resize to make it easy to identify. 5.1 Model Setup

I would take multiple shots of each lightsaber with different backrounds

5.2 Test Result
It would recognize each one from most angle but at certain angle it couldnt tell

6. Improve Your Model
6.1 What's one thing you could do to make the model more accurate?
Make a 360 3d model so it can see it from all angle without my hands somewhere on it
6.2 Do you think this model would work with other input, in different lighting or with different accents?
It should work in different lighting.

6.3 What's one limitation of the model you noticed?
It takes a while for a while to tell what it is and sometimes the lighting caan tip the scales

7. Learnings: Explain in your own words how machines learn using correct terms from lectures and include examples from this lab.
The machine a module that uses a neural network to learn details about different information it breaks down into

Part 3 Reflection

Artificial intelligence is becoming part of everyday life — from hiring decisions and healthcare to video recommendations and facial recognition. But with that power come serious ethical concerns.

Responses demonstrate in-depth personal reflection on the experience and learnings that includes plans for future action.

1. In your own words, explain two ethical issues that can arise from using AI .For each issue, suggest at least one step that designers, companies, or governments should take to reduce harm or promote fairness.

Bias exists in AI and if we use AI to help with thing in law enforcement and it uses the internet it could lead to bias views causing AI to use misleading bias to choose possible suspects

AI can lead to a decrease in cognitive ability and critical thinking if used consistently.

2. AI in your life

2.1 Give 1–2 examples of how AI shows up in the apps, tools, or services you use.
When I use apple music it will use AI to find the music i like.
I use it sometimes to help me find songs if i dont remember the name and it will use my humming to find the song

It can be used to help find apps i can use for different thing or different tools based off of things i watch and browse/purchase
2.2 What did you learn in this module that might change the way you use or think about AI?
Im going to us that teachable machine thing alot cause that could be useful to study if you have the time.

3. Responsibility and Accountability
Who do you think should be responsible when an AI system causes harm — the developers, the company, the government, or the users? Explain your reasoning with an example.

I think we should make legislation in the government to help control, limit, and monitor AI. Limiting what AI can do and have access too, how much of a workplace can be overtaken by AI to help with economic stability./