COSC76/276 Artificial Intelligence
Fall 2022
Review of syllabus, Intro – What is AI

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FIRST: WELCOME BACK TO CLASS!

Today's learning objectives

- Learn about each other

- Learn about the class

- Know about expectations for the class

- Define artificial intelligence

Outline

- You, me, and this course
- What is AI?

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My Background

Joined Dartmouth in March 2019

Research interests:
Natural Language Processing, Machine Learning, Network Science

Before then:

PhD from MIT, 2015
Postdoctoral Associate at MIT, 2015-2018
Fellow at Harvard, 2017-2018
Research scientist at a startup in Berlin 2018-2019

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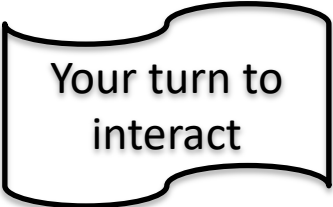Research scientist at a startup in Berlin 2018-2019

Voted Most Likely to Commit Insurance Fraud in High School

TAs

- Lili Wang
- Xiaobo Guo
- Kang Gu
- Jason Chen
- Nicholas Irwin
- Kieran F. O'Day
- Jose A. Hernandez Barbosa

Your background
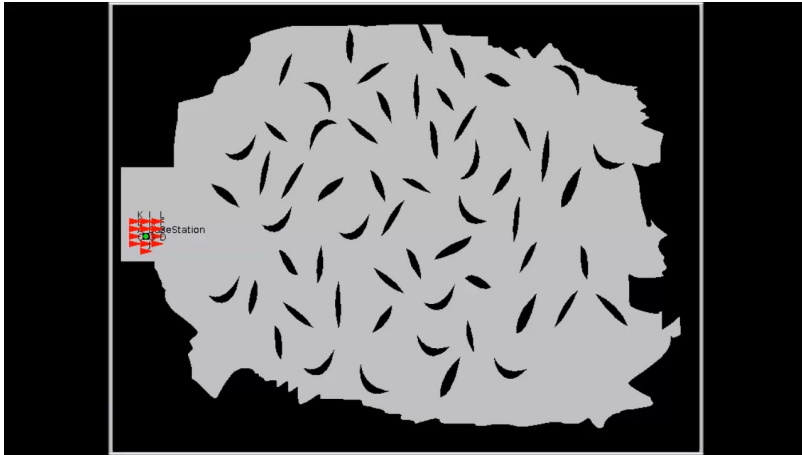
- CS majors? Minors?

- Math?

- Cognitive science?

- Economics?

- …

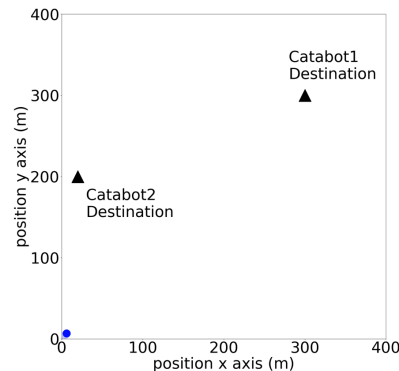- Any related background in AI?
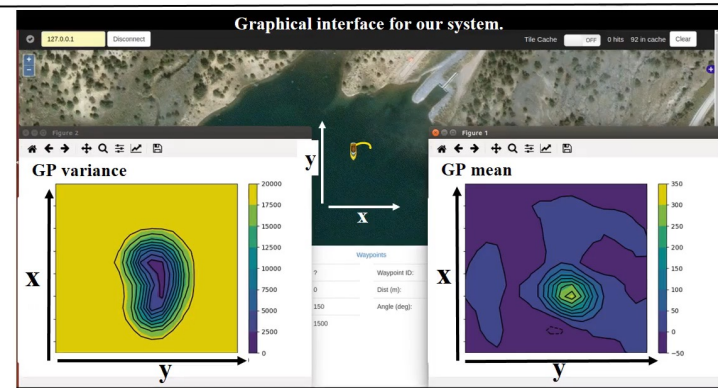
- Prior experience with Python?

Your turn to interact
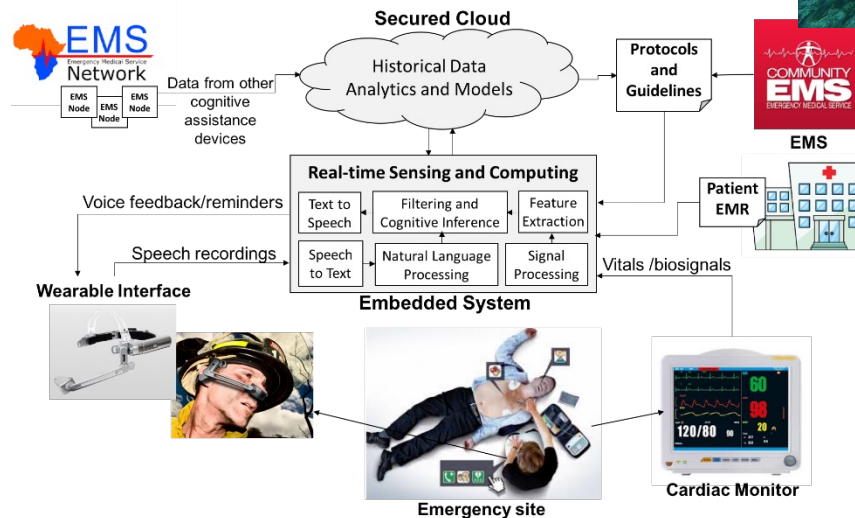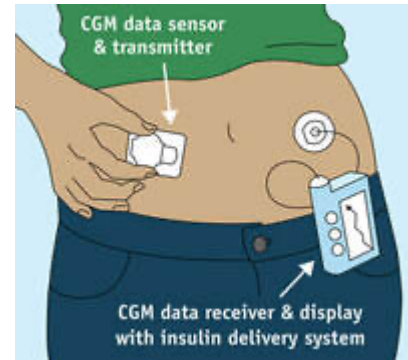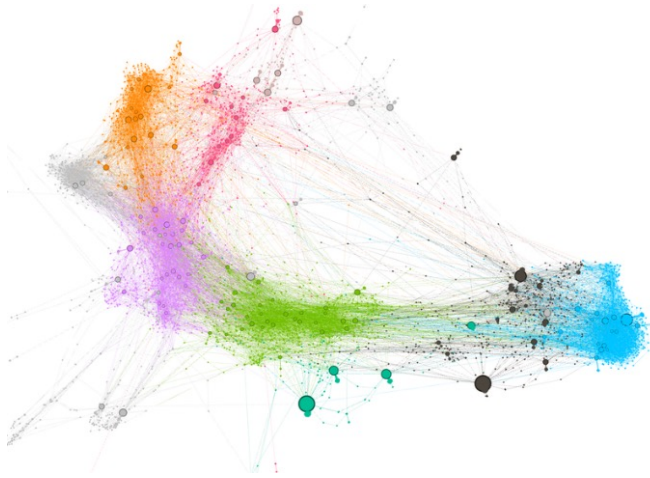
Primary objective for the course

Gain the foundations, perspective, and skills needed to solve real-world problems and do cutting-edge **research** in artificial intelligence

Explorer builds the map

A lot of cool research in CS with "AI"!

CGM data sensor & transmitter

CGM data receiver & display with insulin delivery system

Secured Cloud

Historical Data
Analytics and Models

Protocols and Guidelines

Data from other cognitive assistance devices

EMS Network

EMS Node EMS Node EMS Node

COMMUNITY EMS

EMS

Real-time Sensing and Computing

Voice feedback/reminders

Text to Speech

Filtering and Cognitive Inference

Feature Extraction

Speech recordings

Speech to Text

Natural Language Processing

Signal Processing

Patient EMR

Vitals /biosignals

Wearable Interface

Embedded System
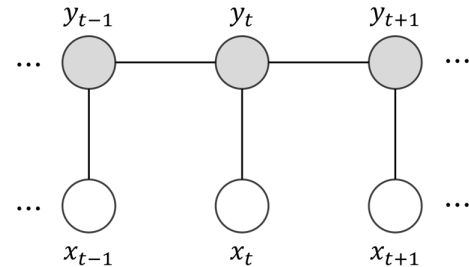
Emergency site

Cardiac Monitor

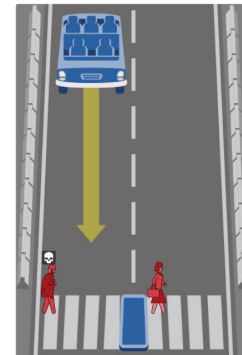And many more…

About the course/learning outcomes

Theory and practice of modeling real-world problems in AI

Hands-on: Implementing algorithms of AI in Python

```
69  class Agent(Thing):
70
71      def __init__(self, program=None):
72          self.alive = True
73          self.bump = False
74          self.holding = []
75          self.performance = 0
```

Discussion of AI and societal implications

Tentative schedule

- Week 01: Syllabus presentation, Intro, Uninformed Search
- Week 02: Informed search, Adversarial search
- Week 03: Games
- Week 04: Constraint Satisfaction problems
- Week 05: Logic and inference
- Week 06: Probabilistic reasoning
- Week 07: Markov Decision Processes
- Week 08: Reinforcement learning
- Week 09: Ethics and future of AI

N.B.: this schedule is subject to changes, check Canvas Calendar

Learning resources

Your learning is our focus!

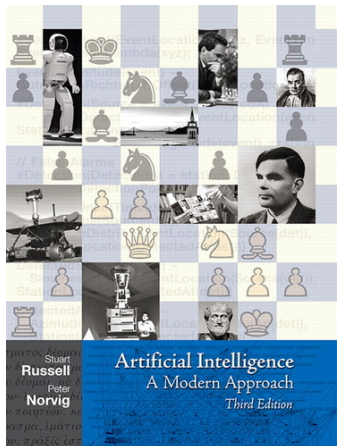You do the learning by actively participating!

Learning resources

Canvas
(https://canvas.dartmouth.edu/courses/54478)

- Syllabus
- General announcements (please enable receiving email from Canvas)
- Slides
- Calendar
- Link to Ed Discussion (https://edstem.org/us/courses/28972/discussion/)
- Link to Videos

Textbook: third edition of Artificial Intelligence: A Modern Approach by Russell and Norvig.
- We'll cover chapters 1-9, 13-15, 18, and 20.

Learning resources

Class meetings:
- Room: Cummings 100
- 3A time slot
  - MW 3:30pm-5:25 pm ET
  - X-hour (might be used as needed, check the calendar) Tu 4:30-5:20pm ET
- Recording should be posted automatically in Panopto by the end of the day
- Taking notes can help in actively learning
- Feel free to raise your hand to ask questions and comment
 - You can also write the question down and ask on Ed Discussions

Learning resources

To assess your learning outcomes, you will:
- Solve programming assignments on real-world problems applying AI models and techniques
- Solve short quizzes and exercises to assess your conceptual understanding of the AI models and techniques.
- Discuss AI and its implications.

Programming assignments are allowed five free late-day passes , total (see syllabus)

Please don't hesitate to reach out if you're falling behind – your learning is important

10%	Final reflective paper
30%	Short assignments (roughly one every week)
60%	6 Programming assignments
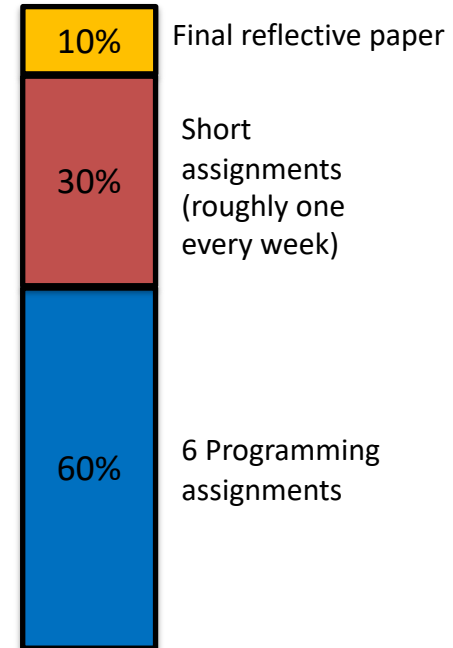
Submissions via Canvas to ensure consistent grading

gradescope

Disclaimer: The grade breakdown is subject to adjustments.

Learning resources

How to get help

- Ed Discussions:
    - Help by your classmates
    - Teaching staff will typically respond within 24 hours
    - Let's build a great community!

Office hours (~2-3 hours/week each member of the teaching team)

Learning resources

Successful learning in the class is typically associated with

- Participating in the class

- Starting all assignments early

- Reaching out for help immediately when stuck

- Please talk to me if you are running behind or if you have any questions/comments

Your learning is our focus!

Lecture Attendance

-Not mandatory, but highly recommended (I will add up to 2% to your final grade based on regular attendance).

-You can use your laptops to take notes.

-There will be a break an hour into the lectures.

-Food!

Class Size

– I have admitted a few students from the waitlist. If you are still on the waitlist, see me after class.

Accommodations

Python

- The homework will require implementation of algorithms in Python.

- You should already have Python and Jupyter Notebook installed on your machines.

- We will be using Python 3.

- Instructions on installing Jupyter Notebook: https://jupyter.readthedocs.io/en/latest/install.html

Outline

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Discussion: What is AI?

- Some examples that come up to your mind?
  - Take a minute to write them down

Your turn to interact
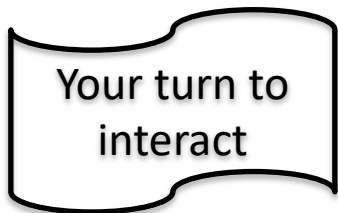
What is AI?

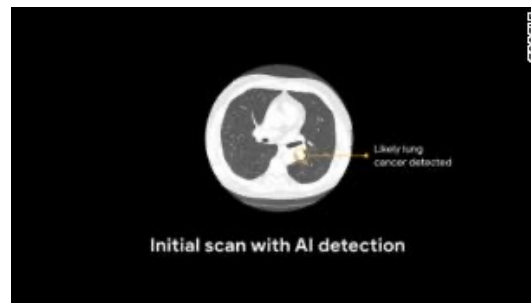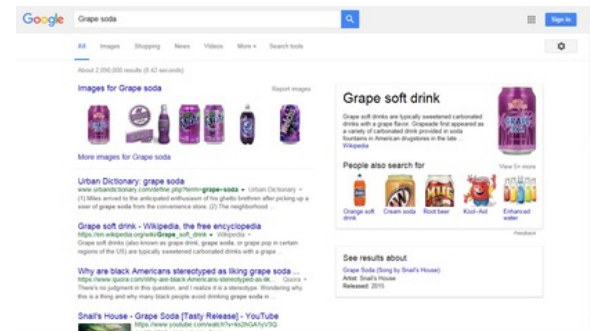# Current examples: Self-driving car

Source: Waymo

Current examples: drone

Source: Skydio

Current examples: many more

Comparison computer vs. brain

	Supercomputer	Personal Computer	Human Brain
Computational units	10^6 GPUs + CPUs 10^{15} transistors	8 CPU cores 10^{10} transistors	10^6 columns 10^{11} neurons
Storage units	10^{16} bytes RAM 10^{17} bytes disk	10^{10} bytes RAM 10^{12} bytes disk	10^{11} neurons 10^{14} synapses
Cycle time	10^{-9} sec	10^{-9} sec	10^{-3} sec
Operations/sec	10^{18}	10^{10}	10^{17}

What is AI?

The science of making machines that:

Think like people	Think rationally
Act like people	**Act rationally**