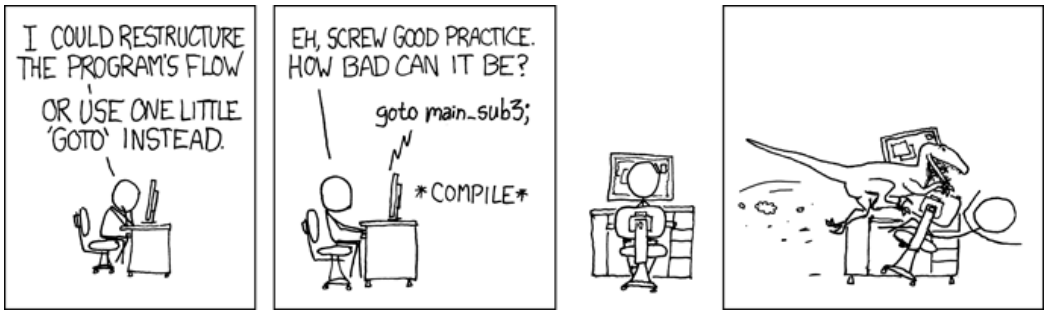
CSCI 3202

Lecture 2 Notes

August 25, 2024



Credit: xkcd, www.xkcd.com

General

- Homework 1 is available on Canvas
- Homework 1 is due on Wednesday, September 3 by 11:59 pm
- Get signed in to Canvas and Piazza if you haven't done so already

Syllabus

- Any questions on the syllabus?

Agents

- **Agent**
  - According to our text, an agent is "Something that perceives and acts in an environment" pg. 60
  - There is some type of a performance measure that evaluates an agent in its environment
  - There is a task environment that describes the location of an agent, the inputs, outputs, performance measure and goals. We want to specify this task environment in as much detail as possible
  - We can describe the agent in terms of the function it performs and how it performs it
- The design of the agent depends on the type of environment it operates in and how it functions

Examples of What Agents Do

Manage the water level in a reservoir (Model-based reflex agent)

- Water comes in from rivers and streams
  - You generally know how much water will flow in from the historical record, but severe storms can greatly increase the flow
  - High inflow may stope
- Water flows out through the gates
- You must maintain a minimum flow to satisfy users and covenants plus keep the fish alive
- There is a limit to how much water can flow out based on the physical characteristics of the gate and the river below
- Can allow water to flow over a spillway
  - There is a limit to how much water can flow over the spillway (and for how long) without damaging the dam or the spillway
- Overtopping the reservoir causes severe by eroding the material under the dam which will ultimately cause the dam to fail
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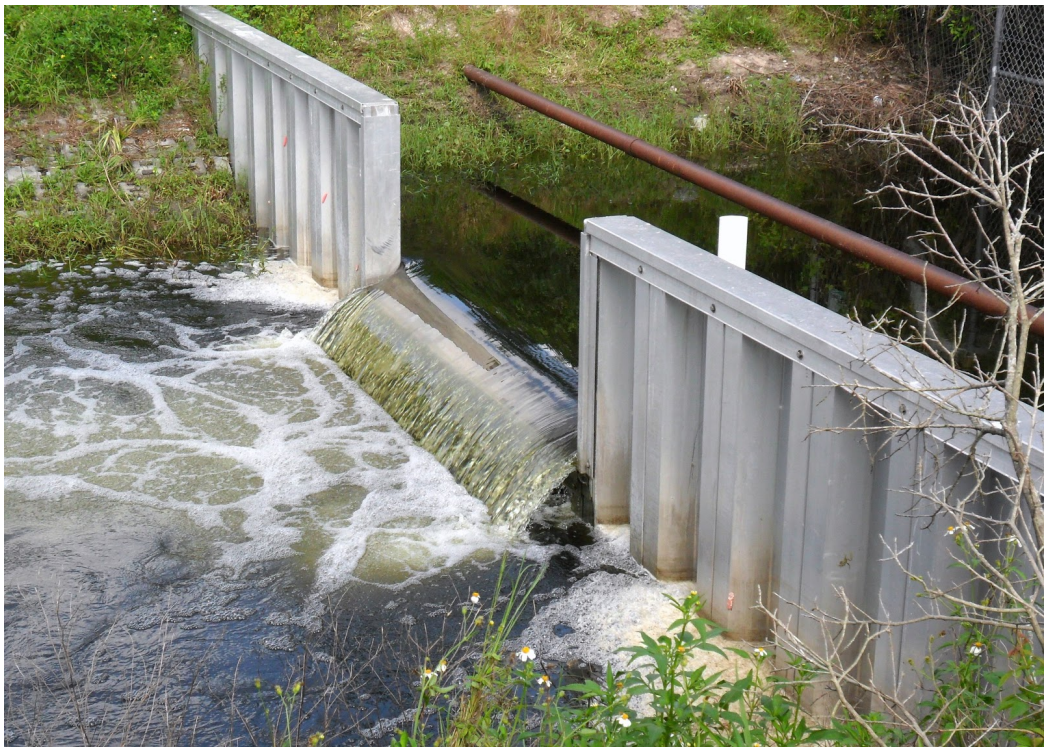
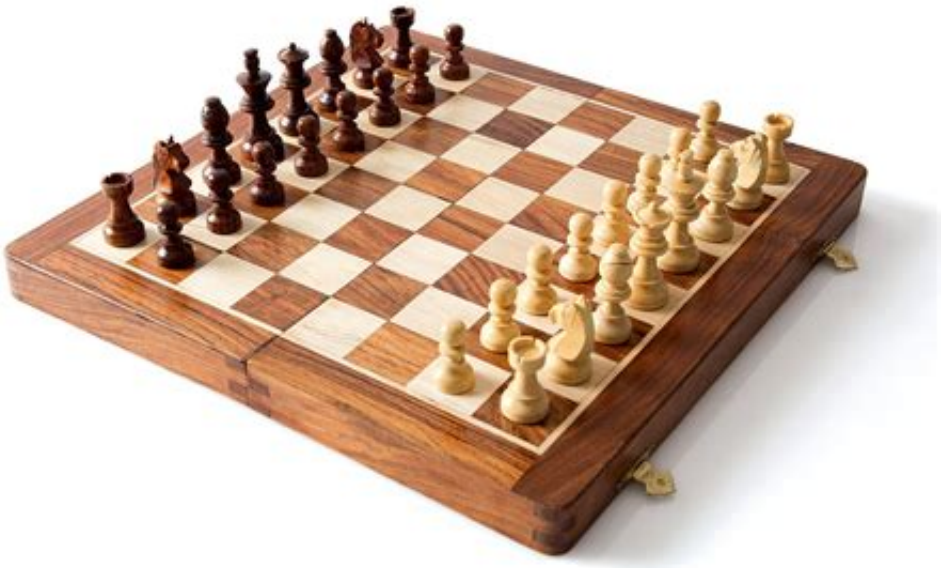
  - Allowing high outflow results in downstream flooding, possible stream damage and unusable water flow

- Purpose of a reservoir is to prevent flooding and store water for later use
- Weather upstream has a powerful effect on the inflow
  - Season and time of year can be proxies for weather
- Snow depth and upstream water usage can have a profound effect on water inflow



Manage the water flow from a reservoir (Simple reflex agent)

- Flow changes based on depth of water behind the dam
- Measure flow as the depth of water through a gate or over a weir
- You have a gate that can be opened or closed to increase or decrease the flow of water from the reservoir
- You have a target flow rate which can be converted to a depth over the weir
- If flow is too low, open the gate more. If flow is too high, close the gate more



Defeat an opponent at chess (Goal-based agent)

- Rules are well defined
- Begin at a starting position
- You have an opponent who is trying to defeat you
  - Opponent will counter each of your moves
- More than one way to win
- Many possible moves in a chess game
  - chessjournal.com argues that there are more possible moves than there are atoms in the universe
  - Can't evaluate all possible moves except for very simple cases
- Chess Masters divide the game into 3 general parts: opening, middle game and end game
  - The strategies they use are generally different for each part of the game
  - As pieces are captured, they are removed and generally do not return to the game
  - The nature of the game can change as the game goes one
- Winning involves making the best possible move for several (many) moves ahead while countering your opponent
  - You have to always consider what your opponent will do
- See Lecture 2 Slides

Next Time

- Read Sections 3.1-3.3 on searching a state space
- We will discuss search a state space
- The Homework is for you to discover any weaknesses you may have with Python

Administrative

- Course videos are available through a navigation link in Canvas
- Next Monday is Labor Day. No class next Monday
- Begin holding office hours on Wednesday
- First in-class quiz will be Friday, August 29 at the end of class
- Homework 1 is due Wednesday, September 3 at 11:59 pm
  - Rename the notebook and upload it to Canvas when you finish it
  - Make sure that you upload the notebook (.ipynb) and not the JavaScript for Jupyter
- You can turn Homework 1 in up to 3 days late with a penalty (5% per day)