NEW ELEUSIS

Bookkeeping

- HW4 is out
- Project
  - Overview today, details on schedule page
  - Please fill out Google team form (posted on schedule)
  - If you aren’t part of a 2-4 person team or would like more members, talk to me as soon as the class exercises start!

Today’s Class

- New Eleusis practice
  - The ideal # for New Eleusis is 6 players, so we will combine teams
  - You should play with your team, however

PROJECT OVERVIEW

New Eleusis

- Project: write a player for the game of New Eleusis.
- Goal: try to figure out a rule using induction over data
- It is a gameified version of the scientific method.
- You play cards in series, which either:
  - Obey the rule
  - Don’t obey the rule
  - Either is informative!
- The goal is to figure out the rule first

New Eleusis

- New Eleusis is a game of logical induction
- Players try to work out a ‘rule’ that defines whether a card is legal to play.
  - Dealer (in the role of “Nature”) thinks up a rule that governs the correct play of the cards
  - Other players (“Scientists”) take turns playing cards to test hypotheses
  - First person to come up with the right rule wins
What You Will Do

• Write a New Eleusis player that:
  • Generates hypotheses
  • Comes up with tests for those hypotheses
  • Implementing those tests
  • Modifies the rule(s)
  • until it is ready to declare success.

• Simplifications to the game you will play include reducing the space of possible rules and reducing the inter-player interaction

Project Goals

• Write a player that
  • Takes inputs in a fixed format
  • Searches for rules describing that input
  • Makes plays intended to test hypotheses about rules
  • Announces the rule when it is successful

• This is an NP-complete problem

Deliverables

• Project Design
  • The names of your team members
  • Short (less than one page) description of your strategies
  • A Python design:
    • Main functions, inputs and outputs for each function,
    • pseudocode/stubs for the behavior of the function
    • Helper functions and computations you will need to implement your planned strategies
    • Corresponding functions to do that work
    • The interface will be informed by your intended designs, so give this some thought
  • You will inevitably make changes later

Deliverables 2

• An implemented player in 2 phases
• Did you correctly implement the solution that you described in your design?
• Design (generality, clarity, and elegance) and readability (indentation, comments, modularity, …)
• Score will be split among phases
• Phases will have progressively fewer simplifications

Components

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<thead>
<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Project Design</td>
<td>Written</td>
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<tr>
<td>Phase I code</td>
<td>Python</td>
<td>30%</td>
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<tr>
<td>Phase II code</td>
<td>Python</td>
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<tr>
<td>Final report</td>
<td>Written</td>
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• If you are not an active, contributing group member, you can lose up to 100%.
Playing New Eleusis

- Martin Gardner wrote about this original version in his Mathematical Games column in the June, 1959 Scientific American.
  - It is a game of inductive logic.
  - You use cards to perform experiments.
- This is NOT the real thing – the real thing* is more complex, and the project version is simpler.
- The goal of this exercise is to understand what you are supposed to be implementing!

*http://matuszek.org/eleusis0.html

Setup

- Shuffle four(ish) decks together
- Pick a rule-maker (“Nature”/“God”)
  - Nature: make up a rule and write it down.
  - The rules can only depend on:
    - Suits (diamond ♦, heart ♥, spade ♠, club ♣).
    - Royal card (King, Queen, Jack) or not.
    - Even or odd value.
    - Numeric value (Ace=1, Jack=11, Queen=12, King=13).
    - Higher or lower deck value.
    - ♦ < ♥ < ♠ < ♣
    - King of clubs is lower value than the two of diamonds
- Everyone else gets 14 cards

Play

- Nature: play 1 card to start.
- Go around clockwise to each player:
  - Play a card from your hand
  - Nature declares it right (follows the rule) or wrong
  - If it’s right, proceed; otherwise, draw 2 cards
- If you think you don’t have a card you can play:
  - Show your hand to Nature – does s/he agree?
  - Yes – discard that hand and draw a new one; play
  - No – you are out of this round of the game!

When You’ve Got It:

- Declare yourself a “Prophet”
- Take over calling right and wrong from Nature
  - DO NOT announce what you think the rule is!
  - After 10 successful calls, you win
  - If you make a bad call, Nature takes back over and you are out for this round
- If everyone is out, Nature wins
- If N*10 cards have been played, Nature loses

Layout

```
Cards played correctly
{ the basic sequence }

Incorrect card
{ the `incontrol’ }
```