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

Component	Type	%age
Project Design	Written	20%
Phase I code	Python	30%
Phase II code	Python	30%
Final report	Written	20%

- If you are not an **active, contributing** group member, you can lose up to 100%.

New Eleusis

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
- Iff 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