PokerBot

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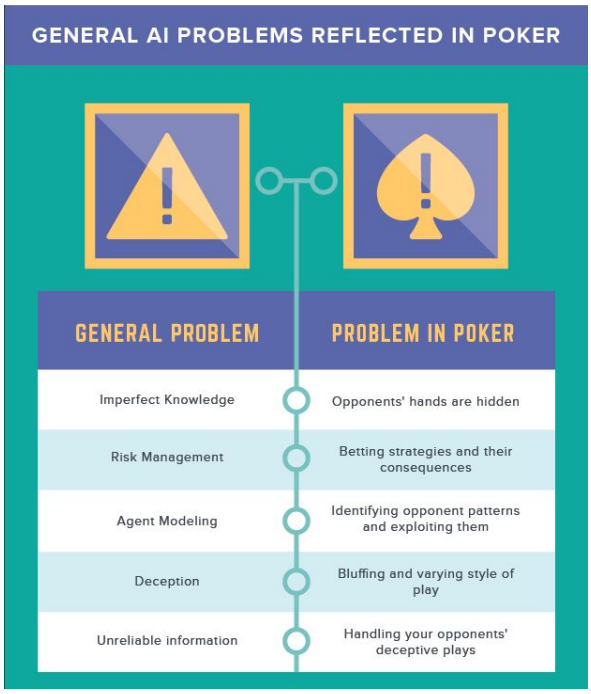
1. The Big Idea: What is the main idea of your project? What topics will you explore and what will you generate? What is your minimum viable product? What is a stretch goal?

Main Idea

We will generate an AI poker bot that can make informed decisions in heads-up poker. This is a challenge in incomplete information.

> "It is a really critical milestone in developing AIs that can solve real world problems with incomplete information, which are the ones we need to solve to advance society--not just poker."



Topics

Probability/Game Theory

i. Risk analysis
ii. Probability of winning given current hand
iii. Probability of winning given other player's bets

iv. Probability of winning given your hand, their bet, and match history (classifying their playing style and pattern)

Machine Learning

v. Learning set will be from poker datasets, link below

Graphics Interface

vi. Poker-esque casino graphics

MVP

Our MVP will be a trained AI that, given a hand of cards, provides a fold/hold classifier, or betting response plan.

Stretch Goal

Use historic game trends and play full game against another player (human for the first pass, AI or group of AIs for a further stretch).

2. Learning Goals: What are your individual learning goals for this project?

   Harrison: Learn basic machine learning procedure.

   Harris: Practical machine learning and practice team collaboration.

   Vivien: Understand and implement machine learning.

   Ava: Learn the basic concepts behind machine learning, better understand its power and limitations as a technique, get a stronger grasp about what type of problems it can be applied to.

   Emma: Working with large datasets (sql?) to work with artificial intelligence.

3. Implementation Plan: This will probably be pretty vague initially. Perhaps at this early juncture you will have identified a library or a framework that you think will be useful for your project. If you don't have any idea how you will implement your project, provide a rough plan for how you will determine this information.

   Useful libraries: scikit-learn, numpy, scipy, mlpy, math, matplotlib, nltk

Create cards with attributes like suit and value

Determine distance between current hand and different types of scores

Risk analysis of each type of hand

Play hand based on risk analysis

Card counting (play consecutive hands)

https://archive.ics.uci.edu/ml/datasets/Poker+Hand

http://poker.cs.ualberta.ca/irc_poker_database.html

4. Project schedule: You have 6 weeks (roughly) to finish the project. Sketch out a rough schedule for completing the project. Depending on your project, you may be able to do this in great specificity or you may only be able to give a broad outline. Additionally, longer projects come with increased uncertainty, and this schedule will likely need to be refined along the way.

   Week 1: Working probability model of possible card combinations and risk analysis

   Week 2: Basic graphics to represent probability models, corresponding actions (fold, hold, check)

   Week 3: Create opponent (user/AI), implement raise, hold, call, check action list with betting amounts

   Week 4: Create web app poker game, work on GUI, improve model

   Week 5: Improve model, work on documentation and website

   Week 6: Improve

   Frontloading!

5. Collaboration plan: How do you plan to collaborate with your teammates on this project? Will you split tasks up, complete them independently, and then integrate? Will you pair program the entire thing? Make sure to articulate your plan for successfully working together as a team. This might also include information about

any software development methodologies you plan to use (e.g. agile development). Make sure to make clear why you are choosing this particular organizational structure.

We will have at least two people working on any discrete, non-trivial task, with full team meetings to integrate often so that everybody understands the aspects of all code at any time. To this end, though our (informal) team name is hackathon64461, we have resolved to prevent individual hackathoning.

We have all downloaded desktop slack to keep in constant communication and enable frequent updates on how certain parts of the project are progressing.

6. Risks: What do you view as the biggest risks to the success of this project?

   Since our group is comprised of people who *want* to learn about machine learning, we are at high risk of going in the wrong direction when it comes to beginning the project. Also, as a technical risk, we have to be able to create and properly gauge a realistic risk analysis/fitness function.

   Organizing code that is written by five (5) people.

7. Additional Course Content: What are some topics that we might cover in class that you think would be especially helpful for your project?

   Game theory, large data manipulation/techniques, and supervised/unsupervised learning