3 Card Pickup

Goals:

* Make a better 5-card Poker hand than your opponent.
* Design a winning strategy that is robust to change and uncertainty.
* Consistently win round-robin tournaments against all other agents.

Rules:

* Each player is dealt 2 private cards from a standard 52-card deck.
* Players will then take turns traversing a connected graph containing cards.
* Graphs will be generated randomly based on a set of parameters.
* Max of 48 nodes (4 cards have been dealt) but expect graphs to be much smaller.
* Players will start at separate random nodes and can see the entire graph.
* Players can only move along one edge each turn.
* At each node a player can decide to pick up the node’s card which is put in their hand.
* Each node contains a set of possible cards only one of which is the actual card.
* The size of the possible card set is parameterized.
* Picking up the card removes it from the graph and is shown to all players.
* A player must pick up 3 cards by the end of the game or automatically lose.
* Players will not be allowed to pick up more than 3 cards.
* The number of turns in the game is also parameterized.
* Parameters can only change between tournaments not during a match.

For fairness each game will be played twice where agents swap starting positions and starting hands. They will not be allowed a history of the previous match.

Standard Poker Rankings - <http://en.wikipedia.org/wiki/Poker_probability>

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hand** | **Frequency** | **Probability** | **Cumulative** | **Odds** |
| Royal flush | 4,324 | 0.0032% | 0.0032% | 30,939 : 1 |
| Straight flush (excl. royal flush) | 37,260 | 0.0279% | 0.0311% | 3,589.6 : 1 |
| Four of a kind | 224,848 | 0.168% | 0.199% | 594 : 1 |
| Full house | 3,473,184 | 2.60% | 2.80% | 37.5 : 1 |
| Flush | 4,047,644 | 3.03% | 5.82% | 32.1 : 1 |
| Straight | 6,180,020 | 4.62% | 10.4% | 20.6 : 1 |
| Three of a kind | 6,461,620 | 4.83% | 15.3% | 19.7 : 1 |
| Two pair | 31,433,400 | 23.5% | 38.8% | 3.26 : 1 |
| One pair | 58,627,800 | 43.8% | 82.6% | 1.28 : 1 |
| No pair | 23,294,460 | 17.4% | 100% | 4.74 : 1 |
| **Total** | 133,784,560 | 100% | 100% | 0 : 1 |

Example Game:

9♠ 9♣

4♠ 6♠

{K♠, 9♥, 3♦, 9♣}

{8♥, 7♥, 4♦, J♣}

{K♠, 2♠, 4♠, 3♣}

{3♦, A♦, 6♦, 3♣}

{J♣, 6♣, 4♣, K♣}

{7♥, 8♥, 4♥, 5♥}

{Q♠, 8♥, 7♦, 2♣}

Deliverables:

1. Documented subclass of Player that is programmed to:
   1. weigh risks versus rewards
   2. make smart decisions
   3. be robust to change
2. Write-up detailing and explaining your reasoning, motivating strategies, and algorithms used by your agent. Two pages should be sufficient.

Do not submit an entire Java project. Turn in only your single Java file and report.

Evaluation Criteria:

* Clean and well documented code.
* Clear explanation of agent strategy and report.
* Agent is intelligent and robust.
* Agent performs well in tournaments against other agents.

Timeline:

* April 14 – Project assigned
* April 24 @ 11:59 pm – First round agent due.
* April 28 – Results of First round discussed
* Project submission final deadline TBA

If you’re interested in alternative final project see Dr. Kiekintveld ASAP.