

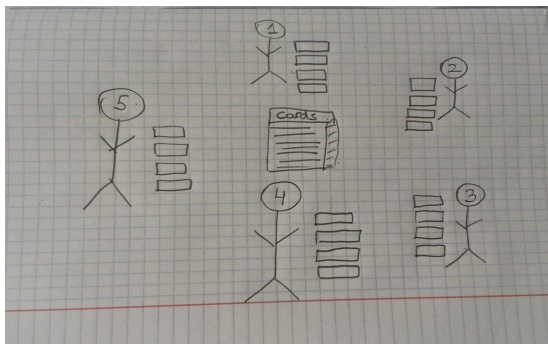
Math behind card game.
How the mathematical rules works in real life

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Introduction: when i was pretty bad at math i used to go to the courses. There tutor taught me a game and after every lesson we used to play that game with cards, it was pretty good tool for using probability and statistics in simple way, now lets see how you can predict who will win using markov chain rule.

About the game: Imagine a card game with five players and a deck of just 32 cards. Each player is dealt four cards, and the winner is the player with the lowest total point value in their hand at the end. There is no direct passive move in this game: every time a player draws a card from the community deck, they must replace one of their four cards with it. First, the player looks at only two of their cards and memorizes them well. After that, the game begins; players are not allowed to look at their cards again—they must rely solely on what they memorized at the start. Each turn involves drawing a card from the community deck and exchanging one of their own cards for that new card; skipping this step is not allowed. If a player discards a joker from their hand, they gain the right to exchange any of their cards for a card from another player but only one card with the lowest total value. If a queen is discarded from their hand, the player may choose whose card they are allowed to see: either one of their own (which they haven't looked at in a while) or one card from any other player. In addition, if a card is drawn from the deck whose rank matches one of the player's cards, they may immediately discard both of these matching cards, reducing the total number of cards in their hand and, as a rule, lowering their point total. Thus, the main objective is to reduce the total value of the cards in one's hand to the minimum.



imagine you are playing there

Solving the problem: The Hidden Information Problem

The game uses 32 cards. Card values range from 1 to 12, with the Queen = 13 and the Joker = 15. Each of the 5 players is dealt 4 cards. There are 12 cards remaining in the deck. Our goal is to minimize the total value of the hand S