CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

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Project Number

J1404

Project Title

Finding the Winning Strategy for Playing Gin Rummy: A Computer Simulation

Abstract

Objectives

The objective of this study is to determine the gin rummy playing strategy with the highest likelihood of winning.

Methods

Computer, Python coding language. Coded a 2-player gin rummy game in which the computer plays itself, using different strategies to test and measure the effectiveness of each strategy. The playing strategies tested were: (1) Highest Card Discard (player discards highest cards in their hand), (2) Lowest Card Discard (player discards lowest cards in their hand), (3) Random (player discards any cards not part of a meld and draws randomly from the draw pile and discard pile), and (4) Learning Strategy (computer randomly picks one of the 3 strategies to play and if the player wins, continues to play that strategy for the next game, otherwise it switches strategies).

Results

After the computer simulates 10,000 two-player games for each match-up, the wins, ties and losses are tallied. The Lowest Card Discard strategy won the majority of games against all of the other strategies with the highest margins against Random strategy (83% vs 17% wins) and significant advantage over Highest Card Discard strategy (63% vs 36% wins) and Learning Strategy (65% vs. 35% wins). For the greatest probability of winning, the computer decides to play Lowest Card Discard strategy.

Conclusions

Although a commonly acknowledged winning strategy for gin rummy is Highest Card Discard (to minimize the number of high cards deductions from the total score), my program proved that the opposite strategy, Lowest Card Discard, results in a higher chance of winning. In other words, players should focus on making melds with high cards in order to maximize their total score. My program is able to test each strategy against another, in isolation, and complete 10,000 game simulations in less than 5 minutes. To replicate these results, it could take several months for people to play with regular cards, for 24 hours a day, which is not realistic. Computer simulations prove to be an effective and efficient way to test playing strategies and pinpoint the strategy with the highest chance of winning. To refine my study further, my next steps would be to add the ability to create runs (or sequential melds), add more strategies to be tested, and add the ability to change strategies in the middle of a game.

Summary Statement

My computer simulations prove that discarding the lowest cards in your hand is the strategy with the highest likelihood of winning at gin rummy.

Help Received

My mentor, Nathan Hutchison, a Computer Science graduate student at Santa Clara University, has been teaching me advanced Python programming and helped troubleshoot bugs over the 8 months that I worked on the program. This project, however, was entirely my idea and I wrote all of the code.