

Developing Strategies for Bidding card game "Diamonds" with GenAI

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1 Introduction

The game of diamonds is a card bidding game with the aim of game being winning more and higher face value diamond cards. the aim of this report is to discuss the process of making strategies for this game with the help of GenAI. Main focus if this study is to train the GenAI assistant to bid effectively to win more and higher value diamond cards by analyzing game dynamics. We begin by outlining the rules and basic structure if the game to provide a clear understanding of the game mechanics. Then we document the process of teaching the GenAI the rules of game and then analyzing the rules to spit out effective strategies.

2 Game of Diamonds Explained

2.1 Overview

The Game of Diamonds is a quick and exciting card game that combines hidden information, strategic bidding, and point collection. Players use their cards from a standard deck (Hearts, Clubs, Spades) to win bids and claim valuable, unknown diamond cards. The player with the highest total point value from their won diamond cards at the end of the game wins!

2.1.1 Number of Players

- 2 Players: Use only the Hearts and Clubs suits for bidding (26 cards).
- 3 Players: Use only the Hearts, Clubs, and Spades suits for bidding (39 cards).

2.1.2 Components

- Deck of standard playing cards (minus any suits not used for bidding)

- Separate deck of face-down diamond cards with varying point values (optional)
- Paper and pen for hidden bids (or another method)

2.1.3 Gameplay

1. Deal Cards: Deal a specific number of cards to each player based on the number of players:
 - 2 Players: Deal 13 cards to each player.
 - 3 Players: Deal 13 cards to each player (with no leftover cards).
2. Bidding (13 Rounds):
 - Players take turns bidding blindly.
 - They write down the value and suit of the card they want to bid with from their standard deck (e.g., 12 for Queen).
 - All bids are revealed simultaneously.
3. Winning Bids:
 - The player(s) with the highest single card value win(s) the corresponding diamond card (unknown value).
 - Ties are handled according to your chosen rule (e.g., split value for ties).
 - Discarded cards (used for bids) are revealed and removed from play.
4. Repeat Bidding for 13 Rounds.
5. Reveal Won Diamond Cards: After all bids are resolved, players reveal the diamond cards they have gained throughout the 13 bidding rounds.

2.1.4 Scoring

- The player with the highest total point value from their revealed diamond cards wins the game.

2.1.5 Key Points

- Hidden Bids: Players don't see each other's cards, adding a layer of deduction and bluffing.
- 13 Fixed Bidding Rounds: Ensures a consistent game length and strategic card management.
- Single Card per Bid: Players must choose their bids wisely, knowing discarded cards can't be reused.

- **Balanced Hand Size:** Each player starts with an equal number of cards for bidding (13 for 2 players, 13 for 3 players).
- **Standard Deck Bidding:** Players only use cards from the standard deck (Hearts, Clubs, Spades) for bidding.
- **Diamond Card Scoring:** Players win the game based on the total point value of their revealed diamond cards.

3 Teaching GenAI the game

While teaching GenAI the game I faced a few challenges. First of all it was difficult to connect previous conversation excerpts to current one to compile all the information. I had to refer back multiple times to one of the threads of conversation to keep it in the loop of the current conversation. But after a point GenAI itself started repeating whatever I had already mentioned as after every few additions of information, I kept asking it to give me the overview of the game.

Teaching the GenAI the rules of the game was a tedious process of making it recall the previous information along with adding the new information. One thing I used was pointing out the particular parts in the answer it gave to me to rectify the faulty points. Also it kept recommending me to add extra features to the game so I had to outrightly right as a prompt to not add any other rules or features than I mentioned. Another thing I tried was after perfecting the game rules and basic structure, I asked it to change the point value of ace from 1 to 14, which it unexpectedly took pretty well and corrected it in the overview of the game. I had expected it to sputter some nonsense and lose track of the previous conversations about the game.

4 Iteration upon strategy

While iterating over the strategy in the first few prompts, it only gave me basic answers and nothing that was very specific to the game. It talked about different types of moves very generally and what kind of outcomes each of the playing patterns might have led to. It also gave a strategy overview for the whole course of game, from pre-bidding to during bidding and all. but even there, instead of sticking to following just one strategy, what it did was discuss various strategies following their outcomes. It did not support any strategy outrightly. Rather, it discussed the pros and cons of each strategy at each part of the game.

Then I tried to steer the conversation to make it focus on developing a successful strategy. The answer to this prompt also started with the ambiguous line that there is no definite strategy. But then it gave the strategy by combining the strong points of all possible moves. It divided the rounds into 3 groups and then worked on to divide the type of bidding in these three groups. i liked this broken-down approach to play the game. It talked about adjusting the strategy

of the game according to the opponenets behaviour and of course the cards at your hand. It also taked about bluffing and risk factor.

5 Conclusion

This report explored the Game of Diamonds and the process of training GenAI to play it effectively. We discussed the game’s rules, mechanics, and scoring system, providing a clear understanding of its core gameplay.

Training GenAI involved overcoming challenges related to maintaining context and avoiding introducing extraneous features. However, through iterative prompting and refinement, GenAI successfully learned the game’s rules and even adapted the point value of the Ace card.

The exploration of strategies revealed that a single, definitive strategy might not exist. However, GenAI’s approach of combining strong elements from various strategies offers a valuable framework. This framework emphasizes adapting bids based on the game stage (early, middle, late rounds), hand composition, opponent behaviour, and the potential for bluffing and risk management.

Overall, this demonstrates the potential for GenAI to learn complex games and develop strategic thinking. By leveraging GenAI’s capabilities, players can gain insights into the Game of Diamonds and potentially improve their own gameplay.