

# Developing Strategies for the Bidding Card Game "Diamonds" with GenAI

Mamidi Sree Pranathi

## 1 Introduction

This is the report of the exercise where we introduce the bidding card game "Diamonds" to GenAI and engage in gameplay to familiarize it with the mechanics and dynamics of the game. As strategic elements play a pivotal role in "Diamonds," we aim to instruct GenAI in various gameplay tactics and develop effective strategies. Through iterative gameplay sessions, we observe GenAI's learning and analyze its decision-making processes. Additionally, we delve into the nuances of bidding, card management, and adapting to changing game states. By imparting a comprehensive understanding of the game and honing GenAI's strategic acumen, we aim to equip it with the skills necessary to compete proficiently in "Diamonds."

## 2 The Diamond Game

The "Diamond" game is played by two or three players. In a three-player game, each player is assigned a suit except diamonds, which are the trump suit. Diamonds are shuffled face down to create a draw pile, with the remaining cards distributed to players based on their assigned suits. Players utilize their non-diamond cards as currency. On each turn, a diamond is revealed from the draw pile, serving as the bidding price. Players secretly bid using their cards, with bids unveiled simultaneously. The highest bid, or tied bids, claims or shares the diamond. In a two-player game, one suit is omitted, simplifying the game. The goal is to strategically bid to acquire diamonds and accumulate points. The player with the highest points emerges victorious.

## 3 Teaching GenAI the Game

Throughout the conversation, I delved into the intricacies of the game and explored various strategies to enhance the gameplay. Initially, I discussed the game's mechanics, including bidding for diamond cards using other cards as currency. It was intriguing to make it learn that each player is assigned a specific suit as their currency. It took me a lot of time to teach the genAI on how to calculate the total scores, ie, based on winning bids and evenly splitting prizes in case of a tie.

I played a virtual version of "Diamonds" with it, while playing with it I made sure that it understood the game by giving it feedback. I found it fascinating how each bid required careful consideration, as repetition or bids falling outside this range were not permitted. Through this process, I honed its learning and refined the game mechanics to ensure a fair game.

Towards the end of our conversation, I explored the potential of genAI to revolutionize strategy development in "Diamonds". I brainstormed methods to teach GenAI the game, iterate upon strategies, and analyze results.

## 4 Iterating Upon Strategies

In the process of developing strategies for the bidding card game "Diamonds," continuous iteration plays a crucial role in refining and optimizing bidding approaches. With each iteration, strategies are evaluated, adjusted, and enhanced based on feedback and insights gained from previous gameplay experiences.

During the iterative process, GenAI explores a diverse range of bidding strategies, allowing it to discover novel approaches that may outperform traditional methods. By continuously evaluating and refining strategies, GenAI adapts to changing game dynamics and identifies robust solutions.

## 5 Analysis and Conclusion

The use of genAI for developing strategies in "Diamonds" offers several advantages over traditional approaches. GenAI can explore a vast search space of potential strategies and discover non-intuitive solutions that may elude human players.

However, it's important to note that the effectiveness of GenAI depends on various factors, including the design and the representation of bidding strategies. Fine-tuning the components is essential for achieving optimal performance.

In conclusion, leveraging genAI for strategy development in "Diamonds" shows great promise. By combining computational intelligence with game theory, GenAI opens up new possibilities for discovering innovative bidding strategies.