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**GOPS AI Project Report**

The Game of Pure Strategy (or GOPS) is a basic bidding game for two players. One suit of 13 cards is dealt to each player to keep in hand, and a third is shuffled and placed face down in the center of the table. Each round of play, the top card of the table deck is flipped over and revealed to both players. Each player then chooses, in secret, a card from their hand to play. When both players have decided, they reveal their choices, and the one who plays the higher card claims the table card. Each player is scored on the value of the cards they win, with Aces being worth 1, Jacks worth 11, Queens worth 12, and Kings 13. In the event of a tie, neither player gets the card.

Aside from the random order of the secret table cards, the game is perfectly trackable by both players, leading to strategies where one must think what their opponent will play and then counter, often encompassing several layers of card counting. A simple strategy that is easily overcome by a wary opponent is matching the face card. The opponent can simply play one rank lower or higher to counter this. More complex strategies for GOPS have been drafted, but the nature of the game is actually incredibly complex and costly to enumerate. The game remains unsolved, and is quite a challenge to think out as a human, much less as a computer.

Our AI takes a goal oriented approach to playing GOPS. At the game’s outset, the AI generates a set of desired cards to reach the minimum score (46 points) needed to win. Anytime the AI loses one of these cards, it regenerates a new set based on cards it has already won and cards that remain. The AI will bid higher for cards it wants (though it can undercut if it would otherwise pay too much for a relatively low-value card), and as low as possible for other cards. Beyond that, the AI will also force a win if it is able to and does not need to worry about losing a future opportunity.

Our interface is fairly simple. It runs via Javascript within a basic HTML page. The main.js file sets up the interface (a green table with two decks of cards and 2 score displays), and runs the game loop of player choice, AI choice, and payout, and updates the graphics. The ai.js file contains the internal logic of the AI card-choice algorithm.