Poker Game Powered By Artificial Intelligence

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***Abstract*—This is a three-card poker game powered by Artificial Intelligence. The main objective of this game is to make the dealer win and not get caught using logics that are part of Artificial Intelligence.**

Keywords—artificial intelligence, poker game, computer games, poker, game

I. Introduction

Artificial Intelligence is a an evolving computing domain, that can be implemented using different logics and rules. Artificial Intelligence is being used in different industries and many sectors nowadays. In this paper I will be implementing a three card poker game, in which the dealer gets the upper hand by winning using the logic powered by the artificial intelligence. This artificial intelligence uses two main rules to make the dealer win the poker game. This paper also outlines the use of artificial intelligence and its possible conceptual design solution to make the dealer win without being caught.

II. Concept Design

A. Artificial Intelligence

Artificial intelligence (AI) is the ability of the computer program or a machine to think and learn [1]. It makes the computer to behave smarter in order to solve problems. For this paper the Artificial Intelligence was implemented by using different logics in the poker game.

B. Ante Bet

Ante bet is the initial bet placed by both the player and the computer in order to start the game. After this ante bet the computer distributes the cards.

C. Straight-Flush

The dealer/player wins the poker game if they have all three cards of same kind and they are in an order. Like if the player has a heart two, heart three and a heart four, then the player wins the game with a Straight-Flush.

D. Triple

The dealer/player wins the poker game if they have all three cards with the same number in different types, provided the player is not straight-flush Like if the dealer has a heart two, spade two and a clubs two, then the dealer wins the game with a Triple.

E. Straight

The dealer/player has the possibility of winning this poker game if they have all three cards of different kind but they are in an order. Like if the player has a heart two, diamond three and a clubs four, then the player wins the game with a Straight.

F. Flush

The dealer/player has the possibility of winning this poker game if they have all three cards of the same kind. Like if the dealer has a heart two, heart ten and a heart four, then the dealer wins the game with a Flush.

G. Pair

The dealer/player has the possibility of winning the poker game if they have two cards of the same number. Like if the player has a heart two and diamonds two and a clubs ten, then the player wins the game with a Pair. This is the least of the winning criteria

H. Chosen Implementation

The three card poker game is implemented in Python and it uses the PYQT4, a python binding library for cross platform GUI to implement the Interface of this poker game. The bet value is given through the terminal window, and once the ante bet is placed the GUI appears with the shuffled cards.

III. Discussion of Implementation

A. Overview of Implementation

Once the player is ready to play the poker game, the dealer starts by asking the ante bet. Now the user places the ante bet with any amount. Then the dealer matches the bet and then the game begins. The computer now shuffles and draws three cards for the player and three cards for the dealer/computer, in which two cards of the player and the dealer are revealed and the third card is faced downwards to hide the value on the card.

Now the player is given the option to fold/give up or to play a bet. In case if the player clicks on the play bet then the initial amount of the ante bet will be doubled. Let us assume that the player places an ante bet of $100 and decides to bet again, in this case the players ante bet of

$100 will be doubled, assuming that now the player has $200 (100+100) in his bet amount.

After the player places the play bet, the artificial intelligence in the game checks if the computer wants to bet or to fold. If the computer places a bet, then immediately after the bet is placed the third card is revealed for both the player and the dealer/computer. Once the third card is revealed the computer decides the winner based on the cards.

Let's assume that the player wants to end the game after seeing the two open cards. In this case the player can fold or give up. Once the player clicks on the Fold/Give up button then the third card is revealed and the winner is decided based on the cards.

B. Artificial Intelligence Engine

Artificial Intelligence (AI) is used to cheat in the developed three-card poker game. Artificial Intelligence in this game plays a vital role in making the dealer/computer win by cheating and without being caught. The game is designed in a manner that the dealer/computer wins approximately one in ten games, depending on the cards that the dealer gets. To make the dealer/ computer win, the Artificial Intelligence uses two different logics.

First logic: If the computer/dealer's revealed card values are of the same type/kind then the Artificial Intelligence matches the third card with the same type. In such case, the dealer/computer most likely wins the game with a Flush. The AI checks for the all available and dispatched card before swapping the card to avoid duplicate. In order to check for the required card, the Artificial Intelligence first checks the value of the hidden card, then the artificial intelligence checks for other option of just changing the kind of the hidden card to match the other two cards. But to accomplish this the Artificial Intelligence should first check if the particular card is available in the deck. If the card is available then the Artificial Intelligence just swaps the card, but if it isn't available then the artificial intelligence leaves the existing third card as it is. This is a random win depending on the two revealed card values. The probability of this win happens one in ten times.

Second logic: If the computer/dealer's revealed card values are of the same value/number then the Artificial Intelligence matches the third card with the same value of different kind. The AI can only switch the dealer's card if the required card is available in the deck and not with the player or dealer. This would most likely make the dealer win the poker game with a Triple, provided the user doesn't have the straight flush. To accomplish a Triple win the Artificial Intelligence checks the hidden card first and then tries swapping the number similar to the first logic. Triple is the second highest winning criteria and so the probability of the dealer/computer winning in this manner is higher. From my testing the possibility was once every thirty times. The whole idea is to make the dealer/computer win but not all the time and so this probability helped with such requirements.

By these two logics the Artificial Intelligence makes the dealer/computer win without being caught. The Artificial Intelligence has to follow a set of steps before helping the dealer/ computer to avoid being caught. This logic helps the dealer/computer win.

Checking for both logics at the same time ensures that the Artificial Intelligence is safe to cheat without being caught and the logics that the Artificial Intelligence follow increase the probability of the dealer/computer winning without being caught in its act.

C. Implementation Diagram

The basic implementation of this poker game is described in Fig.1.

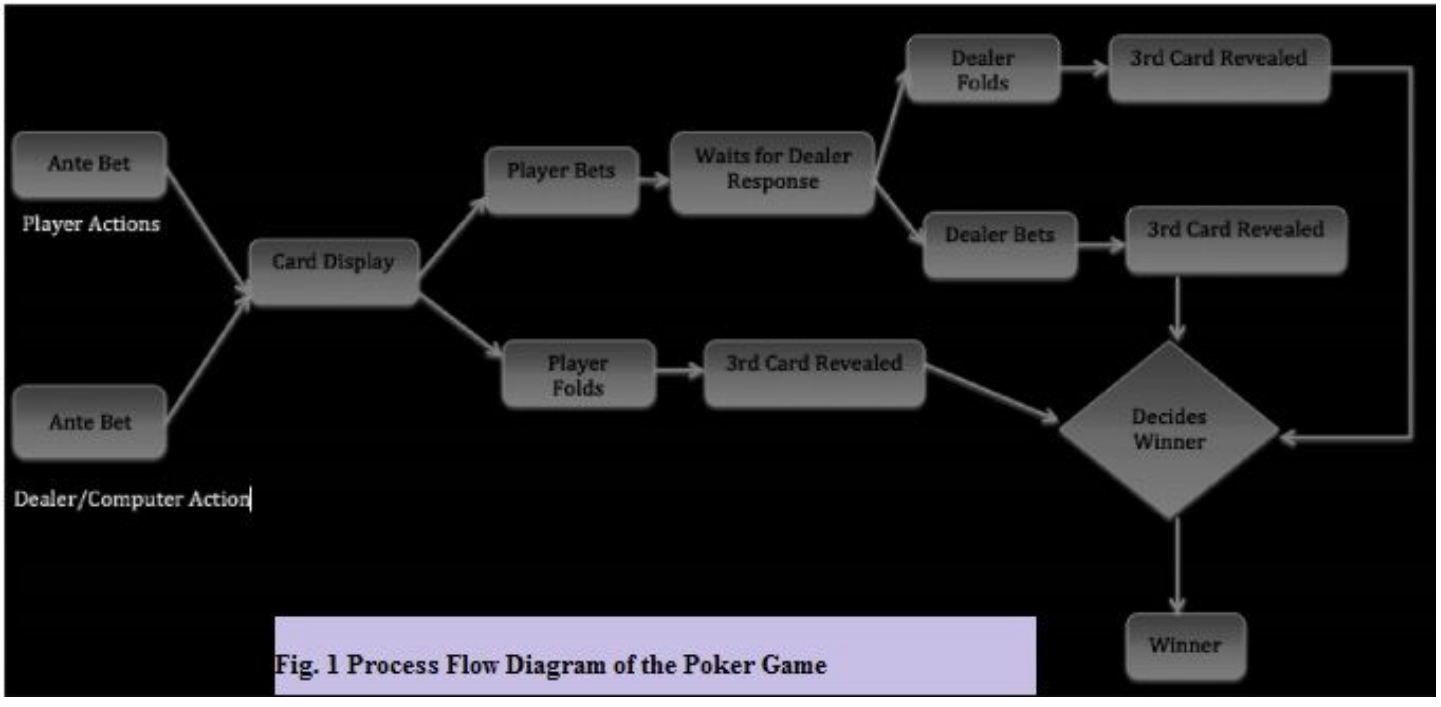

Fig. 1 Process Flow Diagram of the Poker Game

D. Plans for Testing:

To check the probability of the dealer/computer winning, the poker game was played continuously to see how many time the dealer/computer won using the two logics of the artificial intelligence in a given time. This test helped to understand how the Artificial Intelligence helps with the dealers/computers victory

E. Running the Implemented Test

The game was played over and over again to find out the various logics used by the Artificial Intelligence to increase the probability of the dealer/ computer's chances of winning the game.

Fig.2 shows how the artificial intelligence swaps the dealers third card to make the dealer win.

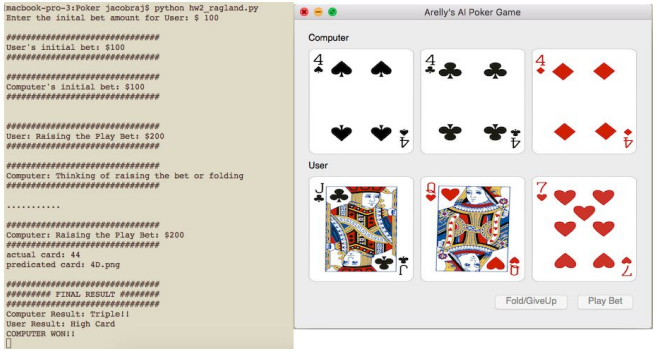

Fig.2 Computer wins with a Triple

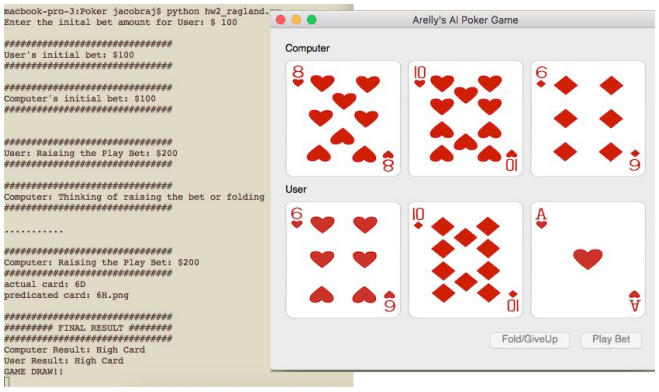

Fig.3 AI tries to make the Dealer to get a Flush

Fig.3 shows how the artificial intelligence tries to swap the required card to make a flush, but then didn't swap, since the required card was already present with the player/user. The required card according to Fig.3 is six hearts.

Fig.4 shows that the computer/dealer won the game with a Flush. Here the Artificial Intelligence succeeds with its first attempt by checking the the value of the hidden card itself.

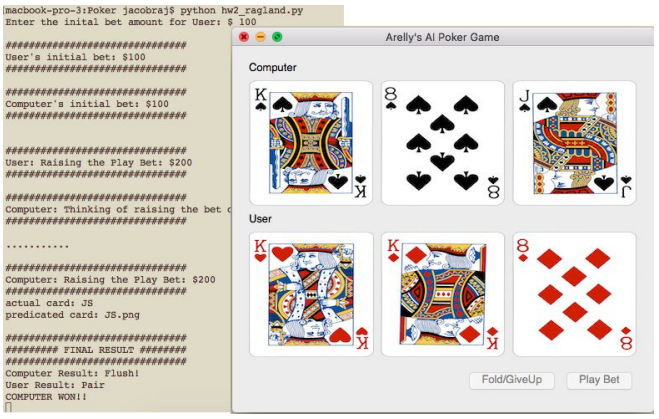

Fig.4 Computer wins with a Flush

F. Test Results:

From my testing, the probability of the dealer/computer winning the poker game with a Flush was one in ten times and the dealer/computer winning with a Triple was one in thirty chances.

Every time the dealer/computer gets two same of a kind cards, the Artificial Intelligence checks the next card and swaps if needed to make the dealer win with a Flush. But to make it feasible the Artificial Intelligence first checks the third cards to confirm its kind. If the third card is the same kind as the other two cards then the artificial intelligence does not change the card. In case the third card is a different card then the artificial intelligence tries to just swap the card with the same kind. To accomplish this the Artificial Intelligence should first check if the player or dealer has the desired card which was to be swapped. If either one of them has the card then the Artificial Intelligence just leaves the existing dealers/computers third card as it is to avoid being caught with cheating.

IV. Conclusion

This poker game increases the probability of the dealer/computer winning the game by enhancing the chances of victory by giving the dealer/computer a Triple or a Flush. The Artificial Intelligence that I designed helps the dealer with its logics and not getting caught.

V. References

[1] https://simple.wikipedia.org/wiki/Artificial_intelligence