

KBG GAME

Artificial intelligence

C1L

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1. Introduction

This project aims to application the **KGB** game using artificial intelligence algorithms. In this project, we have implemented a stochastic algorithm that allows computer to look many moves ahead, thus picking the move that optimizes its chances of the winning.

2. KGB



2.1 Definition

It is a game that can be played by two people consisting of three random cards, each of whom must draw a card and reveal its identity, and according to the priority of the card, the winner will be announced.

2.2 Objective

You get a higher priority card than your opponent until you achieve the goal

2.3 HOW TO PLAY KGB

The draw is done randomly for each of the players, and the choice will fall on (girl / boy / king). The king can beat the boy, the boy can beat the girl, but only the girl can beat the king, and the winner is achieved based on this method.

3. SEARCH ALGORITHM

STOCHASTIC GAMES

In real life, many unpredictable external events can put us into unforeseen situations. Many games mirror this unpredictability by including a random element, such as the throwing of dice. We call these stochastic games.[3] Is a usually a two player games and depend on luck . Card games provide many examples of stochastic partial observability. It is a dynamic game. Roles are exchanged between the players. The complexity of stochastic games stems from the fact that the players' choices have two, sometimes contradictory, consequences. First, the players' actions, along with the current state, determine the immediate payoff that each player receives. Second, the current state and the actions of the players influence the choice of the new state, which determines the potential payoffs in the future.[2]

The complexity of stochastic games stems from the fact that the players' choices have two, sometimes contradictory, consequences.[4]

4. IMPLEMENTATION

The game is divided into several stages. The game is in a certain state at the start of each stage. The players choose actions, and each player receives a payoff based on the current state and the actions chosen. The game then advances to a new random state, the distribution of which is determined by the previous state and the actions taken by the players. The procedure is repeated at the new state, and the game continues indefinitely or indefinitely. The total payoff to a player is frequently assumed to be the discounted sum of the stage payoffs or the limit inferior of the stage payoff averages.[1]

5. CONCLUSION

In summary, we improved the **KGB** game by using stochastic algorithms. Because AI beats human players more often, while using algorithms that search for the best moves ahead of time to avoid what human players are good at knowing everything. reasonably possible movements.

6. CODE

```

main.py
1  #Project CCAI-221
2  #Team(students name):
3  #Dania salim      2111168
4  #Shatha aldhahrr  2111144
5  #Bushra alzeghabi 2110066
6  #Bushra Dajam     2110054
7  #Game
8  #Game rules:
9  #1-It consists of two players (user, computer)
10 #2-The user plays against the computer
11 #3-The Grandfather beats the Boy
12 #4-The Boy beats the Girl
13 #5-The Girl beat the Grandfather
14
15 import random
16 choices = ['grandpa','boy','girl']
17 user_score = 0
18 computer_score=0
19 #Displays the game interface and rules
20 print("*****Welcome to our game(KGB)*****")
21 print("----> Game rules: *****")
22 print("1-The Grandfather beats the Boy\n2-The Boy beats the Girl\n3-The Girl beat the Grandfather\n4-The win")
23 print("*****")
24 #Asks the user to enter her/his name and take input (name)
25 name=input("Enter your name :")
26 #Print a welcome message
27 print(f"\nWelcome {name.title()}\n")
28 def game(user, computer):
29     global user_score
30     global computer_score
31     #Displays the options chosen by the computer and the user
32     print(f"You chose {user}, computer chose {computer}.\n")
33     #Checks if the computer tied with the user (choose the same option)
34     if user == computer:
35         print (f"Both players selected {user}. It's a tie!\n")
36     #Checks if the user choose grandpa and we have two if the first if computer choose boy the user win
37     #else if computer choose anything else (girl) computer will win
38     elif user == "grandpa":
39         if computer == "boy":
40             #User score increase because he/she won
41             user_score += 1
42             #Print and Explanation of the reason of who won in addition to displaying the points of the user
43             print(f"The Grandfather beat Boy!! You scored 1 point. Your score is {user_score}, computer score")
44         else:
45             #computer score increase because it won
46             computer_score += 1
47             #Print and Explanation of the reason of who won in addition to displaying the points of the user
48             print(f"The Girl beat Grandpa!! Computer scored 1 point. Your score is {user_score}, computer score")
49     #Checks if the user choose girl and we have two if the first if computer choose grandpa the user win
50     #else if computer choose anything else (boy) computer will win
51     elif user == "girl":
52         if computer == "grandpa":
53             #User score increase because he/she won
54             user_score += 1
55             #Print and Explanation of the reason of who won in addition to displaying the points of the user
56             print(f"The Girl beat the Grandfather!! You scored 1 point. Your score is {user_score}, computer score")
57         else:
58             #computer score increase because it won
59             computer_score += 1
60             #Print and Explanation of the reason of who won in addition to displaying the points of the user
61             print (f"The Boy beat the Girl!! Computer scored 1 point. Your score is {user_score}, computer score")

```

```

main.py
62 #Checks if the user choose boy and we have two if the first if computer choose girl the user win
63 #else if computer choose anything else (grandpa) computer will win
64 elif user == "boy":
65     if computer == "girl":
66         #User score increase because he/she won
67         user_score += 1
68         #Print and Explanation of the reason of who won in addition to displaying the points of the user
69         print (f"The Boy beat the Girl!! You scored 1 point. Your score is {user_score}, computer score is {computer_score}")
70     else:
71         #computer score increase because it won
72         computer_score += 1
73         #Print and Explanation of the reason of who won in addition to displaying the points of the user
74         print (f"The Grandfather beat the Boy!! Computer scored 1 point. Your score is {user_score}, computer score is {computer_score}")
75
76
77

```

```

78 while True:
79     #If the user's score value reaches 5:
80     #1- It will display the winning message
81     #2- Program execution stops
82     if user_score == 5:
83         print("="*41, f"\nYour score reached 5. YOU WIN {name}!!\n", "="*40, "\n")
84         print("="*21, "\nComputer lose\n", "="*20)
85         exit()
86     #If the computer's score value reaches 5:
87     #1- It will display the winning message
88     #2- Program execution stops
89     elif computer_score == 5:
90         print("="*41, "\nComputer score reached 5. COMPUTER WIN!!\n", "="*40, "\n")
91         print("="*21, f"\n{name} lose\n", "="*20)
92         exit()

```

7.OUTPUT

```

main.py
1 #Game
2 #Game rules:

input
*****Welcome to our game(KGB)*****
----> Game rules: *****
1-The Grandfather beats the Boy
2-The Boy beats the Girl
3-The Girl beat the Grandfather
4-The winner whose score reach 5
*****
Enter your name :bushra

Welcome Bushra

Enter a choice ( grandpa , boy , girl) : buo
You entered invalid choice
please try again!!
Enter a choice ( grandpa , boy , girl) : boy
You chose boy, computer chose girl.

The Boy beat the Girl!! You scored 1 point. Your score is 1, computer score is 0

Enter a choice ( grandpa , boy , girl) : girl
You chose girl, computer chose boy.

The Boy beat the Girl!! Computer scored 1 point. Your score is 1, computer score is 1

Enter a choice ( grandpa , boy , girl) : boy

main.py
1 #Game
2 #Game rules:

input
Enter a choice ( grandpa , boy , girl) : boy
You chose boy, computer chose grandpa.

The Grandfather beat the Boy!! Computer scored 1 point. Your score is 1, computer score is 2

Enter a choice ( grandpa , boy , girl) : bou
You entered invalid choice
please try again!!
Enter a choice ( grandpa , boy , girl) : boy
You chose boy, computer chose boy.

Both players selected boy. It's a tie!

Enter a choice ( grandpa , boy , girl) : grandpa
You chose grandpa, computer chose girl.

The Girl beat Grandpa!! Computer scored 1 point. Your score is 1, computer score is 3

Enter a choice ( grandpa , boy , girl) : grandpa
You chose grandpa, computer chose grandpa.

Both players selected grandpa. It's a tie!

Enter a choice ( grandpa , boy , girl) : boy
You chose boy, computer chose grandpa.

main.py
1 #Game
2 #Game rules:

input
You chose grandpa, computer chose grandpa.

Both players selected grandpa. It's a tie!

Enter a choice ( grandpa , boy , girl) : boy
You chose boy, computer chose grandpa.

The Grandfather beat the Boy!! Computer scored 1 point. Your score is 1, computer score is 4

Enter a choice ( grandpa , boy , girl) : boy
You chose boy, computer chose grandpa.

The Grandfather beat the Boy!! Computer scored 1 point. Your score is 1, computer score is 5

=====
Computer score reached 5. COMPUTER WIN!!
=====

bushra lose
=====

...Program finished with exit code 0
Press ENTER to exit console.

```


8.REFERENCE

[1] Krishnendu Chatterjee and Laurent Doyen. 2014. *Partial-Observation Stochastic Games: How to Win when Belief Fails*. *ACM Trans. Comput. Logic* 15, 2, Article 16 (April 2014), 44 pages. <https://doi.org/10.1145/2579821>

[2] Solan E, Vieille N. Stochastic games. *Proc Natl Acad Sci U S A*. 2015 Nov 10;112(45):13743-6. doi: 10.1073/pnas.1513508112. PMID: 26556883; PMCID: PMC4653174.

[3] S. J. Russell and P. Norvig, *Artificial Intelligence: A modern approach*. Harlow: Pearson Education Limited, 2022.

[4] Solan E, Vieille N. Stochastic games. *Proc Natl Acad Sci U S A*. 2015 Nov 10;112(45):13743-6. doi: 10.1073/pnas.1513508112. PMID: 26556883; PMCID: PMC4653174.