CSCI 5454 Problem Set 4
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No Collaborators

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1. *Implement the action setting of Hedge and use it to complete a few tasks.*

   (a) *Use Hedge to write a game AI and display some sample output.*

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  Payoff Matrix
[-8, 10, 2]
[-4, -2, -1]
[-8, -6, 1]
##########
Round 0
##########
Enter the row you wish to choose: 0
Action chosen by user 0
Probability distribution of AI actions [0.3333333333333333,0.3333333333333333,0.3333333333333333]
Action chosen by AI 1
AI loss vector [-8, 10, 2]
AI weight vector [2980.9579870417283, 4.5399929762484854e-05, 0.1353352832366127]
old AI score 0.0 , new AI score -10.0 , difference -10.0
old user score 0.0 , new user score 10.0 , difference 10.0
##########
Round 1
##########
Enter the row you wish to choose: 0
Action chosen by user 0
Probability distribution of AI actions [0.9999545869027009,
1.522928810416062e-08, 4.5397868011057175e-05]
Action chosen by AI 0
AI loss vector [-8, 10, 2]
AI weight vector [8886110.520507872, 2.061153622438558e-09, 0.018315638888734182]
old AI score -10.0 , new AI score -2.0 , difference 8.0
old user score 10.0 , new user score 2.0 , difference -8.0
##########
Round 2
##########
Enter the row you wish to choose: 0
Action chosen by user 0
Probability distribution of AI actions [0.9999999979388461,2.319522825462676e-16,2.0611536181902033e-09]
Action chosen by AI 0
AI loss vector [-8, 10, 2]
AI weight vector [26489122129.84347, 9.357622968840175e-14, 0.002478752176666359]
old AI score -2.0 , new AI score 6.0 , difference 8.0
old user score 2.0 , new user score -6.0 , difference -8.0
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   (b)

2.

3.

4.

5. *Find a mixed nash equilibrium of the zero-sum game. Give both strategies and the value of the game and show the vector of expected payoffs for player 2 under player 1's strategy and vice versa.*

$$M = \begin{bmatrix} 1 & 0 & 1 & 8 & 0 \\ 5 & 8 & 9 & 2 & 1 \\ 0 & 1 & 8 & 0 & 5 \\ 8 & 9 & 2 & 1 & 0 \\ 1 & 8 & 0 & 5 & 8 \end{bmatrix}$$