

CPSC 481 Final Project: Black Jack Game

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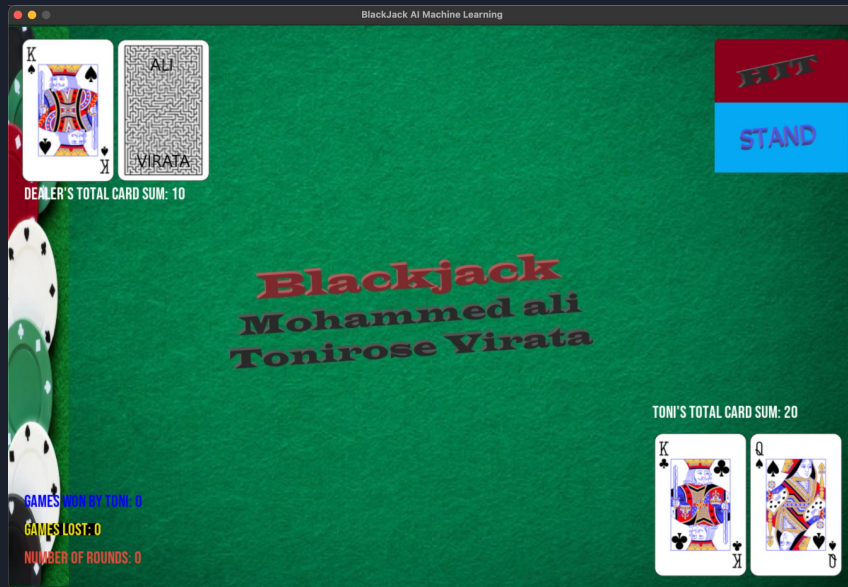
Objectives

- Basic rules of Black Jack
- Graphical user interface
- Player interactions
- Card deck simulation
- Dealer logic
- Computer player AI
- Scoreboard
- Betting System
- Menu
- Sound Effects



What we completed

- Basic rules of Black Jack
- Graphical user interface
- Player interactions
- Card deck simulation
- Dealer logic
- Computer player AI
- Scoreboard
- Graphs to show computer AI learning curve
- Betting system

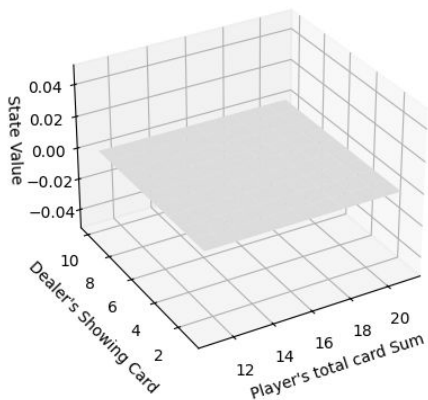


PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
(base) tvirata@Tonis-MacBook-Air New folder (2) % /usr/local/bin/python3 "/Users/tvirata/Desktop/New folder (2)/BlackJack.py"
pygame 2.5.2 (SDL 2.28.3, Python 3.12.0)
Hello from the pygame community. https://www.pygame.org/contribute.html
To Play regular game type 'Game' watch AI play type 'AI' : █
```

Results (1)

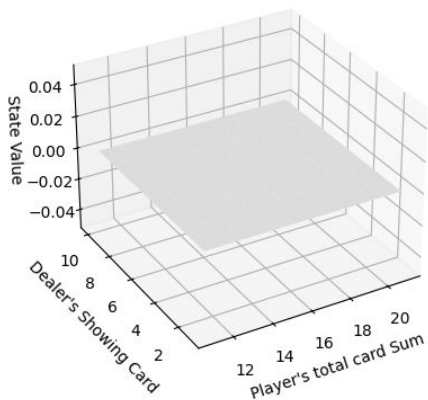
Usable Ace: Games Played: 1 (Wins: 0, Losses: 1)



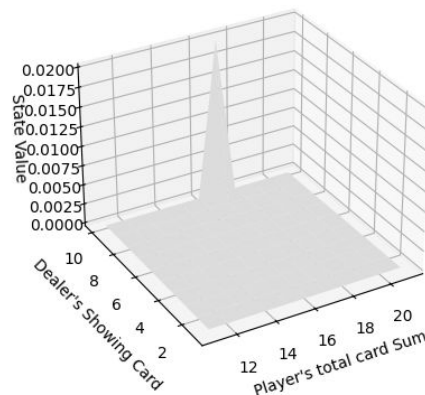
Round 1

- The AI only played 1 game
- It isn't familiar with Blackjack
- Plot is flat and gray because it has not won any games and has not learned much

Not Usable Ace: Games Played: 1 (Wins: 0, Losses: 1)



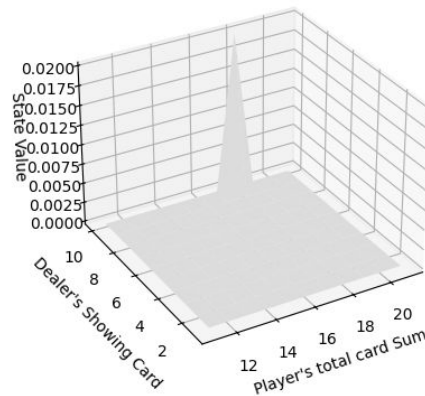
Usable Ace: Games Played: 5 (Wins: 3, Losses: 2)



Not Usable Ace: Games Played: 5 (Wins: 3, Losses: 2)

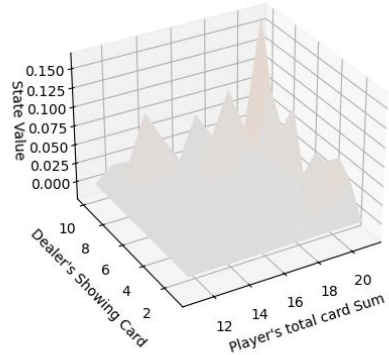
Round 5

- The AI only played 5 games
- It still isn't familiar with Blackjack
- Plot shows spike for playing more than 1 game and gray because it has not won any games and has not learned much



Results (2)

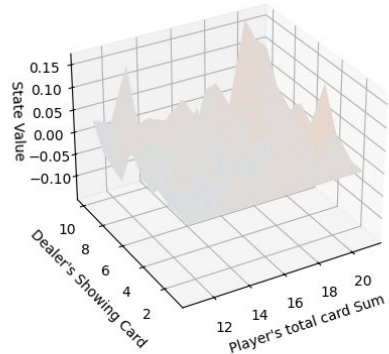
Usable Ace: Games Played: 1000 (Wins: 445, Losses: 555)



Round 1000

- The AI has played 1000 games
- It is learning how to play Blackjack better
- Plot shows spikes for playing more than 1 game and slight orange tint shows how much it learns

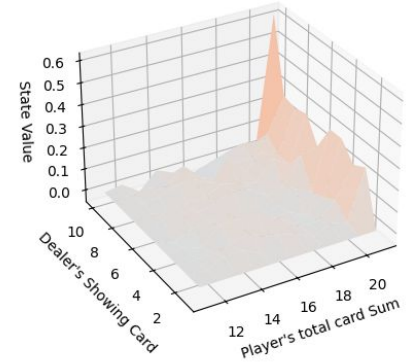
Not Usable Ace: Games Played: 1000 (Wins: 445, Losses: 555)



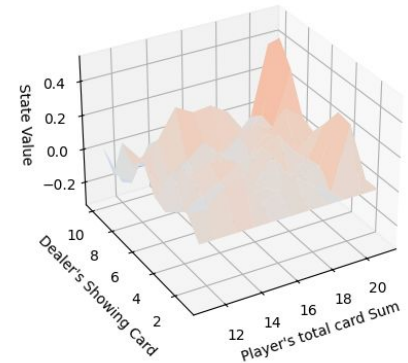
Round 5000

- The AI has played 5000 games
- It is learning how to play Blackjack better
- Plot shows spikes for playing more than 1 game and slight orange tint shows how much it learns

Usable Ace: Games Played: 5000 (Wins: 2481, Losses: 2519)

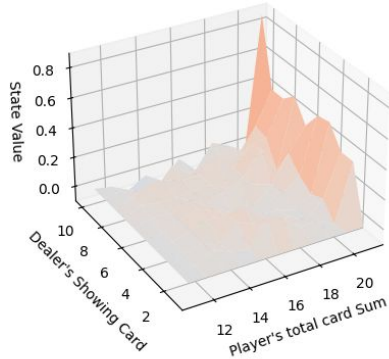


Not Usable Ace: Games Played: 5000 (Wins: 2481, Losses: 2519)



Results (3)

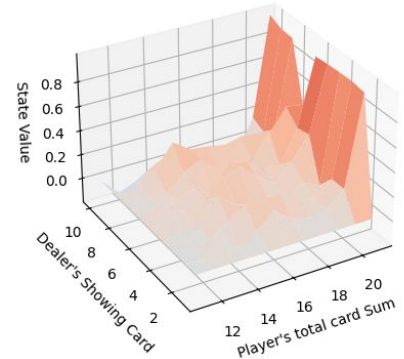
Usable Ace: Games Played: 10000 (Wins: 5026, Losses: 4974)



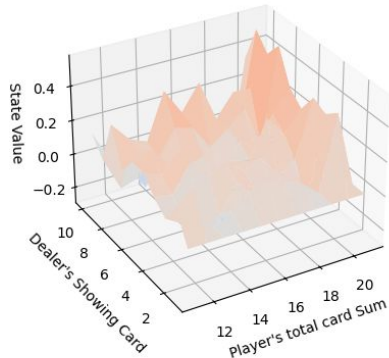
Round 10000

- The AI has played 10000 games
- It is learning how to play Blackjack better
- Plot shows spikes for playing more than 1 game and slight orange tint shows how much it learns

Usable Ace: Games Played: 50000 (Wins: 25692, Losses: 24308)



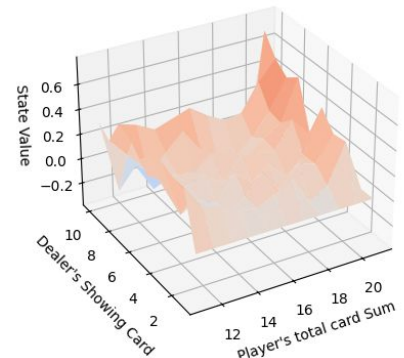
Not Usable Ace: Games Played: 10000 (Wins: 5026, Losses: 4974)



Round 50000

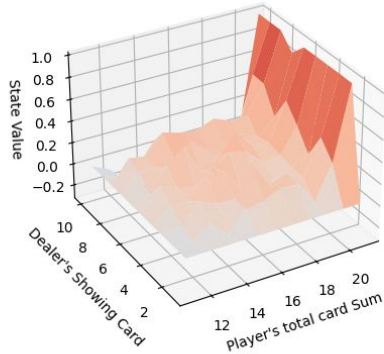
- The AI has played 50000 games
- It is learning how to play Blackjack better
- Plot shows spikes for playing more than 1 game and slight orange tint shows how much it learns

Not Usable Ace: Games Played: 50000 (Wins: 25692, Losses: 24308)

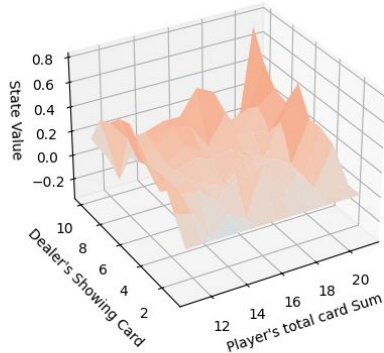


Results (4)

Usable Ace: Games Played: 100000 (Wins: 51825, Losses: 48175)



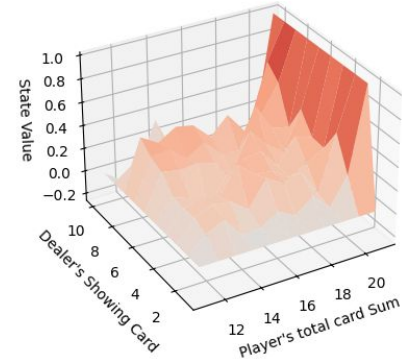
Not Usable Ace: Games Played: 100000 (Wins: 51825, Losses: 48175)



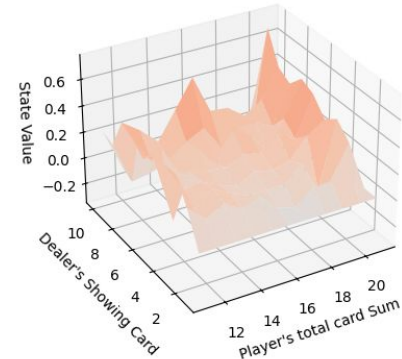
Round 100000

- The AI has played 100000 games
- It is learning how to play Blackjack better
- Plot shows spikes for playing more than 1 game and more orange tint shows how much it's learning

Usable Ace: Games Played: 255374 (Wins: 133116, Losses: 122258)



Not Usable Ace: Games Played: 255374 (Wins: 133116, Losses: 122258)



Round 250000

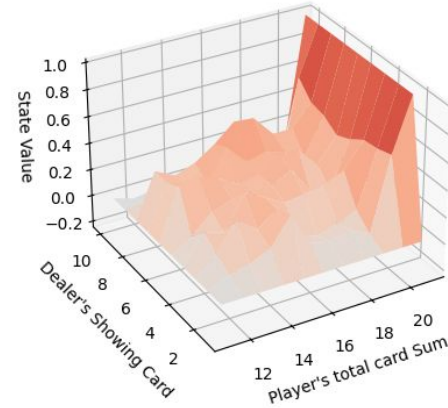
- The AI has played 250000 games
- It is learning how to play Blackjack better
- Plot shows spikes for playing more than 1 game and more orange tint shows how much it's learning

Results (5)

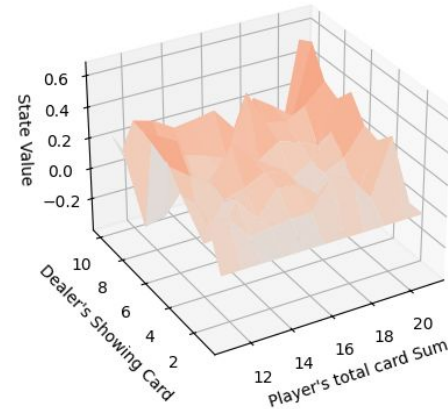
Round 1000000

- The AI has played 1000000 games
- It is learning how to play Blackjack better
- Plot shows spikes for playing more than 1 game and more orange tint shows how much it's learning
- The AI is winning a lot more rounds using Aces.

Usable Ace: Games Played: 1000000 (Wins: 522225, Losses: 477775)



Not Usable Ace: Games Played: 1000000 (Wins: 522225, Losses: 477775)





References

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<https://towardsdatascience.com/learning-to-win-blackjack-with-monte-carlo-methods-61c90a52d53e>

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