Poker with Cheats

1. Project Overview

This is a simple two-player poker game. You play against a bot, but there's a twist where you can see your hand's win rate. It calculates your chances of winning based on the community cards and your opponent's hand, giving you a huge advantage.

2. Project Review

I will study PyPokerEngine, an open-source poker simulator that allows bots and AI strategies. And maybe take some of their code and improve it by displaying real-time win rate instead.

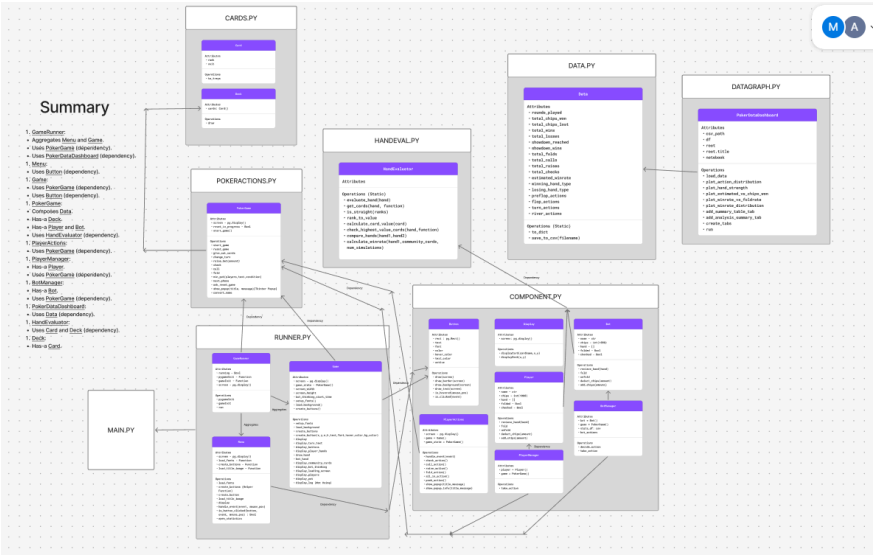
3. Programming Development

3.1 Game Concept

It's just basically poker with standard poker rules where everyone draws 2 and just gambles (without using real money) while each community card gets revealed. But you, the player will see your own win rate so you can decide when to fold or just go all in.

UML

Link:
https://www.figma.com/board/Jy0BgqFlQyyYlj0d4zlDq5/Untitled?node-id=0-1&t=2gDsbJ93iWDcF8cq-1



3.3 Algorithms Involved

There would be 2 main algorithms involved.

Hand Evaluation Algorithm

This algorithm determines the strength of a player's hand based on standard Texas Hold'em hand rankings (e.g., High Card, Pair, Flush, Straight, Full House, etc.) (rule-based evaluation system.

Monte Carlo Simulation (Win Rate Calculation)

The Monte Carlo method is used to estimate win probability by estimating the win rate by simulating thousands of possible outcomes based on the remaining deck.

4. Statistical Data (Prop Stats)

4.1 Data Features

Describe at least five features you will track in the game, which may include player behavior or game-related metrics (e.g., character movement, keystrokes, pixels moved, player score, time played, enemies defeated, accuracy, and completion rate). Each feature should have at least 50 rows of data. (For example, in football, a player's performance can be analyzed by collecting and analyzing statistical data.)

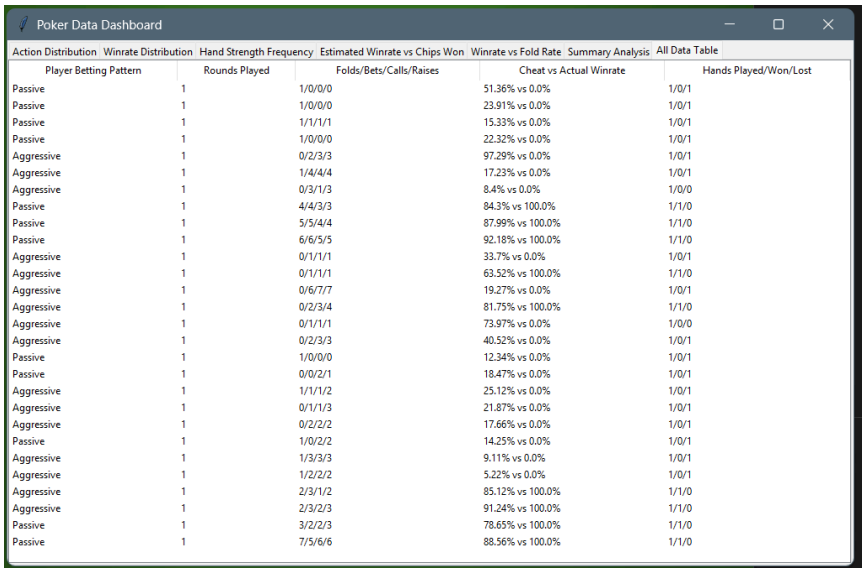
Metric	Value
Total Rounds Played	56
Avg Estimated Winrate (%)	46.96
Win/Loss Ratio	0.7
Net Chips Gained	2125
Showdown Winrate (%)	55.88

	Why is it good to have this data? What can it be used for	How will you obtain 50 values of this feature data?	Which variable (and which class will you collect this from?)	How will you display this feature data (via summarization statistics or via graph)?
Total Round Played	To know what size of data we are dealing with.	Simulate the game 50 times	rounded_played	**Histogram**: Shows the distribution of rounds played across simulations
Average Estimated Win Rate	To know the average win rate of the hand and how accurate it is.	I can simulate the game 25 times and take the estimated hand win rate from 2 players.	estimated_winrate	**Box Plot + Mean Value**: Boxplot to show spread; add a line or text for the average
Win/Loss ratio	To know the bot and player strength who's better on average.	II can simulate the game 25 times and take the data from 2 players.	Total_wins, total_losses	**Bar Graph or Stacked Bar**: Compare win/loss per player; or use **ratio line plot** if showing progression over time
Net Chips Gained	To know how the game state or win loss ratio effect chips gain,	II can simulate the game 25 times and take the data from 2 players.	Total_chips_win, total_chips_lost	**Histogram or Violin Plot**: Show distribution of net chips; **scatter plot** if comparing with win rate
Showdown Win rate	To know what to expect in the showdown	II can simulate the game 25 times and take the data from 2 players.	showdown_win	**Grouped Bar Chart + Table**: Bar for win rate at showdown; Table for summary stats per player

Statistical Data Revision

Feature Name	Graph objective	Graph type	X-axis	Y-axis	Statistical Value
Action Distribution	Show frequency of player actions at each game stage	Stacked Bar	Game Stage	Frequency	Frequency Distribution
Win Rate Distribution	Visualize spread of estimated win rates	Histogram	Estimated Win Rate (%)	Frequency	Distribution Spread, Mean
Winrate by Hand Type	Show how often certain hands result in wins	Horizontal Bar	Hand Type	Win Rate (%)	Mean Win Rate per Hand Type
Estimated Winrate vs Chips Won	Explore relationship between winrate and chips gained/lost	Scatter Plot	Estimated Winrate (%)	Chips Won	Correlation/Trend
Winrate vs Fold Rate	Analyze fold tendencies at different winrate levels	Scatter Plot	Estimated Winrate (%)	Fold Rate (%)	Correlation/Trend

There's also a table that show data from the game also



Player Betting Pattern	Rounds Played	Folds/Bets/Calls/Raises	Cheat vs Actual Winrate	Hands Played/Won/Lost
Passive	1	1/0/0/0	51.36% vs 0.0%	1/0/1
Passive	1	1/0/0/0	23.91% vs 0.0%	1/0/1
Passive	1	1/1/1/1	15.33% vs 0.0%	1/0/1
Passive	1	1/0/0/0	22.32% vs 0.0%	1/0/1
Aggressive	1	0/2/3/3	97.29% vs 0.0%	1/0/1
Aggressive	1	1/4/4/4	17.23% vs 0.0%	1/0/1
Aggressive	1	0/3/1/3	8.4% vs 0.0%	1/0/0
Passive	1	4/4/3/3	84.3% vs 100.0%	1/1/0
Passive	1	5/5/4/4	87.99% vs 100.0%	1/1/0
Passive	1	6/6/5/5	92.18% vs 100.0%	1/1/0
Aggressive	1	0/1/1/1	33.7% vs 0.0%	1/0/1
Aggressive	1	0/1/1/1	63.52% vs 100.0%	1/1/0
Aggressive	1	0/6/7/7	19.27% vs 0.0%	1/0/1
Aggressive	1	0/2/3/4	81.75% vs 100.0%	1/1/0
Aggressive	1	0/1/1/1	73.97% vs 0.0%	1/0/0
Aggressive	1	0/2/3/3	40.52% vs 0.0%	1/0/1
Passive	1	1/0/0/0	12.34% vs 0.0%	1/0/1
Passive	1	0/0/2/1	18.47% vs 0.0%	1/0/1
Aggressive	1	1/1/1/2	25.12% vs 0.0%	1/0/1
Aggressive	1	0/1/1/3	21.87% vs 0.0%	1/0/1
Aggressive	1	0/2/2/2	17.66% vs 0.0%	1/0/1
Passive	1	1/0/2/2	14.25% vs 0.0%	1/0/1
Aggressive	1	1/3/3/3	9.11% vs 0.0%	1/0/1
Aggressive	1	1/2/2/2	5.22% vs 0.0%	1/0/1
Aggressive	1	2/3/1/2	85.12% vs 100.0%	1/1/0
Aggressive	1	2/3/2/3	91.24% vs 100.0%	1/1/0
Passive	1	3/2/2/3	78.65% vs 100.0%	1/1/0
Passive	1	7/5/6/6	88.56% vs 100.0%	1/1/0

3.2 Data Recording Method

Explain how the game will store statistical data. Will it be saved in a database, CSV file, or another format?

I'm planning to go easy on the CSV file but if I'm working with a larger db. I would maybe consider mongo or SQL server. (Planning to use CSV)

3.3 Data Analysis Report

Outline how you will analyze the recorded data. What statistical measures will you use? How will the analysis be presented (e.g., graphs, tables, charts)?

I would analyze the data using the table, it would be the easiest.
But I've also included 5 different graphs.

4. Project Timeline

Week	Task
1 (10 March)	Proposal submission / Project initiation
2 (17 March)	Full proposal submission
3 (24 March)	Do the base code for every feature
4 (31 March)	Finished all the feature
5 (7 April)	Last check up on bugs and error done

6 (14 April)	Submission week (Draft)

Continue Planning

Week	Task
26 March-2 April	Try to finish the main game logic and making the game work
3 April-9 April	Add more features that have been missed out or necessary UI
10 April-16 April	Refactor All the code so it looks cleaner and more reusable
17 April-23 April	Check for bugs (UI & Features)
24 April-11 May	Last check up to get ready for the submission

5. Document version

Version: 3.0

Date: 31 March 2025

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Date	Name	Description of Revision, Feedback, Comments
14/3	Rattapoom	Data Analysis report requires explanation on statistical issues. Other than that, Good Job!
16/3	Parima	The overall document is clear.
28/3	Rattapoom	• Some comments on UML class diagram • Please also tell us which variable you're planning to use to collect those data
30/3	Parima	The UML diagram needs some revision.