APPLICATION FOR PLAYING POKER WITH MULTIPLE USERS

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Abstract
In this world of innovation, we often find ourselves bound by the technology just as we are advancing with it. In the paper, we will provide a solution for a particular problem that a person may go through in his daily life, that is, finding a good form of entertainment when with a group of friends. There are lots of ways one can have fun with their group of friends but it always comes with restrictions that innovation of technology has given birth to. A well-known means of entertainment for a group of friends is card game. There are several popular card games, out of which the one that stands out is Poker. With the technological advancements in the current world, we have found numerous ways to play card games such as Poker on a number of devices like Mobile Phones, Computers, etc. This paper describes the development of a Poker Playing Application which can be played by a group of friends on a single device without the need of any internet connection.

Keywords
Poker, Texas Hold'Em Poker.

1. INTRODUCTION

Poker is one of the most popular card games in the current world. It is a game which can bring fortune as well as misfortune. Poker is said to be a game which incorporates the art of risk-taking.

Up until recently, Poker was viewed as a gambling activity and was shunned as a sport or hobby. But recent studies suggest that Poker is beneficial for cognitive health and development. In Poker, a player needs to have deep understanding of the game and has to pay keen attention on the opponents' movements. Someone who plays Poker regularly is better than an average person at reading people, strategizing and creative thinking.

In the current world where there is competition in every aspect of life, it is important to develop a set of skills called as Business Skills. Poker can help develop and nurture these set of skills which helps the player in real life. Business skills include Confidence, Risk Assessment, Emotional Intelligence, among other things. These are skills that are needed to survive in this competitive world.

Poker is simply a fun way of developing important skills that can benefit you in real life. And what is better than playing with your friends and helping each other become better at life. Playing Poker with your friends might just be one of the best way to improve as a person. There are a lot of ways you can play poker with your friends. Be it playing traditionally with cards and chips,

or be it playing online on a website or application that supports custom rooms. Depending on your preferences, you can choose any of these methods. But what do you do when not all of your friends have good internet or electronic devices to play on? What do you when your friends decide to meet up at your Home but you Wi-Fi is down or cannot smoothly handle so many devices at once? Or What if you do not have a deck of cards at your house?

This paper describes the development of an application that a group of friends can use to play poker on a single device without any internet connection. It is a simple application which can be used to play Poker. There is no need for a person with knowledge of poker to help you play. You only have to initialize a game and start playing chance by chance. It is one of the simplest way of playing poker with your friends. All you have to do is run the application and you can enjoy poker with your friends.

2. LITERATURE REVIEW

The paper [1] "Using a High-Level Language to Build a Poker Playing Agent" talks in-depth about Poker and its history. It provides an overview of How Poker came into picture as one of the most popular games in this modern era. We learn the History of poker and its descendants from the author's research. The research on the history of Poker is defined with precision. It helped us get the perfect idea of Poker's past and its descendants. Apart from the history of Poker, this paper also researches deep into the rising of Texas Hold'Em Poker. It also gives us understanding of variations of Texas Hold'Em Poker.

In [2] "Analysis of poker strategies in heads-up poker", the author talks in detail about the game of Poker. We learn all about Poker from this paper. We base our understanding of Poker from this author's research. Apart from Poker in general, this paper also helps us understand the most famous type of Poker, that is, Texas Hold'Em Poker. This paper dives deep into understanding of Texas Hold'Em Poker.

3. POKER

3.1 HISTORY OF POKER

There have been numerous claims for the origin of Poker. There have been many variations for the birthplace of Poker as well. One of the popular theory places in 17th century Persia, in

the form of As Nas. This was a 20 to 25 card game, which was played between 4 and 5 people. It included betting rounds along with hierarchical hand rankings. This theory is discarded by several historians because the word 'As' does not mean anything related to card in Persian and most likely is referred to 'Ace' in French which would mean absence of the game any time before 1890.

Many European versions of Poker existed in 17th century as well. One popular game was in Germany, called as Pochen. It also included betting, hand ranking and bluffing, all of which exist in Poker. Similarly, a French version existed, called as Poque. Poque holds significant etymological root as French colonies rules the North American territories. So Poker originated from culturally French colony which means an immediate ancestor to Poker would be Poque.

The birth of Poker, has convincingly dated back to 19th century in New Orleans, which was a French territory. It became the part of United States in 1803. The Poker then was only played with 20-card deck dealt between four players evenly. It consisted of the Ace, King, Queen, Jack and 10. After getting inspired by a US originated game called Brag, Poker started to be played with 52-deck card allowing more tha four players to play.

In the year 1920, the birth of Communal Card was witnessed. This was the ultimate origin of the most famous variation of Poker in the modern era.

3.2 TEXAS HOLD'EM POKER

Poker was illegal in United States until the 1960s. In 1970s, an event brought massive media coverage into Poker. It was the World Series of Poker which pitted players against each other. It was a winner-take-all format world championship. After this, Poker became famous as WSOP brought Nationwide coverage in United States.

Eventually the main format for this tournament was Texas Hold'Em Poker. It is a confrontational and explosive version of a normal 5-card draw Poker. With the coverage of media and audiences watching, It can be thrilling and exciting for both the consumers and the players. With the benefits of media coverage all across the globe, Texas Hold'Em Poker became the ultimate version of Poker throughout the world.

The basics of Texas Hold'Em Poker are just as similar to any other version of Poker. There is deck of 52-cards. There are two types of cards, Face and Number. Face cards include Ace, King, Queen and jack. The Number Cards include 10, 9,8,7,6,5,4,3,2. There are four suits of each card: Hearts, Spades, Diamonds and Clubs. Poker is won by winning the pots, that is the money or chips wagered during the play. Pots are won by the player who has the best hand at the end of a round, also called as showdown. Winning the most number of pots does not guarantee a Win, but winning the best posts does.
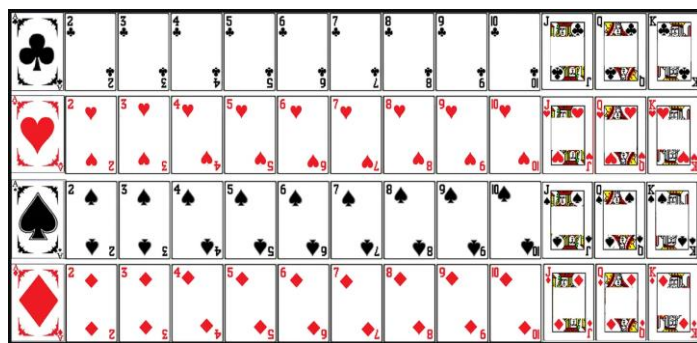

Fig 1. Deck of Cards

A Hand in Poker, refers to the best five-card combination in possession of a player. In variations like Texas Hold'Em Poker, where there are more than 5 cards, the best 5-card combination is considered.

Hands are ranked first by category and then by individual card ranks. Even the lowest value combination in a category beats any combinations from the lower categories. The categories are as follows:

- Royal Flush: It is the highest ranked category. It occurs when player has A, K, Q, J, 10 of the same suit.
- Straight Flush: Next in rank, it occurs when player has a sequence of 5 consecutive cards of same suit. Example, 8, 7, 6, 5, 4 of spades.
- Four-of-a-Kind: It is a combination of 5 cards of which 4 are of the same individual rank and one unrelated card. Example, a 7 of each suit and a 10 of hearts.
- Full House: It is a combination of Three cards of same individual rank and a pair of cards of same individual rank but different from the three cards. Example, a 6 of hearts, clubs and spades along with a 5 of diamonds and hearts.
- Flush: It is combination of 5 cards of same suit and unrelated individual ranks. Example, 2, 3, 5, 7, J of hearts.
- Straight: It is combination of consecutive individual ranks of any suits. Example, a 5, 6, 7, 8, 9 of any suits.
- Three-of-a-Kind: It is a combination of 5 cards of which 3 are of same individual rank and two unrelated cards. Example, a 9 of hearts, spades and clubs along with a Q and 2 of any suit.
- Two Pair: It is a combination of 5 cards where there are two pairs of same individual ranks and one unrelated card. Example, a 7 and 9 each of hearts and clubs along with 5 of any suit.
- Pair: It is a combination of 5 cards where there is one pair of same individual rank and three unrelated cards. Example, a 7 of hearts and clubs along with 3, 4, 5 of any suit.
- High Card: This is considered only when no player has any above mentioned combinations. In this case, the highest ranked card from each player is compared. The individual ranks of cards are A-K-Q-J-10-9-8-7-6-5-4-3-2.

Table 1. Odds of Each Hand

No.	Name of Hand	Odds
1.	Royal Flush	649,739 : 1
2.	Straight Flush	72,192 : 1
3.	Four-of-a-Kind	4,164 : 1
4.	Full House	693 : 1
5.	Flush	508 : 1
6.	Straight	253 : 1
7.	Three-of-a-Kind	46 : 1
8.	Two Pair	20 : 1
9.	Pair	2 : 1
10.	High Card	0.99 : 1

4. DESIGN AND IMPLEMENTATION

Texas Hold'Em Poker is game played that can be played between 2 to 10 players at a time. It is a chance based game where each player gets a chance to act. There are several types of moves that a player can play when their chance appears.

Our game design is focused to keep simplicity in understanding the game of Poker whilst trying to entertain the players. The simplicity of the game is solely focused on the GUI, which is implemented using Python's Tkinter library.

The working of our game is completely coded in python using concepts of classes and objects. Using classes and objects helps organize the code and lets other programmers understand the code faster. It also helps in storing game information in a systematic way. Use of classes and objects enables us to discard the use of any database and the hassles of connecting database to our GUI made from Tkinter.

The structure of our code can explained using Fig 2. The code contains different classes which helps organize all the data that gets inputted from each player. Each class holds its own importance. The different classes implemented in our code are:
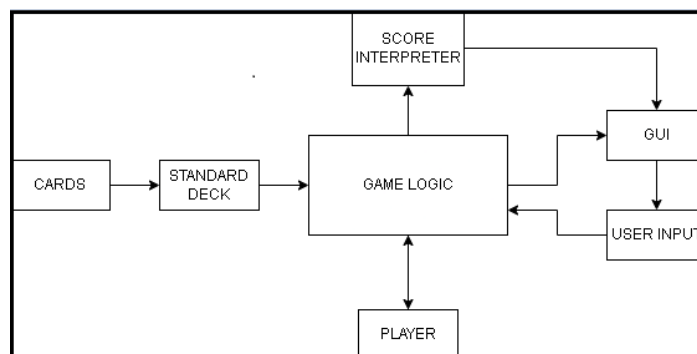

Fig 2. Structure of Code

- Cards: In this class, we manage to create an entity with two attributes, Suit and Value. Suit is supposed to hold number representing the particular suit. Value is supposed to hold the individual rank/value of the card. We have also added a __repr__ function for displaying the card in a convenient format. Example, a 7 of hearts will be displayed as "Seven of Hearts". The instances of this class are created in the next function of standard deck.

- Standard Deck: In this class, we use instances of the Cards class to create a deck of 52 cards. Each suit has 13 cards each from 2 to Ace. We use nested for loops for making each card for each suit. We have added a __repr__ function in this class which will help to display the Deck's remaining cards in a systematic format. Example, "Standard deck of 52 cards remaining".

  We have also included a shuffle function in this class. It uses the python's library called Random in which there is a function named as 'shuffle'. It is the optimum way of shuffling an entity, in terms of time complexity. The random.shuffle offers a time complexity of O(n).

  This class also includes a function to deal one card. It basically pops a card from the shuffled deck and returns the card. This function is later used in Game Logic while dealing cards.

  It also includes a function to burn the existing deck which is used before starting a new round.

- Player: This is a class which can be used to create an instance of a player. It will hold all the attributes needed for a player to function smoothly in a game. It also has a __repr__ function which helps represet the player in a systematic format. Example, if the player's name is 'Player 1', then it will be represented as "Player 1".

  The different attributes that the Player class will hold are: name, chips, stake, stake_gap, cards, score, fold, ready, all_in, list_of_special_attributes and win.

  These attributes will be used either for displaying systematically or to keep track of gameplay by that particular player. 'list_of_special_attributes' will contain the role of that

player in that particular round, which are: Dealer, First Actor, Small Blind and Big Blind.

'fold' and 'all_in' are used to hold the status of the player for that particular round. If the player has folded in that round, then the fold attribute will switch to True.

- Game Logic: It is main part of the code which stores all the mechanics of this game. It processes all the inputs that the players give. It is also responsible for any kind of changes to any attributes of all the classes and objects.

  Game class has its own attributes which keep the status of the rounds, games and active players. Attributes of Game are: need_raise_info, game_over, acting_player, cards, pot, pot_dict, pot_in_play, list_of_player_names, dealer, small_blind, big_blind, first_actor, winners, deck, list_of_scores_from_eligible_winners, round_over, highest_stake, fold_list, round_ended, list_of_players_not_out, list_of_scores_eligible.

  All of these attributes are used to keep constant status of the game. It also helps the code to flow consistently by retrieving any needed information from these attributes.

  This class consists of various functions that are important to Poker. These include deal_hole, deal_flop, deal_turn, deal_river. These functions are used to deal cards as the round proceeds. These are communal cards which are common to all players hence stored in game.cards.

  hand_scorer function allows the game logic to check all the player's hands and determine which player has the highest ranked card combination. It is done by using simple conditions on the attributes of the cards that the player holds. Example, if the card.suit of five cards in player 1 are same, there is a possibility of Flush or Royal Flush which can be further checked by comparing the cards.value.

  find_winners is a function which compares the hands of all players and determines winners. It also determines which player will get how much of the pot, considering a draw between two players. It then inputs the winners into the game.winners attribute. It also prints the given winners information on the console which can be used to keep track of the game by the programmer.

  clear_board and end_round are functions which are used when a round is over. end_round asks the user if they want to start a new round and if not it clears all the attributes of the game using the clear_board function.

- GUI: The GUI of this application is made using the Tkinter library of python. It is convenient for making a GUI easy to understand by ordinary people and easy to code even for amateur programmers.

  GUI part of the code is divided into 3 classes: App, StartPage and GamePage.

The App class is assigned with the task to open a window using Tkinter functions. This class when called upon will open a window and then call the next function that is StartPage.

The StartPage App is used majorly for user input. It contains sections where the user can input the Player names, minimum 2 and maximum 10. Then the user is supposed to enter the starting chips which will be given to all players at start of a game. The user is also supposed to input the small blind and big blind values. The user can then press the Start button to start the game. All these inputs are then processed by the Game class and assign the inputs to their respective attribute.

The GamePage is the page where all the players can input their moves when their chance comes. The function is responsible for smooth functioning of the game. It sends status of every attribute to the game logic after every round. It is also the screen where the winner of the round/game is displayed along with the hand of the player.

- Score Interpreter: It is a simple function which is used to display all the winners of the game/round based on the information given by the game logic. It helps in displaying the winners in a systematic format.

- User Input: It is a function inside Game Logic which tends to process the moves of a player when they input their moves through the GamePage. The various moves a player can play based on the rounds are:
  1. all_in_exact: It means player has put all his chips in the pot. Hence, if the player loses the round, they will not be qualified to play the next round.
  2. fold: It means that player does not want to bet anymore in that particular round. They can play in the next round.
  3. call_exact: It means player wants to match the highest bid.
  4. raise: It means player wants to raise the highest bid. The player will have to input an amount to raise.
  5. call_and_raise: If the player is behind on the stake, he has to call first and then raise. Hence call_and_raise helps user to raise highest bid to a defined amount.
  6. call_and_all_in: If player is behind on and stake and wants to go all in he can play the call_and_all_in move.
  7. all_in: If the player wants to go all_in instead of raising bet, they can use this move.
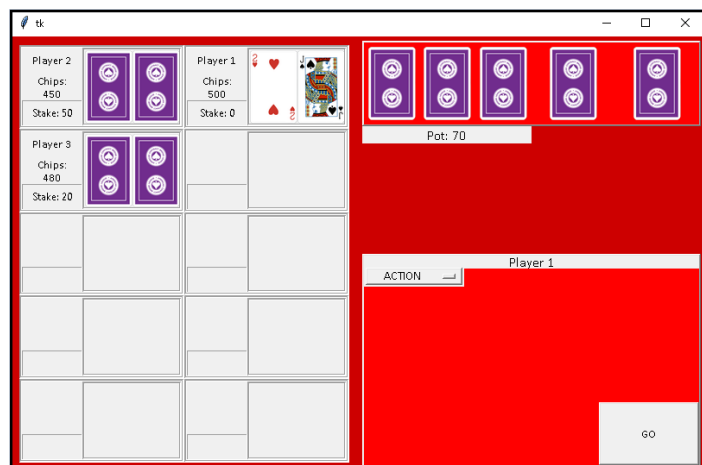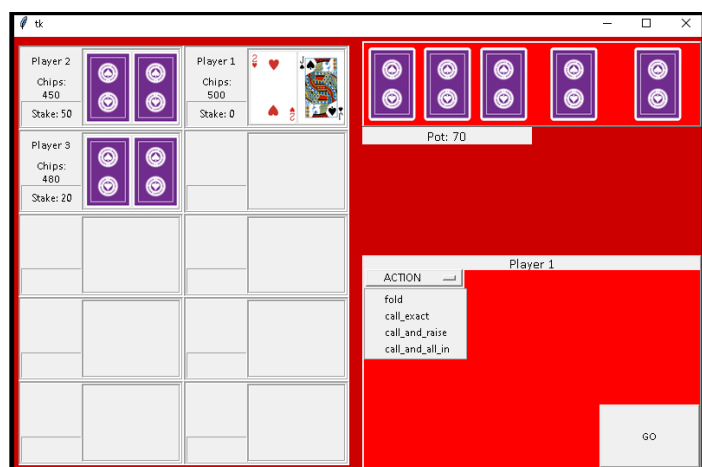
5. RESULT

Fig 3. StartPage

Fig 4. GamePage

Fig 5. Possible Moves for Player 1

Fig 6. Display Winner of Round

6. CONCLUSION

The main objective of this development was to create an application where users can play poker. Achieving this objective is a process of following steps, any amateur programmer can try to create this application.

We have successfully completed the development of an application that can be used by users to play poker amongst themselves without use of multiple devices and internet connection. It is definitely a fun way to spend time with your friends.

Advantages of playing Poker with your friends will follow as users use this application more and more. We can ensure that development of several skills related to Poker can help in real life and business field.

ACKNOWLEDGEMENT

REFERENCES

[1] Nuno Pedro Silva da Cruz, "Using a High-Level Language to Build a Poker Playing Agent", Report of Dissertation Master in Informatics and Computing Engineering, FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO, 2009.

[2] Korik Alons, "Analysis of poker strategies in heads-up poker", VU University Amsterdam, 2007.