(1)R03527017 Yen Cheng, Wang 王嚴徵

(2) The player's strategy :

Method	Design strategy
(a) make_bet	Players will decide their bet according to the total number of cards used in the last round (used card # : # <12, 12≦#<25, #>25). In addition, their position (0~3) will also has influence on their bet. There are no obvious rules for position factor.
(b) buy_insurance	The only factor is the Player's own "open card value **X**" as the dealer's card is always Ace. **Buy : X** = 2~7 **DON'T Buy : X** = Ace, 8~10, J, Q, K
(c) do_surrender	Computer will show all the open cards and calculate the total of value **X** of all current open cards first. If the Player's face up cards value **y** is lower than Dealer's with ≥2 points, surrender. Next, if the **y** < average of **X,** surrender, otherwise, don't surrender.
(d) do_double	The factor to decide do double is the total value of the two original hand cards **X**. **X**≦7 , do double!!! 7<**X**<16 , don't do double **X**≧16 , do double!!!
(e) do_split	I think split will make the logic quite complicated so I just let if the same card value X≦9, **don't do split!** , which indicates that split will almost not appear in this game.
(f) hit_me	The total value of all current hand cards **X** **X** < 17 , **HIT!** **X**≧17, **Stand!**
(g) to_String	Only print the current chips of the player.

(3) All classes related to POOCasino

Actually, I also add my own class **CARD**, to deal with the work of generating card, deck, and shuffling. In **POOCasino**, there are variables, ***decktop*** to record the current top card in the deck; ***ttvalue#***、***bet#***、***insur#***、***surr#***、***dd#***、***split#***、***bust#***、 ***ttHand#*** to record the status and decision of Players. Also, the required ***current_table***、***last_table*** and another ***empty_table***.

Method	Design strategy
(a) showcard	To show the card in a form of "Suit + Value", Ex: CA ,D2 ,H3 ,SJ
(b) make_ori_bet_AI	Make Players to make a bet by the previously designed logic, and print the bet that Player have made.
(c) make_ori_bet_USER	Make Players to make a bet by user's input number and print the bet that Players have made.
(d) distribute	Distribute face up and face down cards to 4 players and dealer.
(e) show_ini_status	Show the open cards of 4 players and dealer.
(f) dealer_getace	If dealer's open card is Ace, ask all Players whether to buy an insurance and output their decision.
(g) checkdealer_win	Check if the dealer get Black Jack at the beginning of the game and finish that round.
(h) checksurrender	If the dealer didn't get Black Jack, ask all Players whether to surrender and output their decision.
(i) open_facedown	Open and print out the face down cards of those who didn't surrender.
(i) checksplit	Dealing with the work of splitting card.
(j) DO_D	Dealing with the work of doing double from Players and output their decision.
(k) cal_point	Calculate the total points of the current hand cards.
(l) HIT	Dealing with the work of hitting from Players and output the final points of them and highlight the Player who het busted.
(m) hit_dealer	Dealing with the work of dealer hitting and output the final points and status of dealer.
(n) final_calculation	Dealing with the work of calculating points, outputting the status of Players and dealer. Finally, distribute chips according to the result. PS. In this part, I let the definition of BlackJack broadened to 21 points as the rules that I am familiar with!
(o) show_lasttable	Show the cards (including unknown face down cards) used in this round.

(4) Experience of cooperating with friends

My partner is T04505201, 潘妍, I think the cooperation was not so difficult as the guideline of hw4 is quite clear, and we just discussed about the meaning of method designed by professor as we actually couldn't get the points of hw4 at first! It was good to have some one that I could discuss with. We decided to use the safest way to complete hw4, so not many problems triggered. We together designed Player with general personality that will bet/have a decision only according to some easily gotten factors (ex: open card value, left cards in the deck, average value of total open cards…etc.). I also learned that how to combine our algorithm, and I had to consider other's opinions when I am programming. To sum up, this part will definitely not be the most painstaking part, although this part is quite an important experience. However, I think this part will be quite difficult if the regulation of hw4 was easing or we decided to do more complicated additional things though. At last, I want to say a BIG THANK YOU to my partner and all teaching asistants!

(5) Part of the output result(each part has no direct relation!!!!!)
1.(General)

```
Welcome to BlackCasino
Game Start!
The chips for every player is 2000
The game will be held for 5 rounds
------------------This is the  1  round.------------------
------------------Now start card assigning part.------------------
------------------Now start bet making part.------------------
Now, every player should make an initial bet
Player1 make a bet 80
Player2 make a bet 120
Player3 make a bet 90
Player4 make a bet 100
The current situation is Dealer - HQ ,P1 - SA ,P2 - HK ,P3 - D4 ,P4 - S4
The dealer's face up card is  HQ
The dealer's face up card is HQ face down card is S3
------------------Now start surrender deciding part.------------------
The dealer doesn't get a Blackjack,all players can choose whether surrender or n
ot
Player 1 surrendered
Player 2 didn't surrender
Player 3 surrendered
Player 4 surrendered
Player 2's face down card is  S7
------------------Now start doing double bet part.------------------
Player 2 did double!!!
------------------Now start hitting part.------------------
Player2's all cards are  HK  S7
Player2 choose to stand.
Player 2 get 17 points.!
------------------Now start dealer's hitting part.------------------
Dealer's cards are  HQ  S3  The Dealer's card value <17 or got soft 17, hit!
The hit card is  SK
Dealer's all cards are  HQ  S3  SK
The Dealer stand, dealer's total point is  23
The Dealer is busted
------------------Now start chips calculating part.------------------
Player1 chose to surrender and get back 0.5 bet chips
Player3 chose to surrender and get back 0.5 bet chips
Player4 chose to surrender and get back 0.5 bet chips
Dealer got busted, anyone who didn't surrender/busted get back their bet!
This round has finished
Now, Player1's chips are 1960.0
Player2's chips are 2000.0
Player3's chips are 1955.0
Player4's chips are 1950.0
The all used cards (including face down cards) in last round is
 SA  H8  HK  S7  D4  C8  S4  S10  HQ  S3  SK
```

2.(Buy_insurance)

```
------------------This is the  3  round.------------------
------------------Now start card assigning part.------------------
------------------Now start bet making part.------------------
Now, every player should make an initial bet
Player1 make a bet 80
Player2 make a bet 120
Player3 make a bet 90
Player4 make a bet 100
The current situation is Dealer - HA ,P1 - S9 ,P2 - C3 ,P3 - D9 ,P4 - HQ
The dealer's face up card is  HA
------------------Now start insurance buying part.------------------
The dealer's Face up card is Ace, all the players must decide whether to buy an
insurance
Player 1 didn't buy an insurance
Player 2 bought an insurance
Player 3 didn't buy an insurance
Player 4 didn't buy an insurance
The dealer's face up card is HA face down card is C8
------------------Now start surrender deciding part.------------------
The dealer doesn't get a Blackjack,all players can choose whether surrender or n
ot
Player 1 didn't surrender
Player 2 didn't surrender
Player 3 didn't surrender
Player 4 didn't surrender
Player 1's face down card is  CK
Player 2's face down card is  H10
Player 3's face down card is  S2
Player 4's face down card is  C9
------------------Now start doing double bet part.------------------
Player 1 didn't do double!!!
Player 2 didn't do double!!!
Player 3 didn't do double!!!
Player 4 did double!!!
------------------Now start hitting part.------------------
Player1's all cards are  S9  CK
Player1 choose to stand.
Player 1 get 19 points.!
Player2 choose to hit.
The card is  DK
Player2's all cards are  C3  H10  DK
Player 2 get busted!!!!!
Player 2 get 23 points.!
Player3 choose to hit.
The card is  H2
Player3 choose to hit.
The card is  SA
Player3 choose to hit.
The card is  DJ
Player3's all cards are  D9  S2  H2  SA  DJ
Player 3 get busted!!!!!
Player 3 get 24 points.!
Player4's all cards are  HQ  C9
Player4 choose to stand.
Player 4 get 19 points.!
------------------Now start dealer's hitting part.------------------
Dealer's cards are  HA  C8  The Dealer's card value <17 or got soft 17, hit!
The hit card is  C6
The Dealer's card value <17 or got soft 17, hit!
The hit card is  SJ
Dealer's all cards are  HA  C8  C6  SJ
The Dealer stand, dealer's total point is  25
The Dealer is busted
------------------Now start chips calculating part.------------------
Player2 get busted and lose his/her bet!!
Player3 get busted and lose his/her bet!!
Dealer got busted, anyone who didn't surrender/busted get back their bet!
This round has finished
Now, Player1's chips are 1920.0
Player2's chips are 1580.0
Player3's chips are 1730.0
Player4's chips are 1850.0
The all used cards (including face down cards) in last round is
 S9  CK  C3  H10  DK  D9  S2  H2  SA  DJ  HQ  C9  HA  C8  C6  SJ
```