HW2_Raines

Task

The aim of the task is to simulate the Black Jack game.

To do this, I need to:

- create suitable objects for casino deck, dealer hand, and my hand.
- implement shuffle_deck() function
- implement start_game() function that shuffles deck, deals 2 cards for me and dealer. and prints state
- implement deal() function that deals me a card and prints state
- implement stop_game() function that prints result: win or loose

Solution

Casino desk, dealer hand and my hand.

First of all, let's import the standard international 52-card deck.

```
deck <- read.table('deck.csv', header = TRUE, sep = "\t")
cat("The deck and value table:")
```

```
## The deck and value table:
```

```
deck
```

face <chr>	suit <chr>	value <int>
king	spades	10
queen	spades	10
jack	spades	10
ten	spades	10
nine	spades	9
eight	spades	8
seven	spades	7
six	spades	6
five	spades	5
four	spades	4

1-10 of 52 rows Previous **1** 2 3 4 5 6 Next

Then I need to assume the casino which includes 4 full decks.

```
deck <- rbind(deck, deck[rep(1:52, 3), ])
rownames(deck) <- 1:208 #fix the rownames
cat("The number of cards in casino:", nrow(deck))
```

```
## The number of cards in casino: 208
```

The next step is to create the dealer hand and the player hand. Let's make 2 empty data frames.

```
dealer_hand <- data.frame(matrix(vector(), 0, 3,
            dimnames=list(c(), c("face", "suit", "value"))))

player_hand <- data.frame(matrix(vector(), 0, 3,
            dimnames=list(c(), c("face", "suit", "value"))))
```

Moreover, let's create the deck for the dealer. This object is essential as to create the stat function.

```
new_deck <- deck
```

Shuffle function

The next step is creating the shuffle function. It does not really difference with the one from the lesson, but the number of cards should be changed.

```
shuffle <- function(deck) {
  random <- sample(1:nrow(deck), size = nrow(deck))
  deck <<- deck[random, ]
}
```

The start game function

Also it is worth making the function for the game stats and a way to count the probability of victory.

```
stats <- function(dealer_hand, player_hand, new_deck) {

  #the stats part

  cat("Dealer's hand:", fill = TRUE)
  print(dealer_hand, row.names = FALSE, right = FALSE)
  cat("Sum", sum(dealer_hand$value), fill = TRUE)
  cat(" ", fill = TRUE)
  cat("Your hand:", fill = TRUE)
  print(player_hand, row.names = FALSE, right = FALSE)
  cat("Sum", sum(player_hand$value), fill = TRUE)
  cat(" ", fill = TRUE)

  #the probability part

  if(sum(player_hand$value) %in% c(sum(dealer_hand$value):21)) {
    cat("chances 100 %")
  } else if (sum(player_hand$value) > 21) {
    cat("chances 0 %")
  } else {
    low_limit <<- sum(dealer_hand$value) - sum(player_hand$value)
    high_limit <<- 21 - sum(player_hand$value)
    limits <<- c(low_limit:high_limit)
    count <<- sum(new_deck$value %in% limits)
    if((high_limit - low_limit) > 10) {
      cat("The difference between you sum and dealers sum is more than 10, which is more than the largest card value.")
    } else {
      cat("chances", (count/nrow(new_deck))*100, "%", fill = TRUE)
    }
  }
  cat("\n\n")
}
```

As the **shuffle function** is already created, let's create the **start game function** and add the **shuffle function** to it.

```
start_game <- function(deck) {
  new_deck <<- shuffle(deck) #create new deck for every game game
  player_hand <<- new_deck[1:2,] #give cards to players
  new_deck <<- new_deck[-c(1, 2), ] #take the cards out of the deck
  dealer_hand <<- new_deck[1:2,] #give cards to dealer
  new_deck <<- new_deck[-c(1, 2), ] #take the cards out of the deck
  stats(dealer_hand, player_hand, new_deck)
}
```

Deal function

According to the rules, the player can take an additional card mane times as possible. To make it, it is necessary to run the **deal** function. I am not sure does it is essential to shuffle cards before the deal, so add this function but as a comment.

```
deal <- function() {
  #shuffle(new_deck) # Shuffle all left card
  new_card <- new_deck[1,]
  player_hand[nrow(player_hand) + 1,] <<- new_card
  new_deck <<- new_deck[-c(1), ]
  stats(dealer_hand, player_hand, new_deck)
}
```

Stop game function

And finally, the stop function which stops the game.

```
stop_game <- function() {

  stats(dealer_hand, player_hand, new_deck)

  if(sum(player_hand$value) %in% c(sum(dealer_hand$value): 21)){

    cat("You won")

  } else {
    cat("You lose")
  }
}
```

Test 1

So, let’s run the first test game.

```
start_game(deck)
```

```
## Dealer's hand:
##  face  suit      value
##  king  diamonds  10
##  four  spades     4
## Sum 14
##
## Your hand:
##  face   suit      value
##  three  clubs     3
##  ace    diamonds  1
## Sum 4
##
## chances 30.88235 %
```

```
deal()
```

```
## Dealer's hand:
##  face  suit      value
##  king  diamonds  10
##  four  spades     4
## Sum 14
##
## Your hand:
##  face   suit      value
##  three  clubs      3
##  ace    diamonds   1
##  ten    clubs     10
## Sum 14
##
## chances 100 %
```

```
stop_game()
```

```
## Dealer's hand:
##  face  suit      value
##  king  diamonds  10
##  four  spades     4
## Sum 14
##
## Your hand:
##  face   suit      value
##  three  clubs      3
##  ace    diamonds   1
##  ten    clubs     10
## Sum 14
##
## chances 100 %
##
## You won
```

Test 2

And the second test

```
start_game(deck)
```

```
## Dealer's hand:
##  face   suit      value
##  six    diamonds   6
##  queen  diamonds  10
## Sum 16
##
## Your hand:
##  face  suit    value
##  five  clubs    5
##  ten   hearts  10
## Sum 15
##
## chances 46.07843 %
```

```
stop_game()
```

```
## Dealer's hand:
##  face   suit      value
##  six    diamonds   6
##  queen  diamonds  10
## Sum 16
##
## Your hand:
##  face  suit    value
##  five  clubs    5
##  ten   hearts  10
## Sum 15
##
## chances 46.07843 %
##
##
## You lose
```