HW2_Igor_Glukhov

Igor Glukhov

2022-04-15

Black Jack

```
deck_descr <- read.csv("deck.csv")
tail(deck_descr, 5)
```

```
##     face   suit value
## 48  five hearts     5
## 49  four hearts     4
## 50 three hearts     3
## 51   two hearts     2
## 52   ace hearts     1
```

Function implementation

```
shuffle_deck <- function(){
  return(c(rep(seq(1, 52), 4)))
}

calc_chance <- function(dealer_hand, player_hand, deck, deck_descr){
  player_cards = deck_descr[player_hand, ]
  dealer_cards = deck_descr[dealer_hand, ]
  deck_cards = deck_descr[deck, ]

  cur_player_sum <- sum(player_cards$value)
  cur_dealer_sum <- sum(dealer_cards$value)

  if(cur_player_sum > 21){
    return("0%")
  }
  else if(cur_player_sum > cur_dealer_sum){
    return("100%")
  }
  else{
    max_card_in_deck <- max(deck_descr[deck, 'value'])

    if(cur_dealer_sum - cur_player_sum > max_card_in_deck){
      return("0% for this state, but still a chance later")
    }
```

```
    else{
      return(paste(round(100 * sum(deck_cards$value %in%
                          c((cur_dealer_sum - cur_player_sum): (21-cur_player_sum)))
             / nrow(deck_cards)), '%'))
    }
  }
}

print_state <- function(dealer_hand, player_hand, deck, deck_descr){
  print('Dealers hand:')
  for(i in dealer_hand){
      print(as.character(deck_descr[i, ]))
  }
  print(paste('Sum:', sum(deck_descr[dealer_hand, 'value'])))
  print('')
  print('Your hand:')
  for(i in player_hand){
      print(as.character(deck_descr[i, ]))
  }
  print(paste('Sum:', sum(deck_descr[player_hand, 'value'])))
  print(paste("Chance:", calc_chance(dealer_hand, player_hand, deck, deck_descr)))
}

start_game <- function(deck_descr){
  deck <- shuffle_deck()

  dealers_init <- sample(deck, 2)
  deck <- deck[-match(dealers_init, deck)]

  player_init <- sample(deck, 2)
  deck <- deck[-match(player_init, deck)]
  print_state(dealers_init, player_init, deck, deck_descr)

  return(list('deck'=deck, 'player_hand'=player_init, 'dealer_hand'=dealers_init))
}

deal <- function(dealers_hand, player_hand, deck, deck_descr){
  player_new_card <- sample(deck, 1)
  deck <- deck[-match(player_new_card, deck)]
  new_player_hand <- c(player_hand, player_new_card)
  print_state(dealers_hand, new_player_hand, deck, deck_descr)
  return(list('deck'=deck, 'player_hand'=new_player_hand))
}

stop_game <- function(dealer_hand, player_hand, deck, deck_descr){
  player_cards = deck_descr[player_hand, ]
  dealer_cards = deck_descr[dealer_hand, ]
  deck_cards = deck_descr[deck, ]

  cur_player_sum <- sum(player_cards$value)
  cur_dealer_sum <- sum(dealer_cards$value)

  if((cur_player_sum > 21) | (cur_player_sum < cur_dealer_sum)){
```

```
    print("Loss")
  }
  else{
    print("Victory")
  }
}
```

Lets keep our casino 4 decks as a vector of integers (ids from initial .csv file)

1

```
state <- start_game(deck_descr)
deck <- state$deck
player_hand <- state$player_hand
dealers_hand <- state$dealer_hand

state <- deal(dealers_hand, player_hand, deck, deck_descr)
deck <- state$deck
player_hand <- state$player_hand

stop_game(dealers_hand, player_hand, deck, deck_descr)
```

```
## [1] "Dealers hand:"
## [1] "ace"      "diamonds" "1"
## [1] "ace"    "spades" "1"
## [1] "Sum: 2"
## [1] ""
## [1] "Your hand:"
## [1] "jack"   "hearts" "10"
## [1] "eight"    "diamonds" "8"
## [1] "Sum: 18"
## [1] "Chance: 100%"
## [1] "Dealers hand:"
## [1] "ace"      "diamonds" "1"
## [1] "ace"    "spades" "1"
## [1] "Sum: 2"
## [1] ""
## [1] "Your hand:"
## [1] "jack"   "hearts" "10"
## [1] "eight"    "diamonds" "8"
## [1] "five"  "clubs" "5"
## [1] "Sum: 23"
## [1] "Chance: 0%"
## [1] "Loss"
```

2

```
state <- start_game(deck_descr)
deck <- state$deck
player_hand <- state$player_hand
dealers_hand <- state$dealer_hand

state <- deal(dealers_hand, player_hand, deck, deck_descr)
deck <- state$deck
player_hand <- state$player_hand

stop_game(dealers_hand, player_hand, deck, deck_descr)
```

```
## [1] "Dealers hand:"
## [1] "seven"  "spades" "7"
## [1] "three"  "spades" "3"
## [1] "Sum: 10"
## [1] ""
## [1] "Your hand:"
## [1] "ten"      "diamonds" "10"
## [1] "nine"  "clubs" "9"
## [1] "Sum: 19"
## [1] "Chance: 100%"
## [1] "Dealers hand:"
## [1] "seven"  "spades" "7"
## [1] "three"  "spades" "3"
## [1] "Sum: 10"
## [1] ""
## [1] "Your hand:"
## [1] "ten"      "diamonds" "10"
## [1] "nine"  "clubs" "9"
## [1] "ace"   "clubs" "1"
## [1] "Sum: 20"
## [1] "Chance: 100%"
## [1] "Victory"
```

3

```
state <- start_game(deck_descr)
deck <- state$deck
player_hand <- state$player_hand
dealers_hand <- state$dealer_hand

state <- deal(dealers_hand, player_hand, deck, deck_descr)
deck <- state$deck
player_hand <- state$player_hand

stop_game(dealers_hand, player_hand, deck, deck_descr)
```

```
## [1] "Dealers hand:"
## [1] "jack"   "hearts" "10"
```

```
## [1] "five"   "hearts" "5"
## [1] "Sum: 15"
## [1] ""
## [1] "Your hand:"
## [1] "six"    "spades" "6"
## [1] "ace"      "diamonds" "1"
## [1] "Sum: 7"
## [1] "Chance: 47 %"
## [1] "Dealers hand:"
## [1] "jack"   "hearts" "10"
## [1] "five"   "hearts" "5"
## [1] "Sum: 15"
## [1] ""
## [1] "Your hand:"
## [1] "six"    "spades" "6"
## [1] "ace"      "diamonds" "1"
## [1] "king"   "hearts" "10"
## [1] "Sum: 17"
## [1] "Chance: 100%"
## [1] "Victory"
```