hw2_app_stat

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1. Read and construct one shoe from card decks

Shoe is multiple card deck stacked together according to rules of blackjack

```
setwd("E:/education/Applied Stats/HW2")
deck <- read.csv('deck.csv')

#index for stack
top_index <- 5
c_names <- c("face", "suit", "value")
shoe <- do.call("rbind", replicate(4, deck, simplify = FALSE))

head(shoe)
```

```
##    face   suit value
## 1  king spades    10
## 2 queen spades    10
## 3  jack spades    10
## 4   ten spades    10
## 5  nine spades     9
## 6 eight spades     8
```

Functions

```
# shuffle all cards in shoe
shuffle_deck <- function()
{
  shoe <<- shoe[sample(1:nrow(shoe)), ]
}

print_hand <- function(name, hand)
{
    cat(paste(name, " hand:\n"))
    for (i in 1:nrow(hand))
      cat(paste(hand[i,1], hand[i,2], hand[i,3], "\n"))
    cat(paste("sum ", sum(hand$value), "\n"))
}

calculate_chance <- function()
{
  dealer_sum <- sum(dealer_hand$value)
  player_sum <- sum(player_hand$value)
  if (player_sum > 21)
```

```
    cat("chance not to bust 0%\n")
  else
  {
    current_shoe <- shoe[top_index:nrow(shoe), ]

    #calculate prob not to overcome 21
    good_vals_n <- length(current_shoe$value[(current_shoe$value + player_sum) > 21])
    prob_not_to_bust <- 1 - good_vals_n / nrow(current_shoe)

    cat(paste("chance not to bust", as.integer(prob_not_to_bust * 100), "%\n"))
  }
  cat("\n")
}

# deals you a card and prints state
deal <- function()
{
  player_hand[top_index - 2,] <<- shoe[top_index,]
  top_index <<- top_index + 1

  print_hand("Dealer", hand=dealer_hand)
  cat("\n")
  print_hand("Your", hand=player_hand)

  calculate_chance()
  #return(sum(player_hand$value))
}

free_hand <- function()
{
  top_index <<- 5

  dealer_hand <<- setNames(data.frame(matrix(ncol = 3, nrow = 0)), c_names)
  player_hand <<- setNames(data.frame(matrix(ncol = 3, nrow = 0)), c_names)
}

#shuffles deck, deals 2 cards for you and dealer. and prints state
start_game <- function()
{
  free_hand()
  shuffle_deck()

  dealer_hand[1:2,] <<- shoe[1:2,]
  player_hand[1:2,] <<- shoe[3:4,]

  print_hand("Dealer", hand=dealer_hand)
  cat("\n")
  print_hand("Your", hand=player_hand)

  calculate_chance()
}

# prints result: win or loose
```

```
stop_game <- function()
{
  dealer_sum <- sum(dealer_hand$value)
  player_sum <- sum(player_hand$value)
  if (player_sum > 21)
    cat("You lose\n")
  else if (player_sum >= dealer_sum)
    cat("You win\n")
  else
    cat("You lose\n")
}

#just for debug in loop
play <- function()
{
  start_game()

  msg = "write d to deal another card or e for end of turn"
  line <- readline(prompt = msg)
  while (line != "e")
  {
    if (line == "d")
    {
      player_sum <- deal()
      if (player_sum > 21)
      {
        break
      }
    }

    line <- readline(prompt = msg)
  }
  stop_game()
}
```

Example

```
start_game()
```

```
## Dealer  hand:
## ten clubs 10
## three hearts 3
## sum  13
##
## Your  hand:
## four diamonds 4
## five clubs 5
## sum  9
## chance not to bust 100 %
```

```
deal()
```

```
## Dealer  hand:
```

```
## ten clubs 10
## three hearts 3
## sum  13
##
## Your  hand:
## four diamonds 4
## five clubs 5
## ace hearts 1
## sum  10
## chance not to bust 100 %
```

```
stop_game()
```

```
## You lose
```

```
start_game()
```

```
## Dealer  hand:
## king hearts 10
## king diamonds 10
## sum  20
##
## Your  hand:
## six spades 6
## five hearts 5
## sum  11
## chance not to bust 100 %
```

```
deal()
```

```
## Dealer  hand:
## king hearts 10
## king diamonds 10
## sum  20
##
## Your  hand:
## six spades 6
## five hearts 5
## six spades 6
## sum  17
## chance not to bust 31 %
```

```
deal()
```

```
## Dealer  hand:
## king hearts 10
## king diamonds 10
## sum  20
##
## Your  hand:
## six spades 6
## five hearts 5
## six spades 6
## seven diamonds 7
## sum  24
## chance not to bust 0%
```

```
stop_game()
```

```
## You lose
```