HW 2

Denis Fedorov

Black Jack probabilities

Dear students in your second homework I want you to model Black Jack classic card game.

```
deck <- read.csv("deck.csv")

origdeck <- deck[rep(seq_len(nrow(deck)), 4), ] #replicate 4 times
```

Functions

```
shuffle_deck <- function() {
  deck <<- origdeck[sample(1:nrow(origdeck)),]
}

state <- function() {
  dealerSum <<- sum(dealer$value)
  cat("Dealer's hand:", fill = T)
  for (i in as.list(as.data.frame(t(dealer)))){
    cat("\t", i,"\n")
  }
  cat("sum", dealerSum, fill = T)
  cat("\n")

  youSum <<- sum(you$value)
  cat("Your hand:", fill = T)
  for (i in as.list(as.data.frame(t(you)))){
    cat("\t", i,"\n")
  }
  cat("sum", youSum, fill = T)
  cat("\n")

  if (youSum > 21) {
    cat("chances 0%")
    }
  else if (dealerSum <= youSum) {
    cat("chances 100%")
    }
  else {
    probab <<- sum(deck$value <= 21-youSum & deck$value >= dealerSum-youSum)/nrow(deck)
    cat("chances ", 100*probab, "%", sep="")
  }
  cat("\n--------------------\n\n\n")
```

```
}

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

  dealer <<- deck[c(1,2),]
  deck <- deck[-c(1,2),]
  you <<- deck[c(1,2),]
  deck <<- deck[-c(1,2),]
  state()
}

deal <- function() {
  you <<- rbind(you, deck[1,])
  deck <<- deck[-1,]
  state()
}

stop_game <- function() {
  if (dealerSum <= youSum && youSum < 21) {
    cat(">>>Win<<<")
  }
  else {
    cat(">>>Loose<<<")
  }
}
```

Example 1

```
start_game()
```

```
## Dealer's hand:
##   seven spades 7
##   six diamonds 6
## sum 13
##
## Your hand:
##   five hearts 5
##   six spades 6
## sum 11
##
## chances 92.15686%
## --------------------
```

```
deal()
```

```
## Dealer's hand:
##   seven spades 7
##   six diamonds 6
## sum 13
```

```
##
## Your hand:
##   five hearts  5
##   six spades  6
##   ten clubs 10
## sum 21
##
## chances 100%
## --------------------
```

```
stop_game()
```

```
## >>>Loose<<<
```

Example 2

```
start_game()
```

```
## Dealer's hand:
##   three hearts  3
##   ten hearts 10
## sum 13
##
## Your hand:
##   two hearts  2
##   queen spades 10
## sum 12
##
## chances 69.60784%
## --------------------
```

```
while (youSum < dealerSum && youSum <= 21 && probab > 0.3){
  deal()
}
```

```
## Dealer's hand:
##   three hearts  3
##   ten hearts 10
## sum 13
##
## Your hand:
##   two hearts  2
##   queen spades 10
##   jack hearts 10
## sum 22
##
## chances 0%
## --------------------
```

```
stop_game()
```

```
## >>>Loose<<<
```

Example 3

```
start_game()
```

```
## Dealer's hand:
##   two diamonds  2
##   ten hearts 10
## sum 12
##
## Your hand:
##   three hearts 3
##   five spades 5
## sum 8
##
## chances 77.45098%
## --------------------
```

```
for (i in 1:3){
  deal()
}
```

```
## Dealer's hand:
##   two diamonds  2
##   ten hearts 10
## sum 12
##
## Your hand:
##   three hearts 3
##   five spades 5
##   ace clubs 1
## sum 9
##
## chances 85.22167%
## --------------------
##
##
## Dealer's hand:
##   two diamonds  2
##   ten hearts 10
## sum 12
##
## Your hand:
##   three hearts  3
##   five spades  5
##   ace clubs  1
##   king hearts 10
```

```
## sum 19
##
## chances 100%
## --------------------
##
##
## Dealer's hand:
##   two diamonds  2
##   ten hearts 10
## sum 12
##
## Your hand:
##   three hearts  3
##   five spades  5
##   ace clubs  1
##   king hearts 10
##   queen diamonds 10
## sum 29
##
## chances 0%
## --------------------
```

```
stop_game()
```

```
## >>>Loose<<<
```