Manojkumar Ravichandran

MCS – R Assignment

I have created R Script of Monte Carlo Simulation and I'll be explaining it in sections.

- Function to play the game

I created a game function with prize = 2 and turn = 1 with if sample 0:1 (It means Heads or Tails). So, if its Tails, then prize = prize + $(turn)^2$ or else it's the prize.

```
1. #Function to play the game
2. game <- function(prize=2, turn=1) {
3.   if(sample(0:1, 1)) {
4.     prize <- prize + (2^turn)
5.     turn <- turn + 1
6.     game(prize, turn)
7.   }
8.   else {
9.     prize
10.    }
11.  }
```

- Simulate the Game

This section basically about many simulations does I want it to take place. So I can assign the values in a array in the next section.

```
1. #Simulate the Game
2. simgame <- function(times) {
3.   results <- NA
4.   for(i in 1:times) {
5.     results[i] <- game()
6.   }
7.   return(results)
8. }
9.
```

- Create the matrix rows – different pay ins; columns – average number of games

In this section I created a matrix with the (Pay ins) rows and columns (No. of Games). So, I can assign various values based on my requirements.

```
1. #Create the matrix rows - different pay ins; cols - average number of
   games
2. finalmatrix <- matrix(nrow = 10, ncol =  10)
```

- Assign Row names as £1, £2, £3……

In this section, I assigned the row names as £1, £2, £3 etc..

```
1. #Assign rownames as £1, £2, £3....
2. rnames = NA
3. for(i in 1:nrow(finalmatrix)){rnames[i] = paste0('£',i)}
4. rownames(finalmatrix) <- rnames
```

- Assign Column names as 1 Games, 2 Games, 3 Games etc…

In this section, similar to Row names I also assigned names to the columns such as 1 Games, 2 Games, 3 Games etc..

```
#Assign column names as 1 Games, 2 Games, 3 Games...
cnames = NA
for(i in 1:ncol(finalmatrix)){cnames[i] = paste0(i, ' Games')}
colnames(finalmatrix) <- cnames
```

- To show the required 2D Matrix with average win/loss

I used mean function to find the average win/loss and rounded it off into 2 decimals.

```
#The required 2D Matrix showing average win/loss
for(i in 1:nrow(finalmatrix)){
  for(j in 1:ncol(finalmatrix)){
    finalmatrix[i,j] <- round(mean(simgame(j)-i), 2)
  }
}

print(finalmatrix)
```

- To export the table into excel

I wrote this code just to export the table/matrix into a table in excel as it is required for the assignment.

```
write.csv(finalmatrix, file = "C:/MCS.csv")
```