MonteCarloSimulation-Genetic Algorithms

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Contents

MonteCarlo SImulations

Clear all the environment variables

```
rm(list=ls(all=TRUE))
```

Defining the function for the activity

```
timeRequired = function(number.simulations){
  time = 0
  for(i in 1: number.simulations){
    # Probability for the Full project is 90% amd for Part project is 10%
    partOrFull = runif(1,0,1)
    if(partOrFull <= 0.1) {
      total.module = sample(10:12,1)
    }
    else{
      total.module = sample(20:24,1)
    }
    # Task and the people per module are represented by two vectors randomly.
    tasks.per.module = sample(50:100, total.module, replace = T)
    total.tasks = sum(tasks.per.module)

    # Total time taken for all the tasks: Each task can take any time between 5 to 10 hours to get comp
    tasks.time = sum(sample(5:10,total.tasks,replace = T))
    # Randomly pick the number of resources
    resources = sample(3:7,1,replace = TRUE)
    # Time taken to complete the project
    time.taken.estimate = tasks.time/ resources
  }
  return (time.taken.estimate)
}
```

Running the simulations

```
simulations = c(10,100,10000, 100000, 200000, 300000, 100000, 200000, 300000)
for (i in simulations) {
  total.project.time = timeRequired(i)
  cat("Total Estimated Time to complete the project with",i," simulations is ",total.project.time,"\n")
}
```

```
## Total Estimated Time to complete the project with 10  simulations is  2882.2
## Total Estimated Time to complete the project with 100  simulations is  1787
## Total Estimated Time to complete the project with 10000  simulations is  2153.2
## Total Estimated Time to complete the project with 1e+05  simulations is  915.6667
## Total Estimated Time to complete the project with 2e+05  simulations is  2515
## Total Estimated Time to complete the project with 3e+05  simulations is  2936.5
## Total Estimated Time to complete the project with 1e+05  simulations is  2814.2
## Total Estimated Time to complete the project with 2e+05  simulations is  2330.2
## Total Estimated Time to complete the project with 3e+05  simulations is  2581.6
```

Genetic Algorithm

Clear all the environment variables

```
rm(list = ls(all=TRUE))
```

Loading the required package

```
library(GA)
```

```
## Warning: package 'GA' was built under R version 3.4.1
## Loading required package: foreach
## Warning: package 'foreach' was built under R version 3.4.1
## Loading required package: iterators
## Package 'GA' version 3.0.2
## Type 'citation("GA")' for citing this R package in publications.
```

Setting the working directory

```
setwd("I:/DATA-SCIENCE/Insofe/Assignments/MonteCarlo-GA/assignment-mcs-ga-Thomas-K-John-master")
```

Reading the file

```
tsp.distance.data = read.csv("distanceinfo.csv", header =TRUE)
```

Implementation of the algorithm

```
rownames(tsp.distance.data) = colnames(tsp.distance.data)
tsp.distance.data = as.matrix(tsp.distance.data)

tour.length = function(tour, dist.matrix) {
  tour = c(tour, tour[1])
  route = embed(tour, 2)[,2:1]
  sum(dist.matrix[route])
}
tsp.fitness = function(tour, ...) 1/tour.length(tour, ...)

tsp.solution.model = ga(type="permutation", fitness=tsp.fitness, dist.matrix=tsp.distance.data, min=1, m

summary(tsp.solution.model)
```

```
## +-----------------------------------+
## |         Genetic Algorithm         |
## +-----------------------------------+
##
## GA settings:
## Type                  =  permutation
## Population size       =  50
## Number of generations =  100
## Elitism               =  2
## Crossover probability =  0.8
## Mutation probability  =  0.2
##
## GA results:
## Iterations             = 100
## Fitness function value = 0.000856898
## Solutions =
##      x1 x2 x3 x4 x5 x6 x7 x8 x9 x10
## [1,]  9  2  4  1  3  6  8  7 10   5
## [2,] 10  5  9  2  4  1  3  6  8   7
```