Visualization

R Markdown

Set up ggplot library

```
library(ggplot2)
```

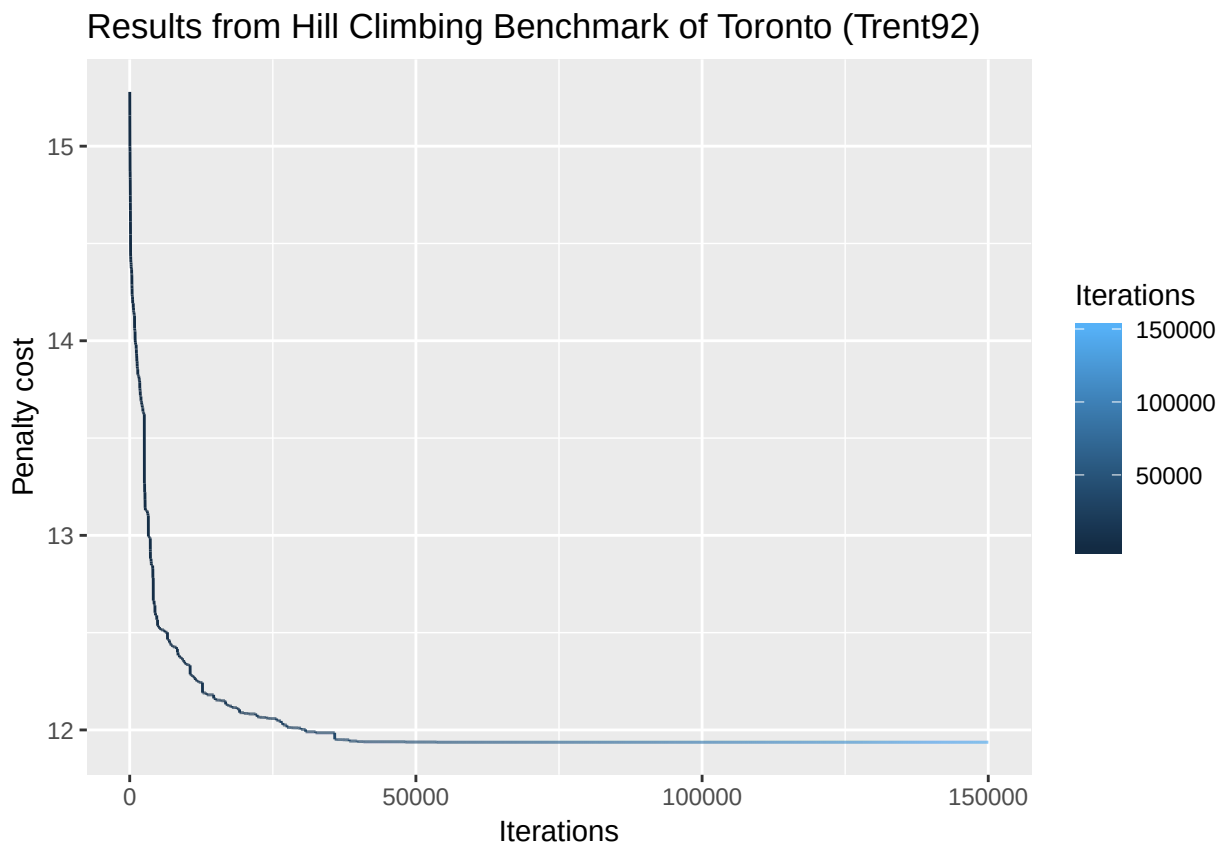
```
## Registered S3 methods overwritten by 'ggplot2':
##   method         from
##   [.quosures     rlang
##   c.quosures     rlang
##   print.quosures rlang
```

```
Data<- read.csv("Hill.csv",header=T)
```

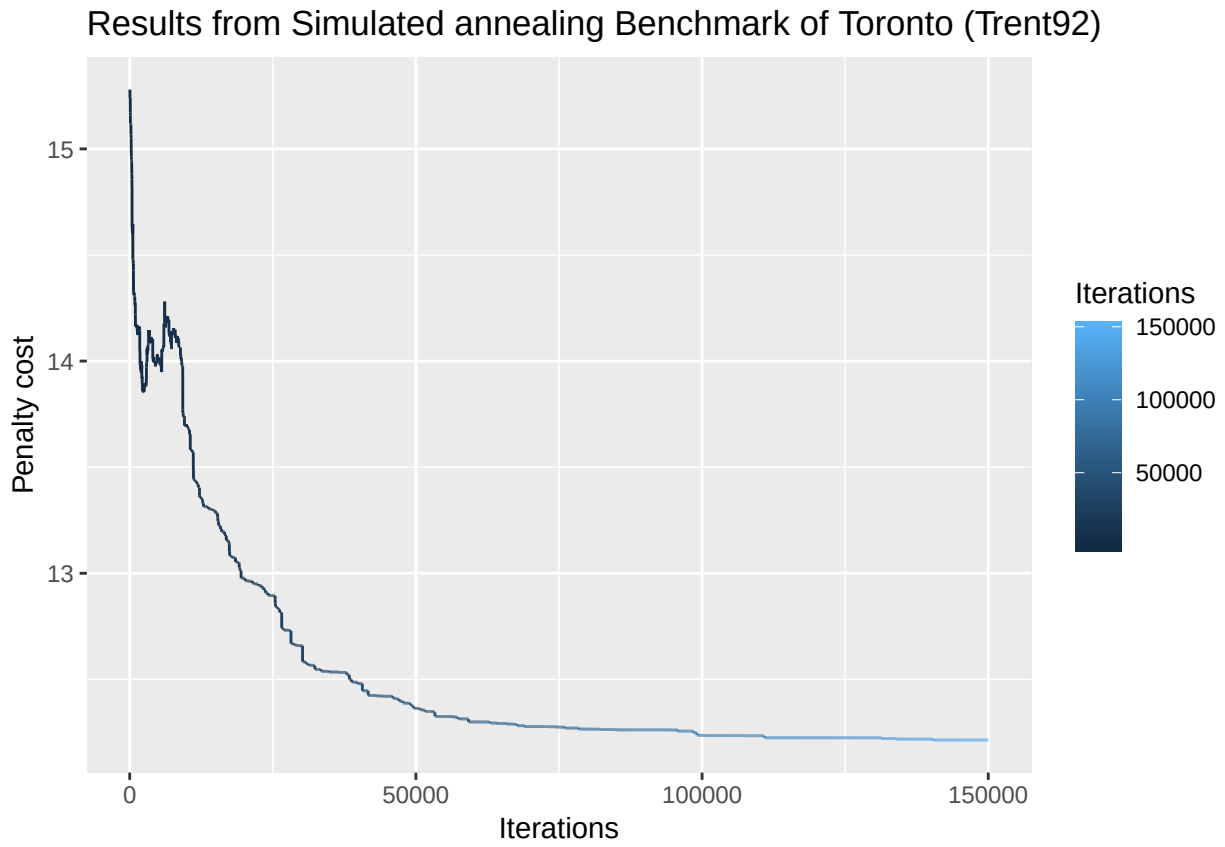
```
Data1<- read.csv("Simu.csv",header=T)
```

```
Data2<- read.csv("Tabu.csv",header=T)
```

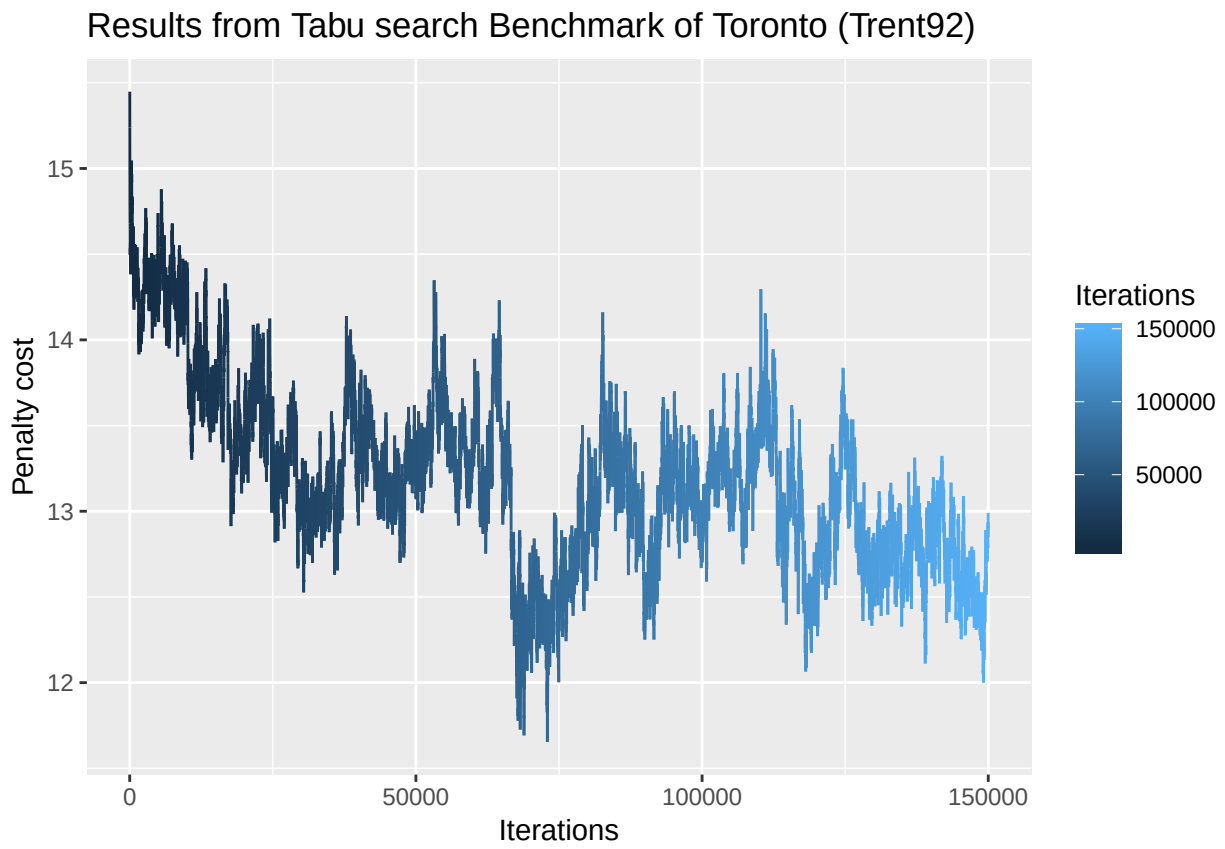
```
p<-ggplot(Data,aes(Iterations))
p<-p+geom_line(aes(y=Data$Trent92,colour=Iterations))+ggtitle("Results from Hill Climbing Benchmark of T
p
```




```
v<-ggplot(Data1,aes(Iterations))
v<-v+geom_line(aes(y=Data1$Trent92,colour=Iterations))+ggtitle("Results from Simulated annealing Benchma
v
```



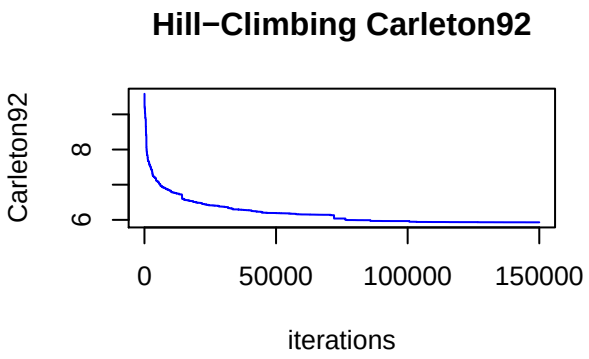

```
c<-ggplot(Data2,aes(Iterations))
c<-c+geom_line(aes(y=Data2$Trent92,colour=Iterations))+ggtitle("Results from Tabu search Benchmark of T
c
```

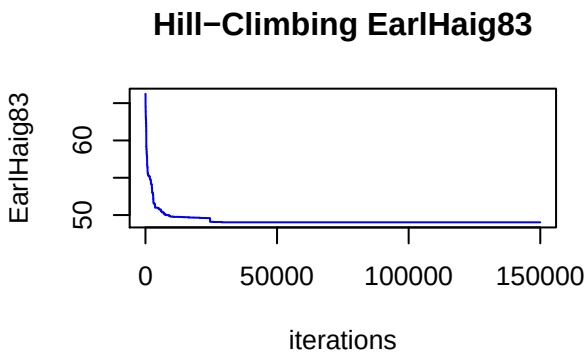


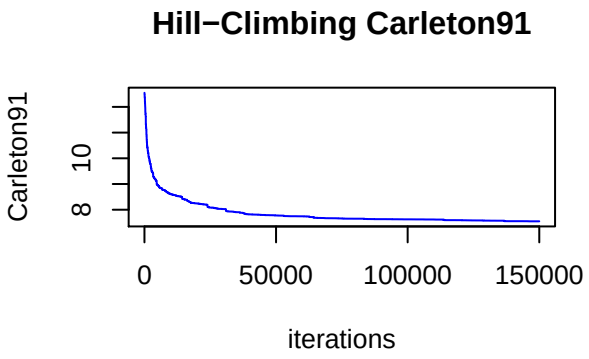

```
##p<-ggplot(Data2,aes(Iterations))
##p<-p+geom_line(aes(y=Data2$test1,colour=Iterations))+ggtitle("Results from Tabu search Benchmark of T
##p
```

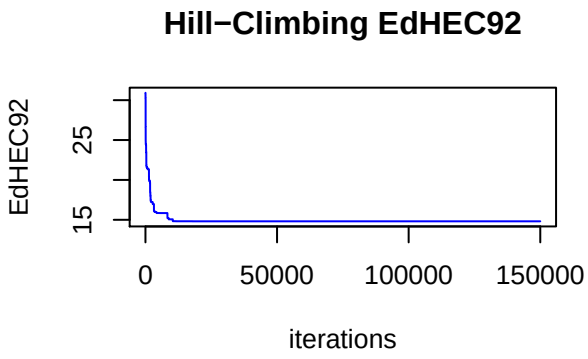
#hill climbing line plot

```
t=Data$Iterations

par(mfcol=c(2,2))
plot(t,Data$Carleton92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton92", main="Hill-Cl
plot(t,Data$Carleton91,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton91", main="Hill-Cl
plot(t,Data$EarlHaig83,type="l", col="blue", lwd=1, xlab="iterations", ylab="EarlHaig83", main="Hill-Cl
plot(t,Data$EdHEC92,type="l", col="blue", lwd=1, xlab="iterations", ylab="EdHEC92", main="Hill-Climbing
```

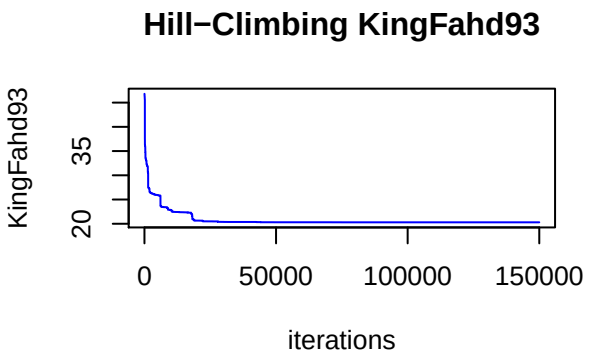


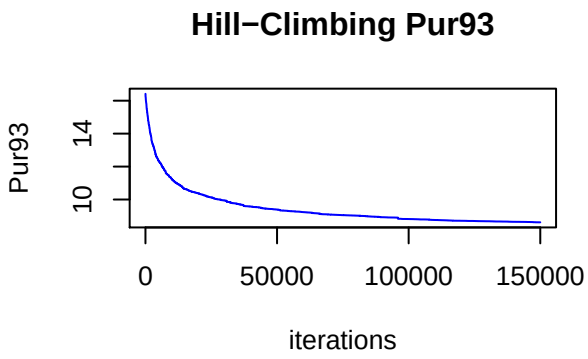


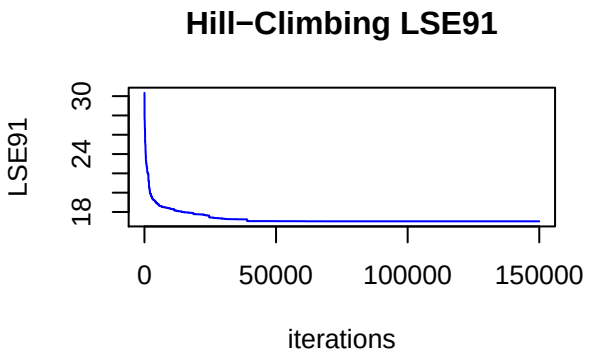


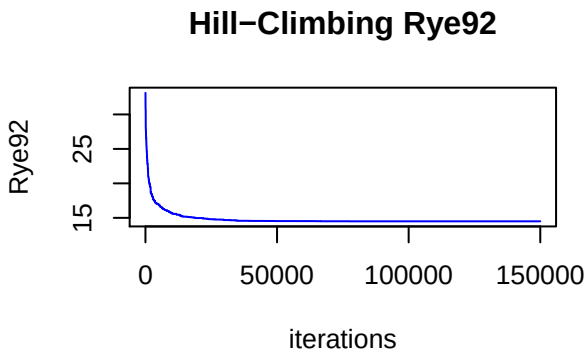



```
plot(t,Data$KingFahd93,type="l", col="blue", lwd=1, xlab="iterations", ylab="KingFahd93", main="Hill-Cl
plot(t,Data$LSE91,type="l", col="blue", lwd=1, xlab="iterations", ylab="LSE91", main="Hill-Climbing LSE
plot(t,Data$Pur93,type="l", col="blue", lwd=1, xlab="iterations", ylab="Pur93", main="Hill-Climbing Pur
plot(t,Data$Rye92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Rye92", main="Hill-Climbing Rye
```

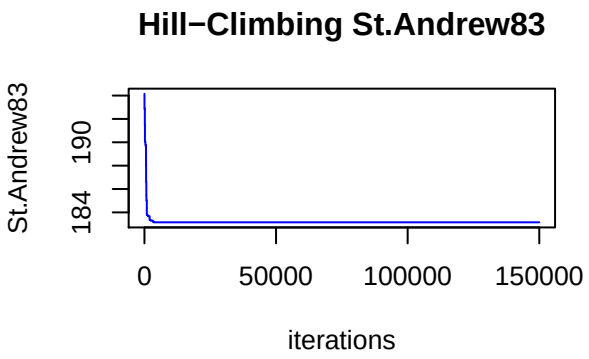


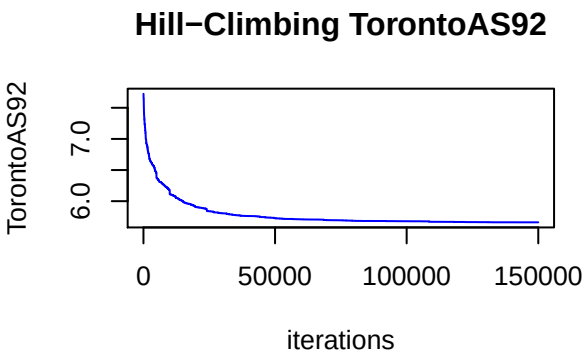


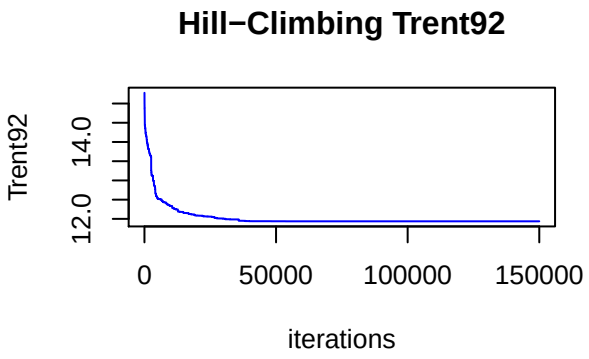


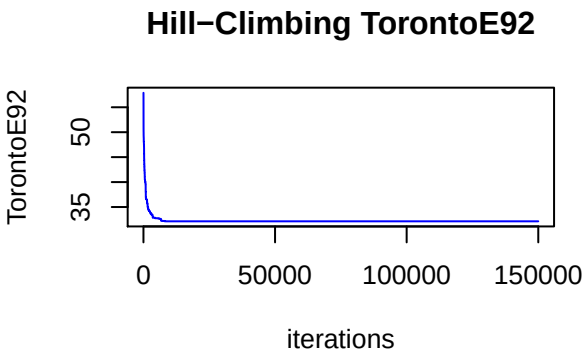



```
plot(t,Data$St.Andrews83,type="l", col="blue", lwd=1, xlab="iterations", ylab="St.Andrew83", main="Hill
plot(t,Data$Trent92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Trent92", main="Hill-Climbing
plot(t,Data$TorontoAS92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoAS92", main="Hill-
plot(t,Data$TorontoE92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoE92", main="Hill-Cl
```

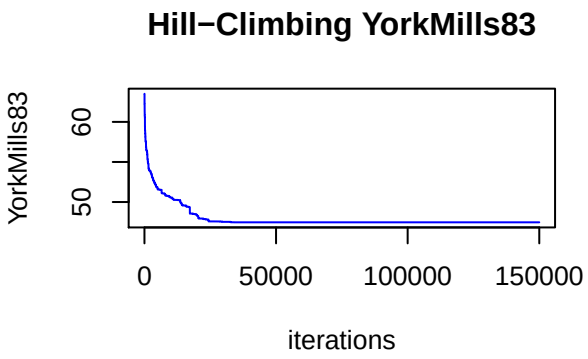






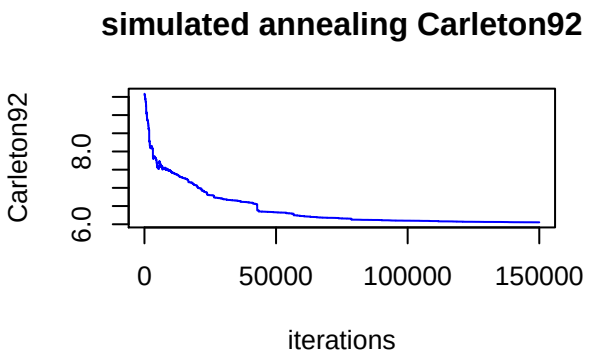


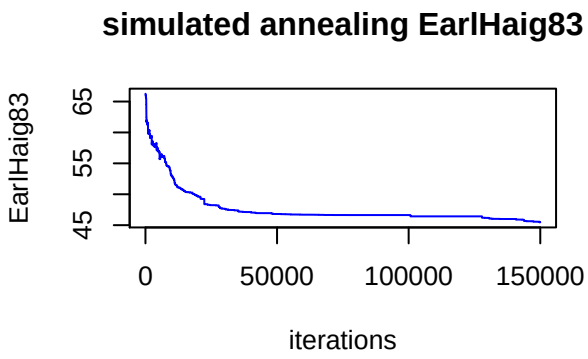

```
plot(t,Data$YorkMills83,type="l", col="blue", lwd=1, xlab="iterations", ylab="YorkMills83", main="Hill-C
```

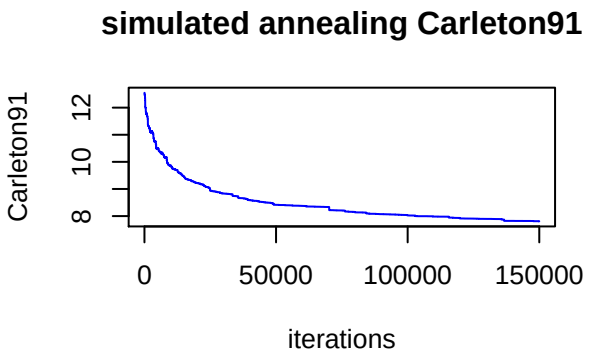


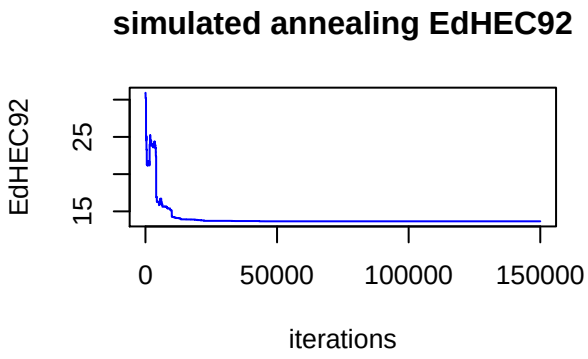
#simulate annealing line plot

```
t=Data1$Iterations
par(mfcol=c(2,2))
plot(t,Data1$Carleton92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton92", main="simula
plot(t,Data1$Carleton91,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton91", main="simula
plot(t,Data1$EarlHaig83,type="l", col="blue", lwd=1, xlab="iterations", ylab="EarlHaig83", main="simula
plot(t,Data1$EdHEC92,type="l", col="blue", lwd=1, xlab="iterations", ylab="EdHEC92", main="simulated an
```

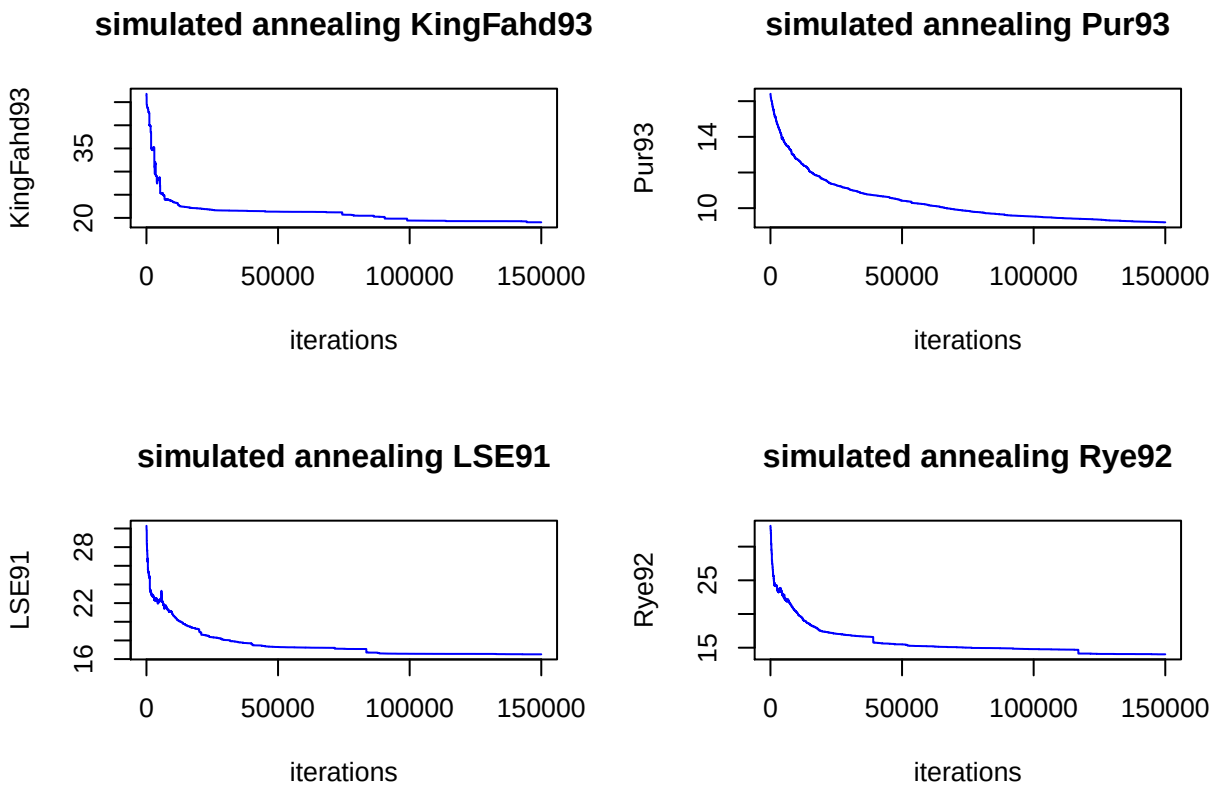




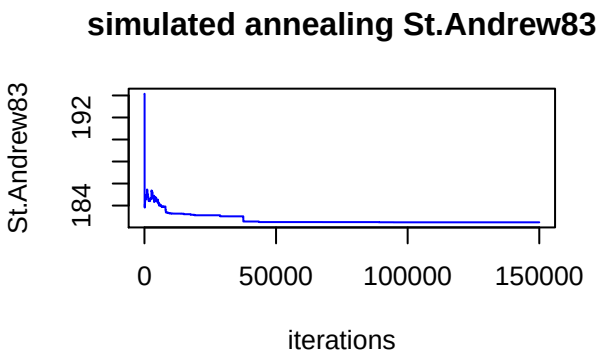


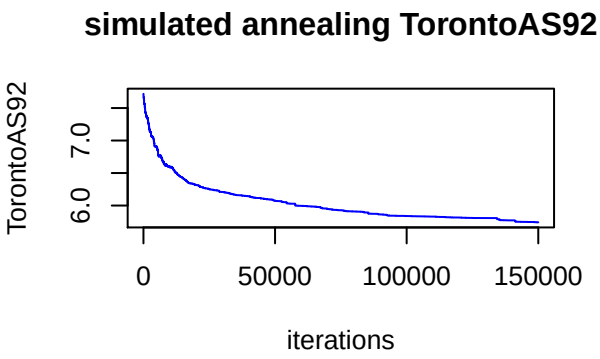


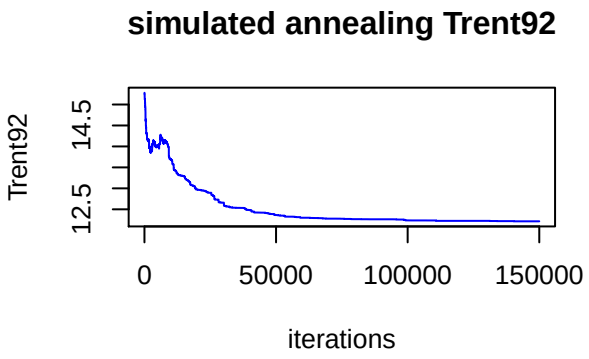

```
plot(t,Data1$KingFahd93,type="l", col="blue", lwd=1, xlab="iterations", ylab="KingFahd93", main="simula
plot(t,Data1$LSE91,type="l", col="blue", lwd=1, xlab="iterations", ylab="LSE91", main="simulated anneali
plot(t,Data1$Pur93,type="l", col="blue", lwd=1, xlab="iterations", ylab="Pur93", main="simulated anneali
plot(t,Data1$Rye92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Rye92", main="simulated anneali
```

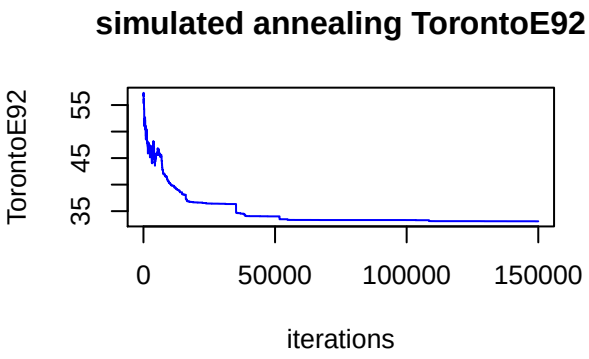



```
plot(t,Data1$St.Andrews83,type="l", col="blue", lwd=1, xlab="iterations", ylab="St.Andrew83", main="simu
plot(t,Data1$Trent92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Trent92", main="simulated an
plot(t,Data1$TorontoAS92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoAS92", main="simul
plot(t,Data1$TorontoE92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoE92", main="simula
```

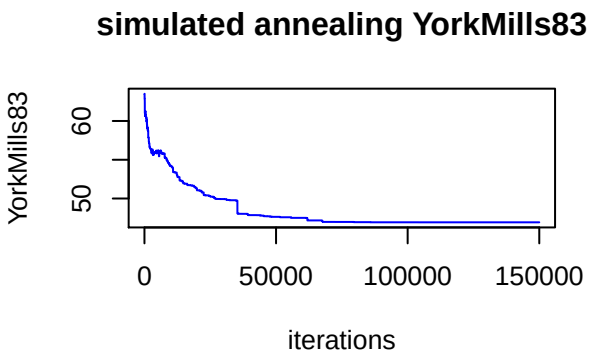






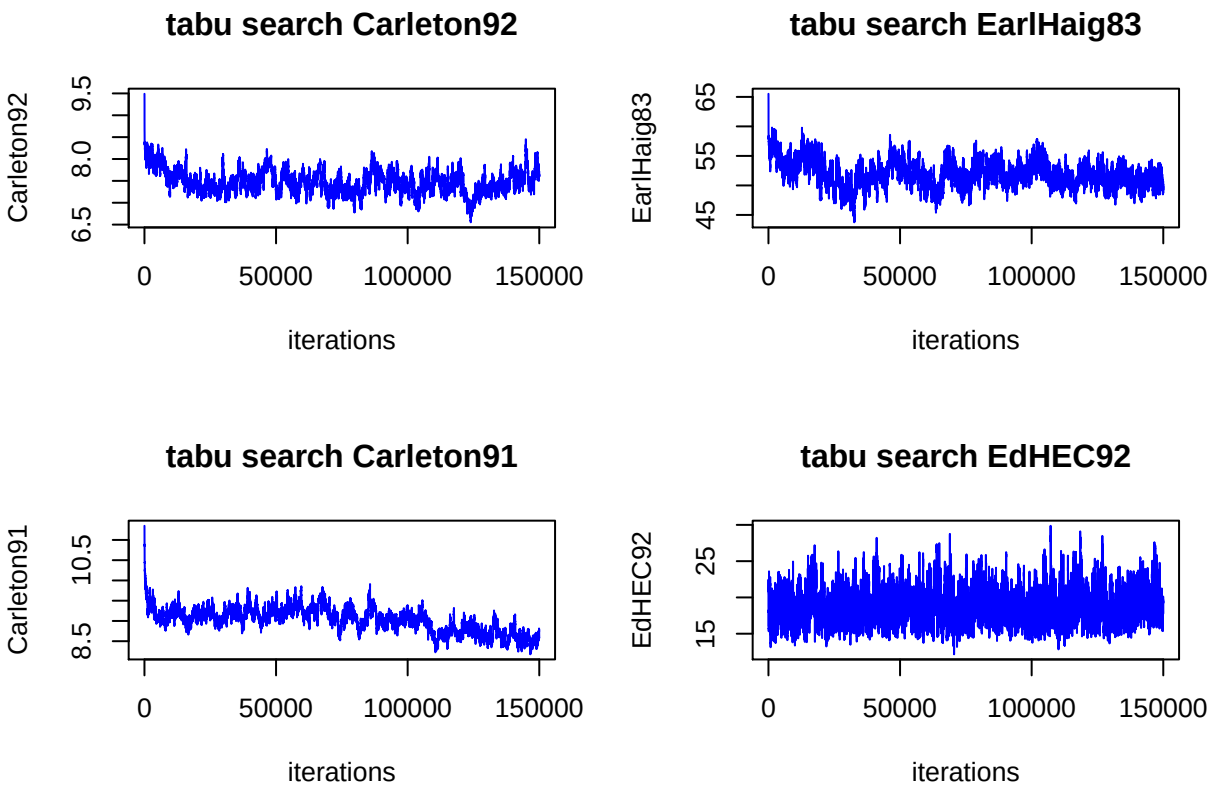



```
plot(t,Data1$YorkMills83,type="l", col="blue", lwd=1, xlab="iterations", ylab="YorkMills83", main="simul
```

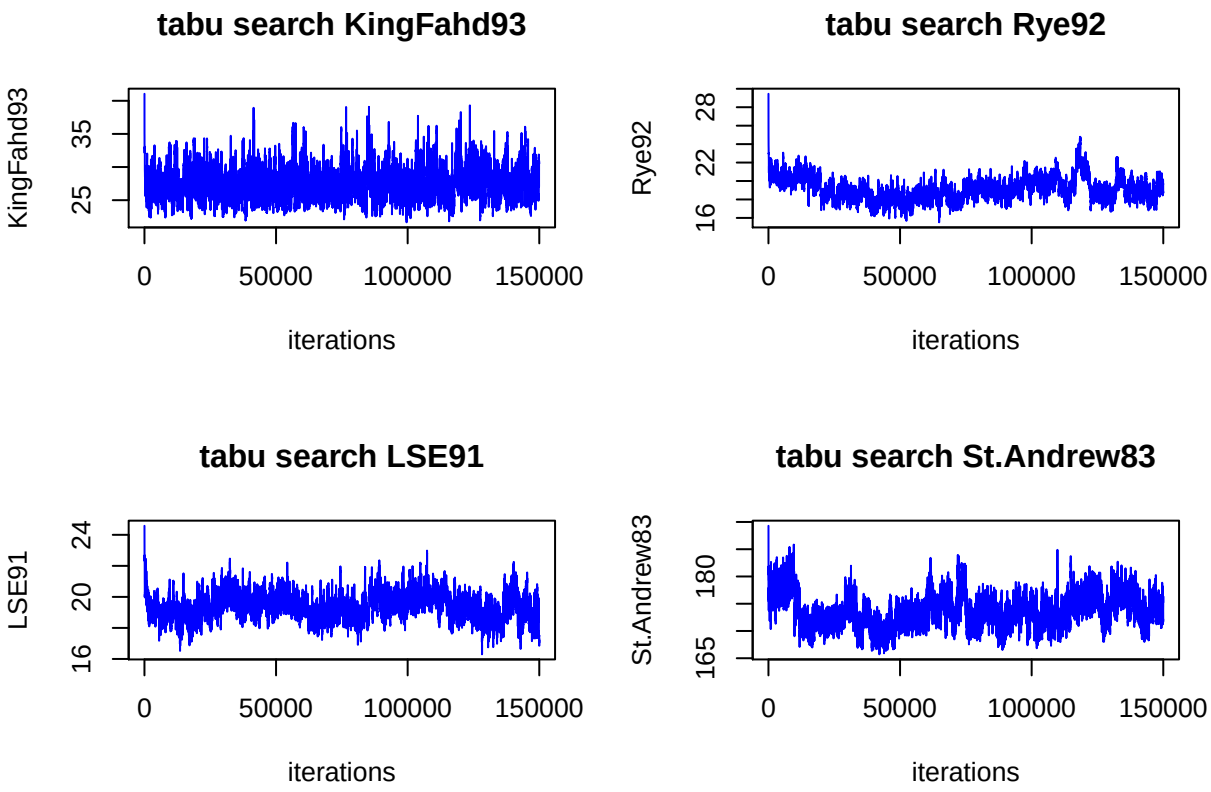


#Tabu search

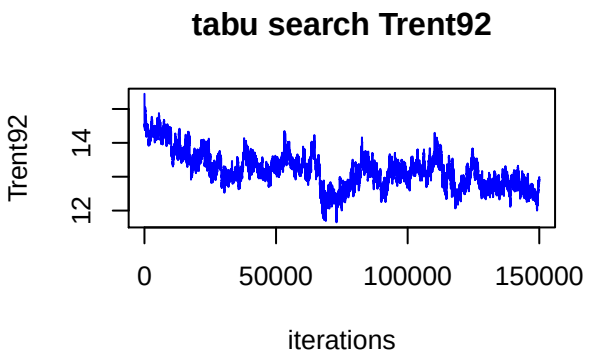
```
t=Data2$Iterations
par(mfcol=c(2,2))
plot(t,Data2$Carleton92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton92", main="tabu s
plot(t,Data2$Carleton91,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton91", main="tabu s
plot(t,Data2$EarlHaig83,type="l", col="blue", lwd=1, xlab="iterations", ylab="EarlHaig83", main="tabu s
plot(t,Data2$EdHEC92,type="l", col="blue", lwd=1, xlab="iterations", ylab="EdHEC92", main="tabu search
```

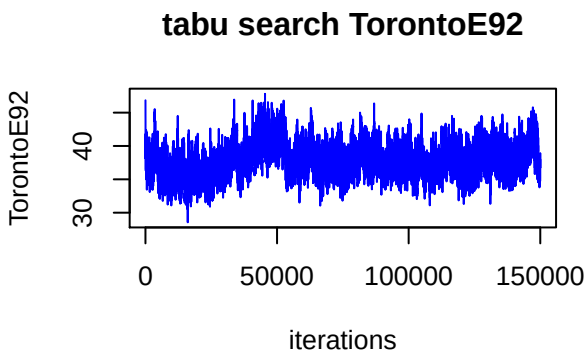


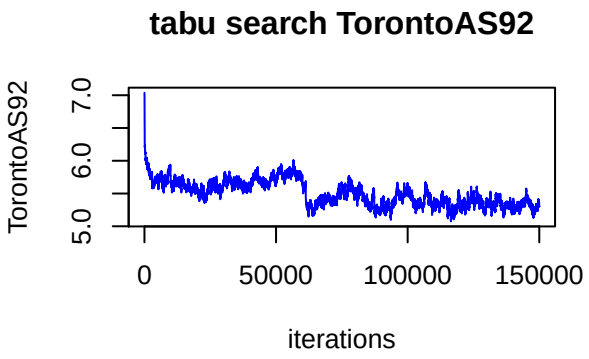

```
plot(t,Data2$KingFahd93,type="l", col="blue", lwd=1, xlab="iterations", ylab="KingFahd93", main="tabu s
plot(t,Data2$LSE91,type="l", col="blue", lwd=1, xlab="iterations", ylab="LSE91", main="tabu search LSE9

plot(t,Data2$Rye92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Rye92", main="tabu search Rye9
plot(t,Data2$St.Andrews83,type="l", col="blue", lwd=1, xlab="iterations", ylab="St.Andrew83", main="tabu
```

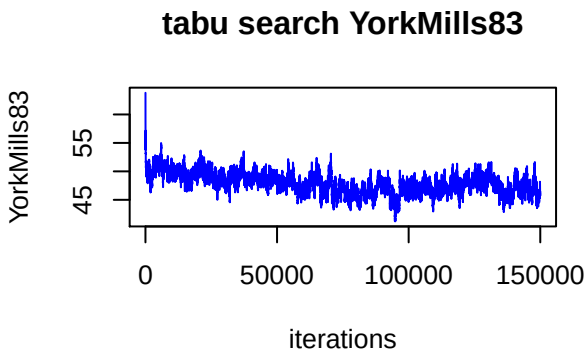



```
plot(t,Data2$Trent9,type="l", col="blue", lwd=1, xlab="iterations", ylab="Trent92", main="tabu search T
plot(t,Data2$TorontoAS92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoAS92", main="tabu
plot(t,Data2$TorontoE92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoE92", main="tabu s
plot(t,Data2$YorkMills83,type="l", col="blue", lwd=1, xlab="iterations", ylab="YorkMills83", main="tabu
```



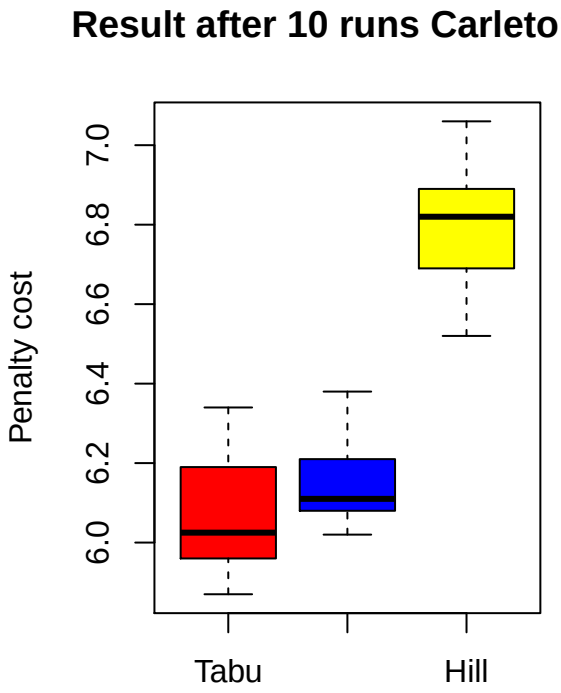


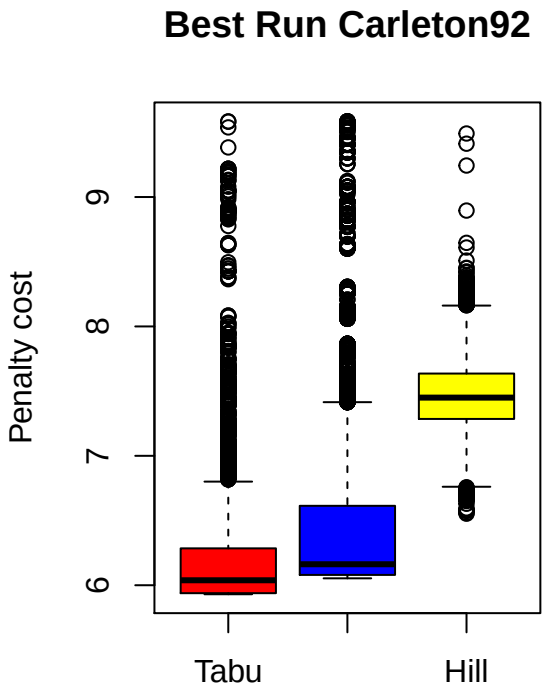




#Boxplots car f.92

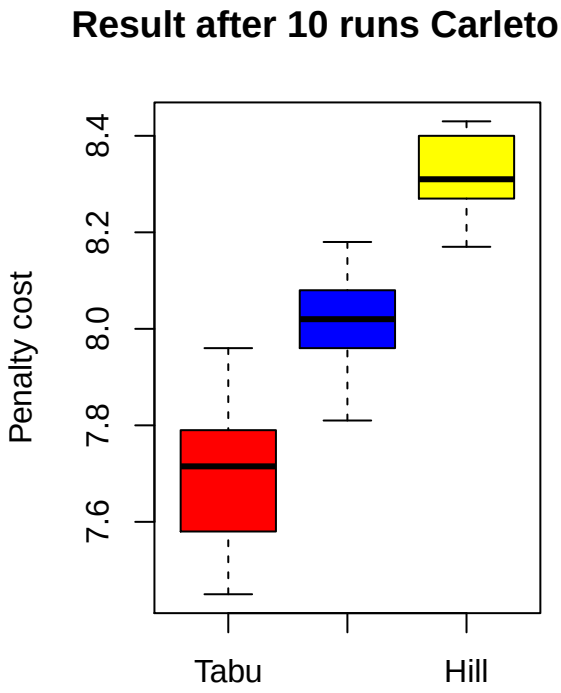
```
par(mfcol=c(1,2))
boxplot(Data$Car.f.92,Data1$Car.f.92,Data2$Car.f.92,names = c("Tabu","Simulated","Hill"),main="Result a
boxplot(Data$Carleton92,Data1$Carleton92,Data2$Carleton92,names = c("Tabu","Simulated","Hill"),main="Be
```

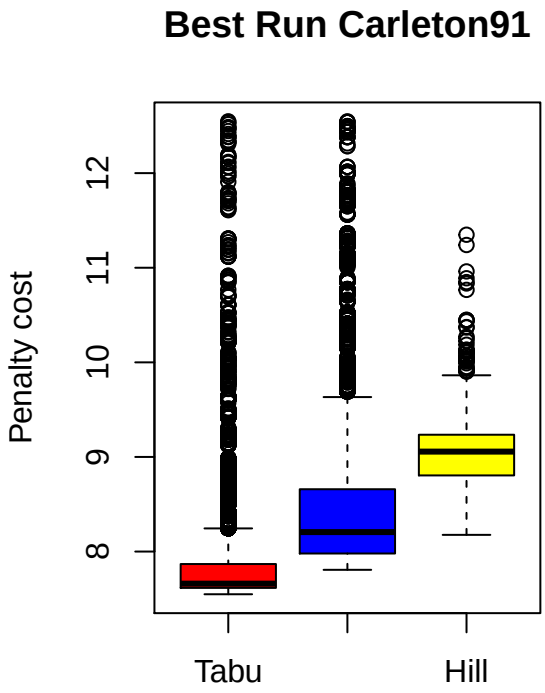




#Boxplots car f.91

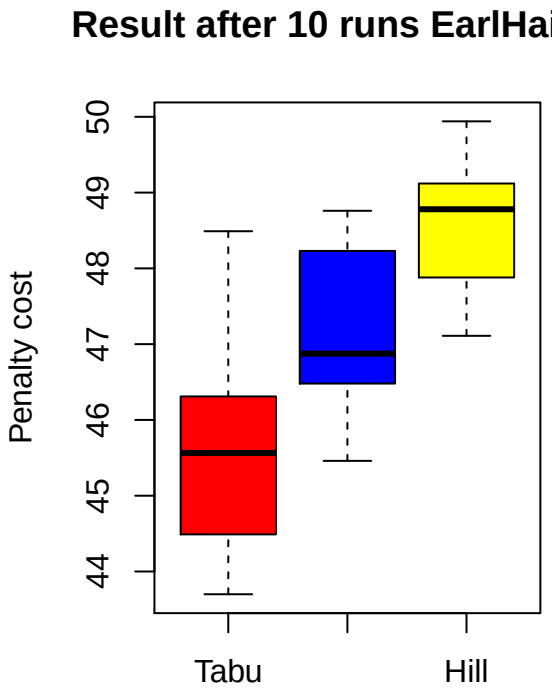
```
par(mfcol=c(1,2))
boxplot(Data$Car.s.91,Data1$Car.s.91,Data2$Car.s.91,names = c("Tabu","Simulated","Hill"),main="Result a
boxplot(Data$Carleton91,Data1$Carleton91,Data2$Carleton91,names = c("Tabu","Simulated","Hill"),main="Be
```

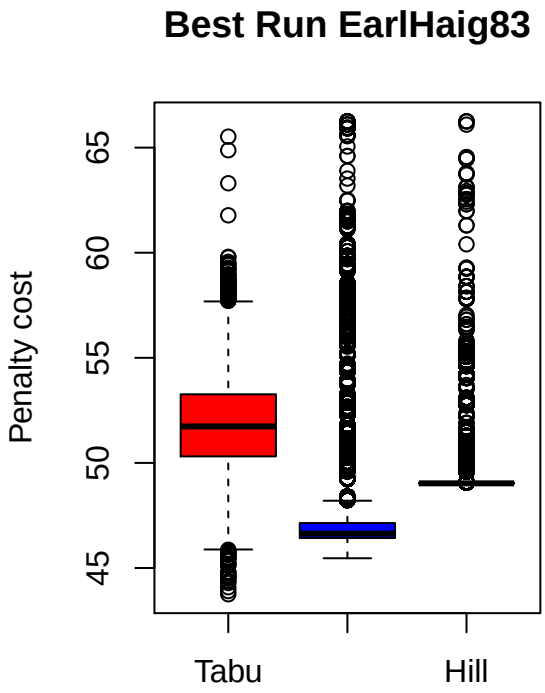




#Boxplots Ear-f-83

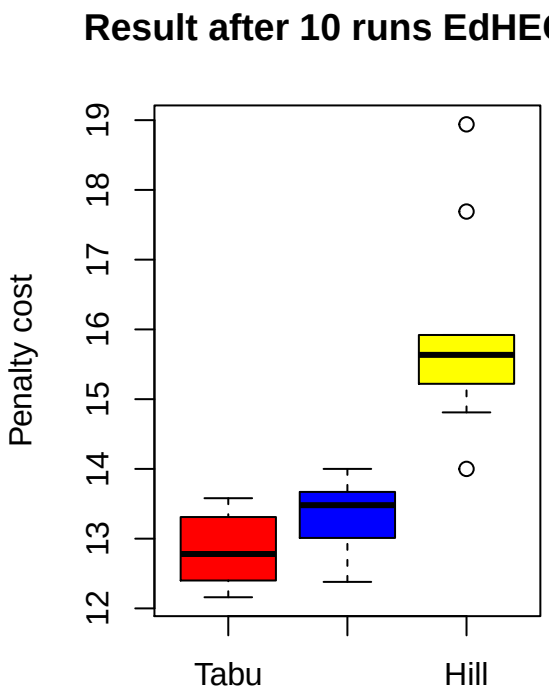
```
par(mfcol=c(1,2))
boxplot(Data2$Ear.f.83 ,Data1$Ear.f.83,Data$Ear.f.83  ,names = c("Tabu","Simulated","Hill"),main="Resul
boxplot(Data2$EarlHaig83,Data1$EarlHaig83,Data$EarlHaig83,names = c("Tabu","Simulated","Hill"),main="Be
```

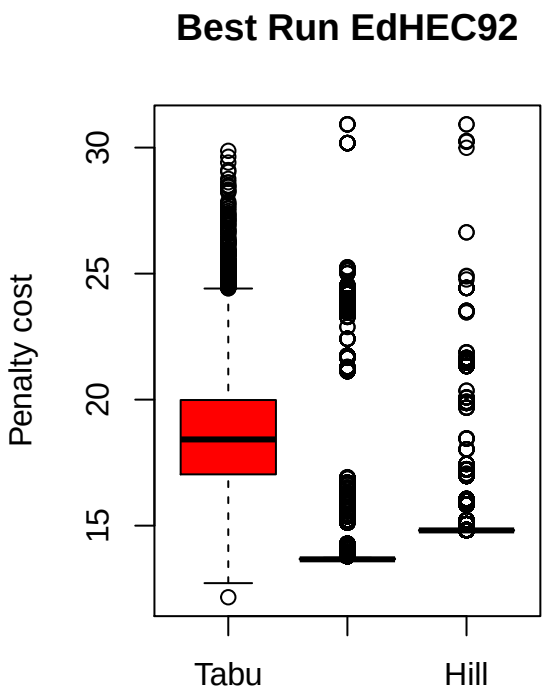




#Boxplots Hec-s-92

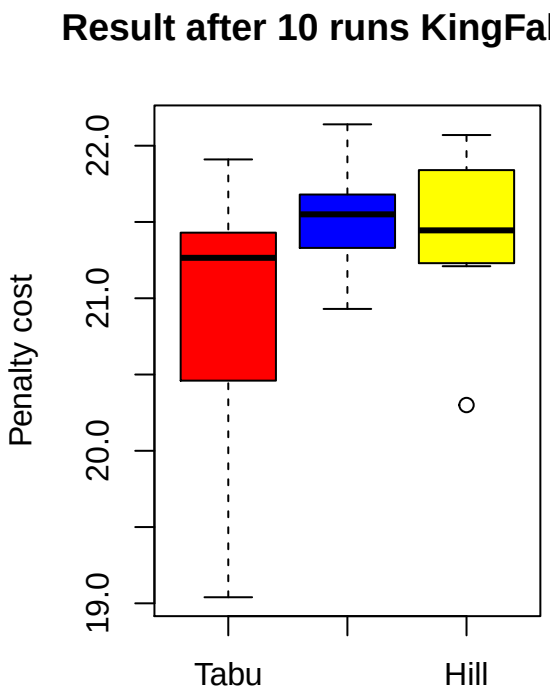
```
par(mfcol=c(1,2))
boxplot(Data2$Hec.s.92 ,Data1$Hec.s.92,Data$Hec.s.92  ,names = c("Tabu","Simulated","Hill"),main="Resul
boxplot(Data2$EdHEC92,Data1$EdHEC92,Data$EdHEC92,names = c("Tabu","Simulated","Hill"),main="Best Run Ed
```

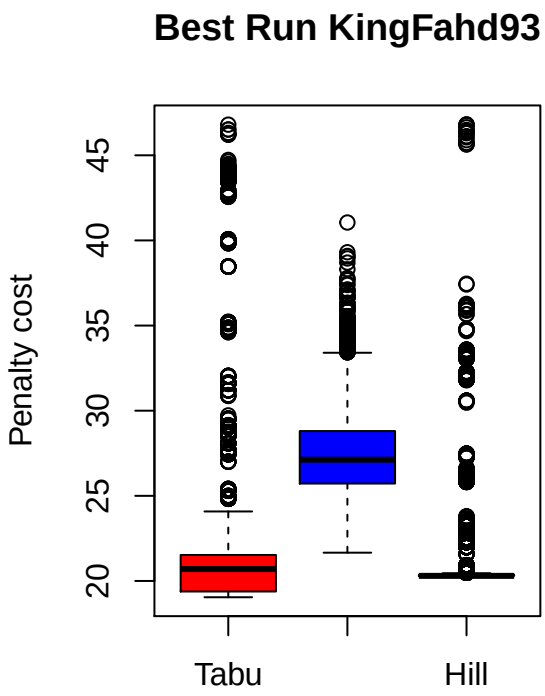




#Boxplots Kfu-s-93

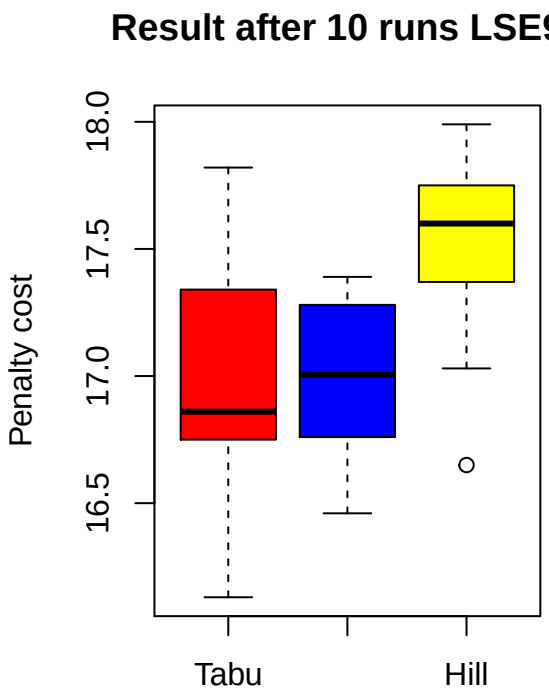
```
par(mfcol=c(1,2))
boxplot(Data1$Kfu.s.93 ,Data2$Kfu.s.93,Data$Kfu.s.93  ,names = c("Tabu","Simulated","Hill"),main="Resul
boxplot(Data1$KingFahd93,Data2$KingFahd93,Data$KingFahd93,names = c("Tabu","Simulated","Hill"),main="Be
```

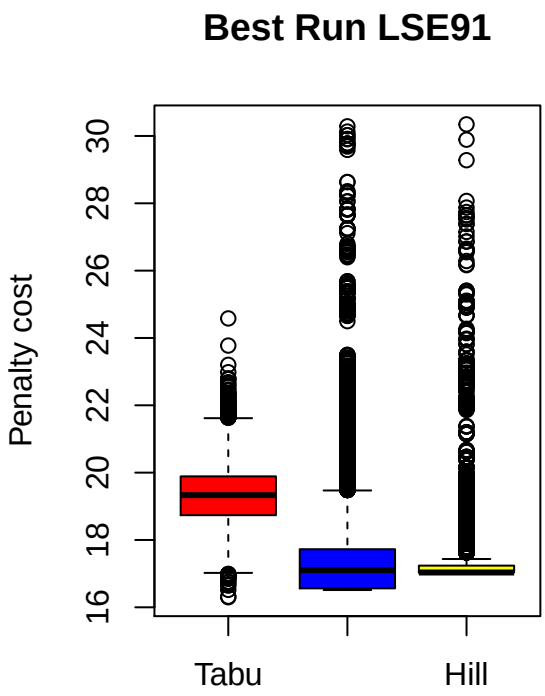




#Boxplots Lse-f-91

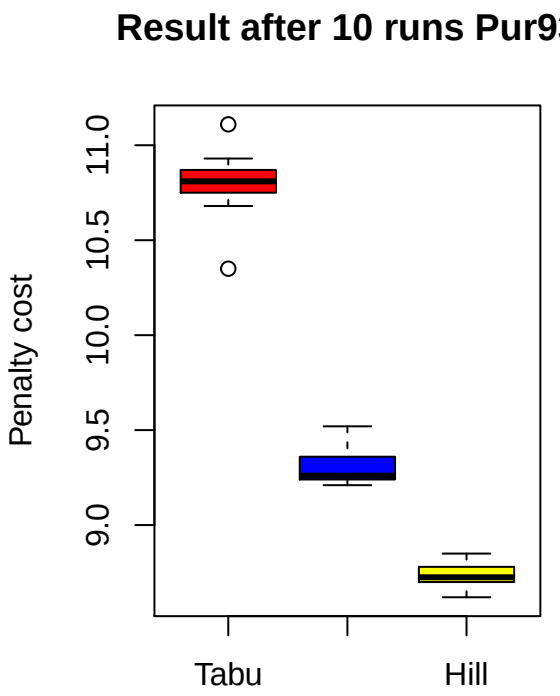
```
par(mfcol=c(1,2))
boxplot(Data2$Lse.f.91 ,Data1$Lse.f.91 ,Data$Lse.f.91    ,names = c("Tabu","Simulated","Hill"),main="Resu
boxplot(Data2$LSE91,Data1$LSE91,Data$LSE91,names = c("Tabu","Simulated","Hill"),main="Best Run LSE91",c
```

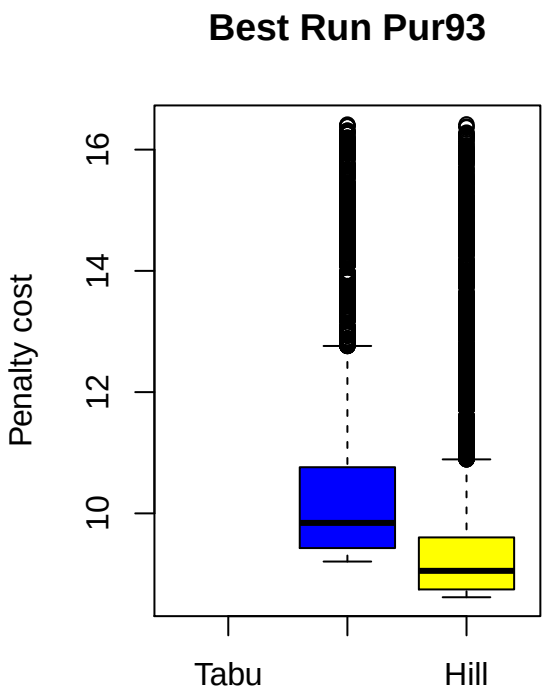




#Boxplots Pur-s-93 NOT SO GOOD

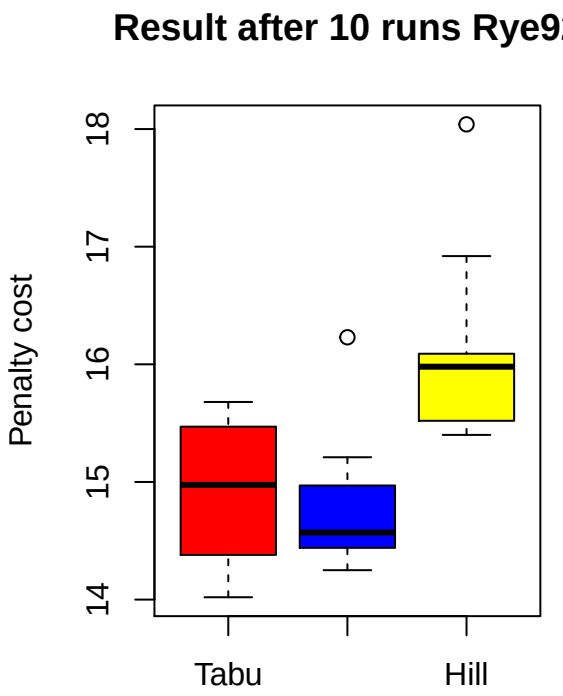
```
par(mfcol=c(1,2))
boxplot(Data2$Pur.s.93 ,Data1$Pur.s.93 ,Data$Pur.s.93   ,names = c("Tabu","Simulated","Hill"),main="Resu
boxplot(Data2$Pur93,Data1$Pur93,Data$Pur93,names = c("Tabu","Simulated","Hill"),main="Best Run Pur93",c
```

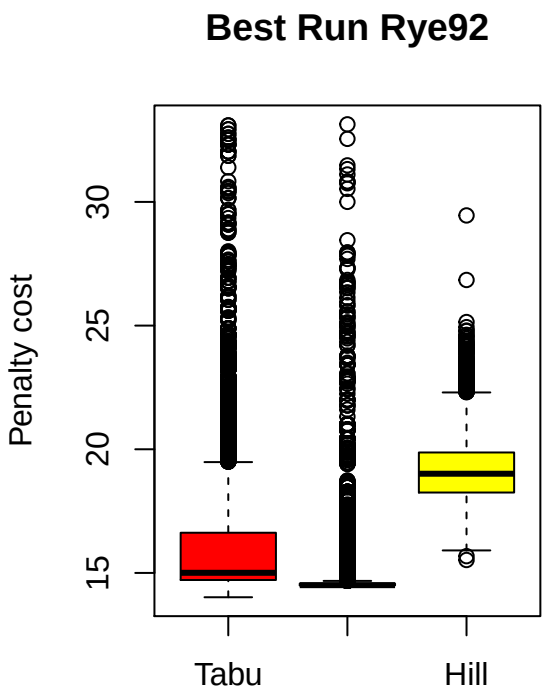




#Boxplots Rye-s-93

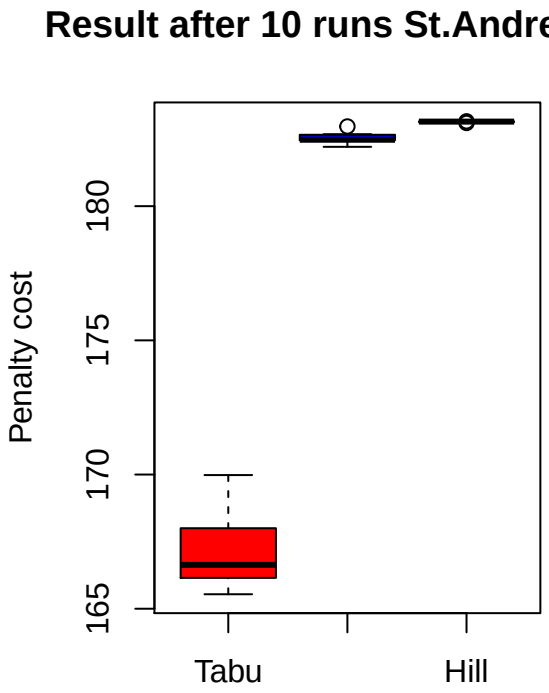
```
par(mfcol=c(1,2))
boxplot(Data1$Rye.s.93 ,Data$Rye.s.93 ,Data2$Rye.s.93   ,names = c("Tabu","Simulated","Hill"),main="Resu
boxplot(Data1$Rye92,Data$Rye92,Data2$Rye92,names = c("Tabu","Simulated","Hill"),main="Best Run Rye92",c
```

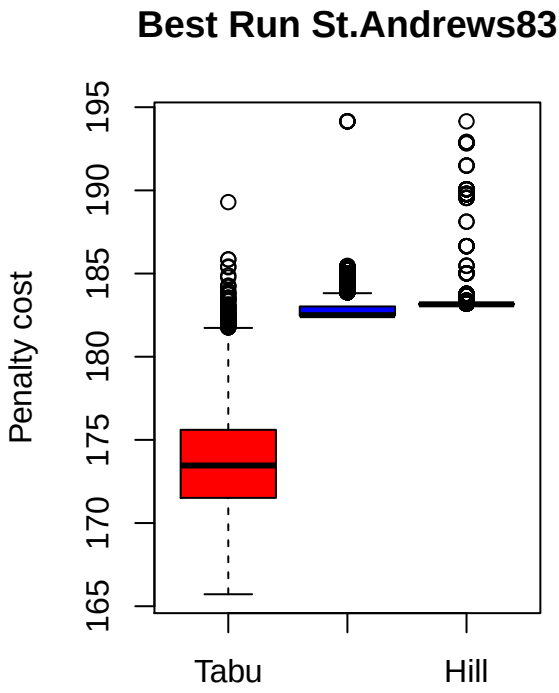




#Boxplots Sta-f-83

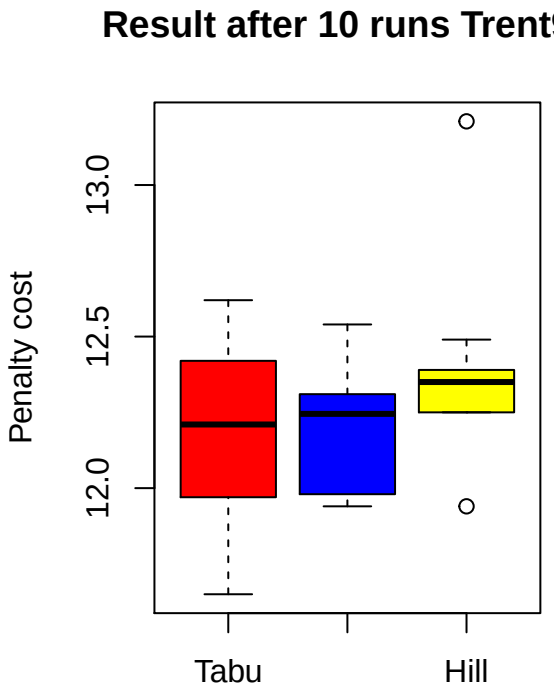
```
par(mfcol=c(1,2))
boxplot(Data2$Sta.f.83 ,Data1$Sta.f.83 ,Data$Sta.f.83  ,names = c("Tabu","Simulated","Hill"),main="Resul
boxplot(Data2$St.Andrews83,Data1$St.Andrews83,Data$St.Andrews83,names = c("Tabu","Simulated","Hill"),ma
```

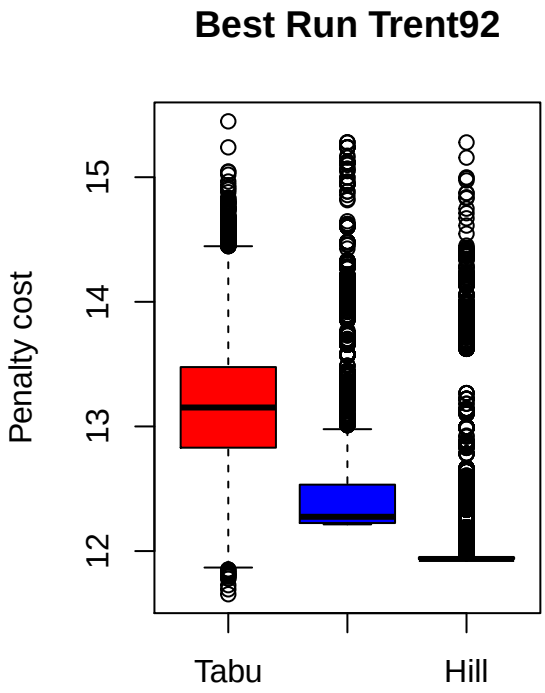




#Boxplots Tre-s-92

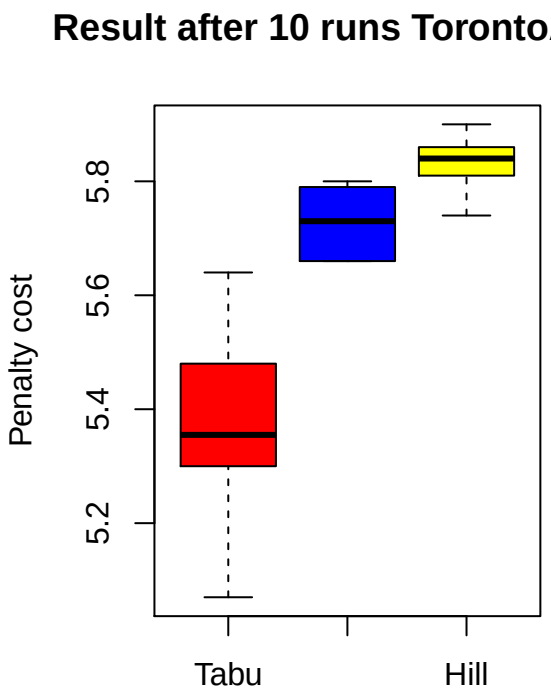
```
par(mfcol=c(1,2))
boxplot(Data2$Tre.s.92 ,Data1$Tre.s.92 ,Data$Tre.s.92  ,names = c("Tabu","Simulated","Hill"),main="Resul
boxplot(Data2$Trent92,Data1$Trent92,Data$Trent92,names = c("Tabu","Simulated","Hill"),main="Best Run Tr
```

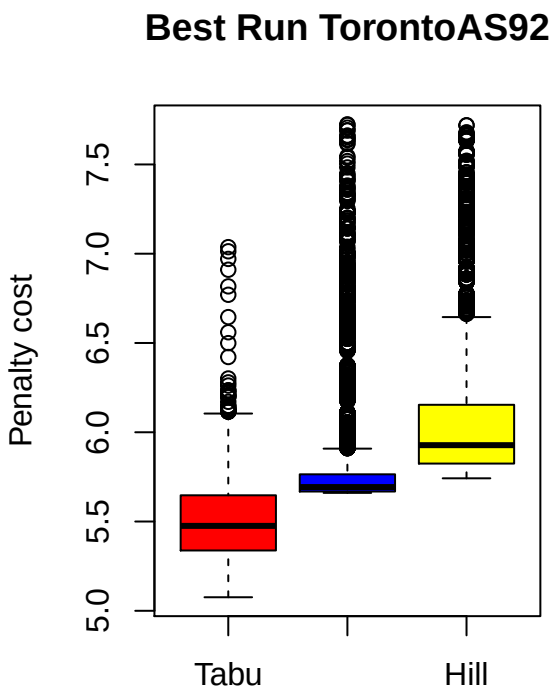




#Boxplots Uta-s-92

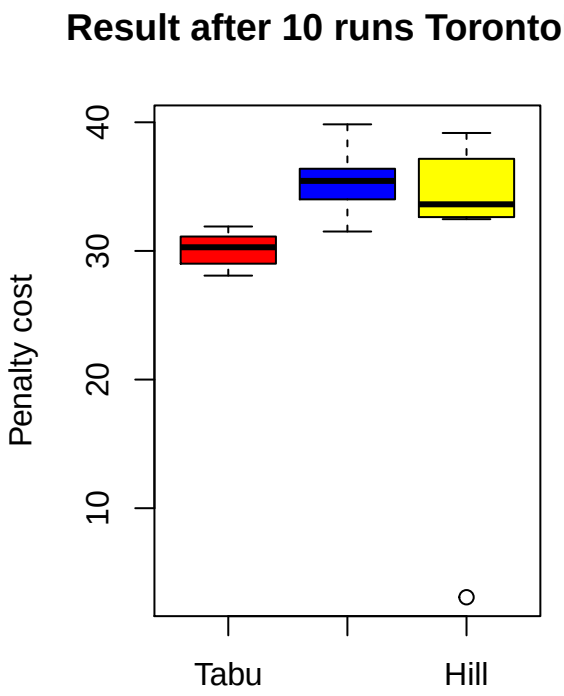
```
par(mfcol=c(1,2))
boxplot(Data2$Uta.s.92 ,Data$Uta.s.92 ,Data1$Uta.s.92  ,names = c("Tabu","Simulated","Hill"),main="Resu
boxplot(Data2$TorontoAS92,Data$TorontoAS92,Data1$TorontoAS92,names = c("Tabu","Simulated","Hill"),main=
```

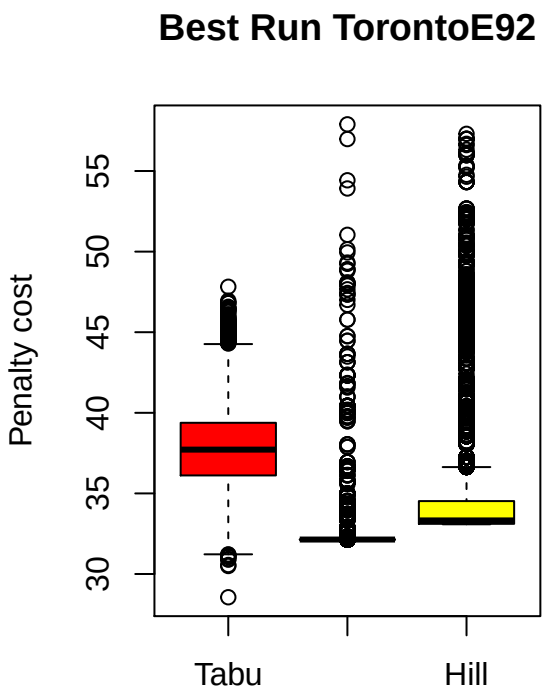




#Boxplots Ute-s-92

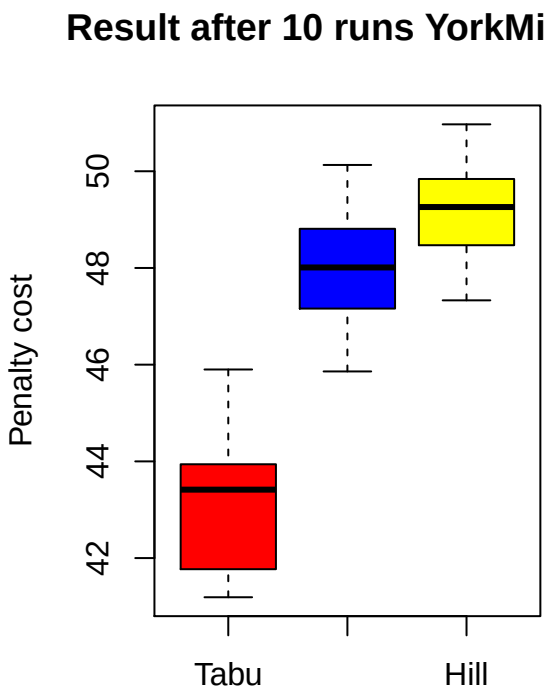
```
par(mfcol=c(1,2))
boxplot(Data2$Ute.s.92 ,Data$Ute.s.92 ,Data1$Ute.s.92  ,names = c("Tabu","Simulated","Hill"),main="Resul
boxplot(Data2$TorontoE92,Data$TorontoE92,Data1$TorontoE92,names = c("Tabu","Simulated","Hill"),main="Bes
```

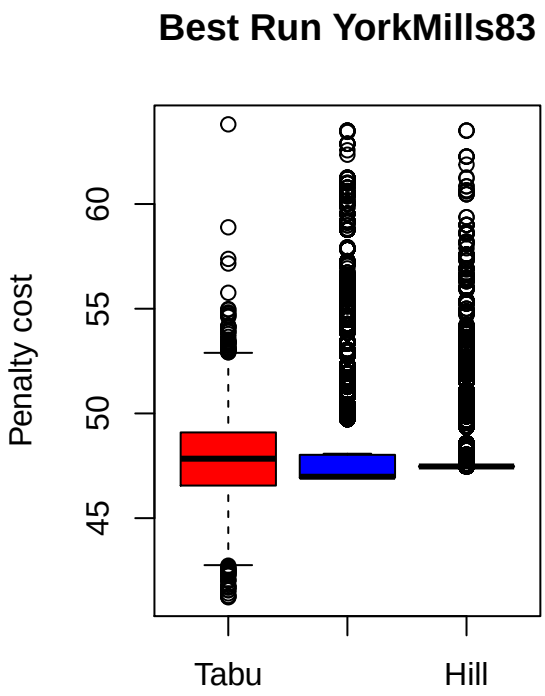




#Boxplots yor-f-83

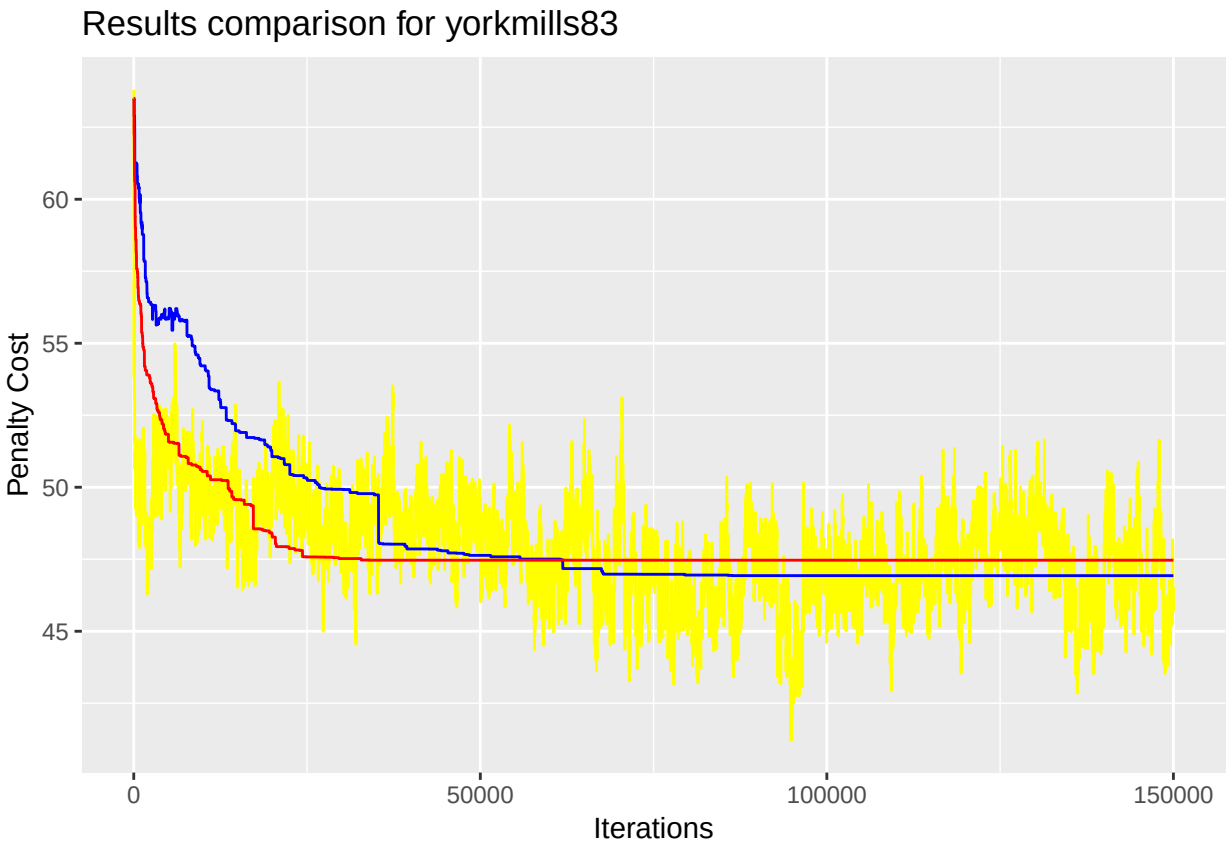
```
par(mfcol=c(1,2))
boxplot(Data2$yor.f.83 ,Data1$yor.f.83 ,Data$yor.f.83  ,names = c("Tabu","Simulated","Hill"),main="Resu
boxplot(Data2$YorkMills83,Data1$YorkMills83,Data$YorkMills83,names = c("Tabu","Simulated","Hill"),main=
```





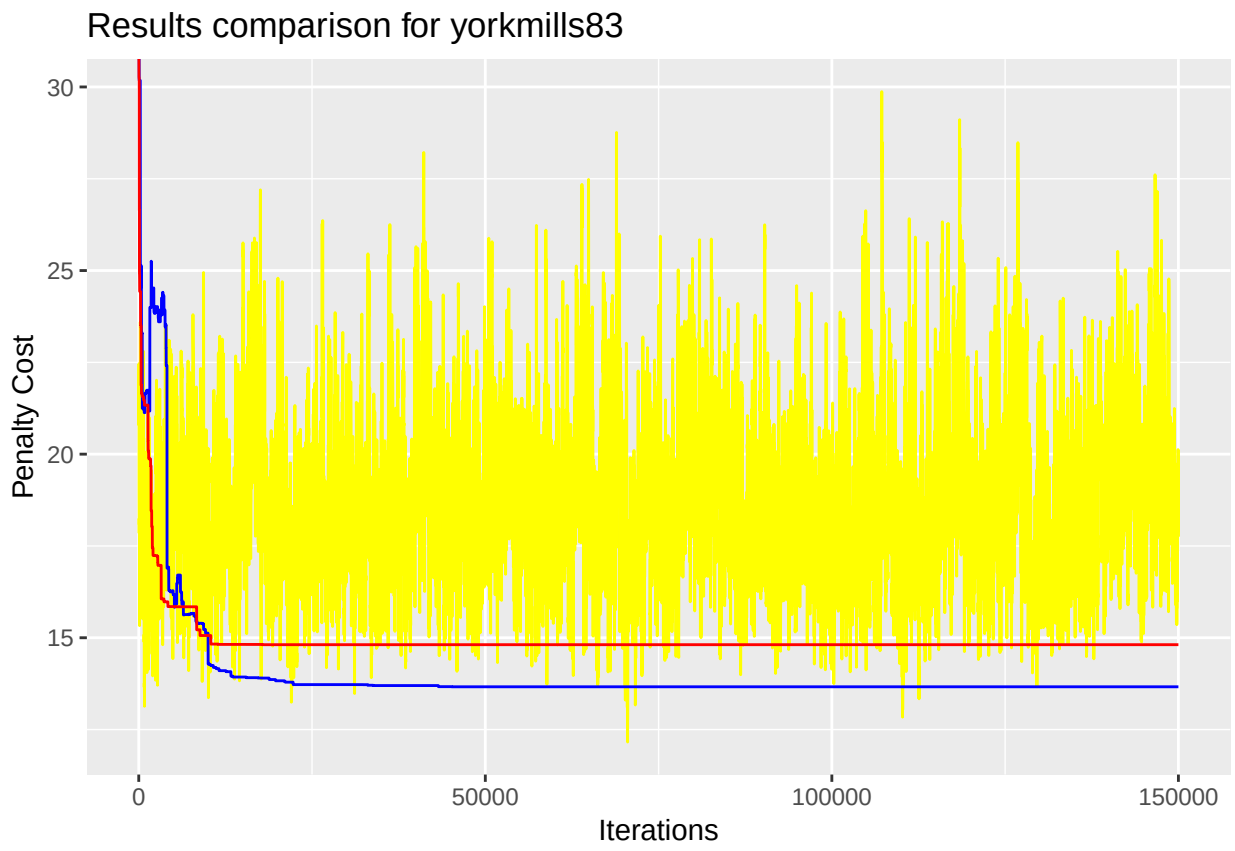
#DATASET OF YORKMILLS83

```
x<-Data$Iterations
y0<- Data$YorkMills83
y1<-Data1$YorkMills83
y2<-Data2$YorkMills83

ggplot(data.frame(x,y0,y1,y2),aes(x=x,y=y2))+geom_line(color="yellow")+geom_line(y=y1,color="blue")+geo
```



##DATASET OF EDHEC92

```
x<-Data$Iterations
y0<- Data$EdHEC92
y1<-Data1$EdHEC92
y2<-Data2$EdHEC92

ggplot(data.frame(x,y0,y1,y2),aes(x=x,y=y2))+geom_line(color="yellow")+geom_line(y=y1,color="blue")+geo
```



##DATASET OF lse91

```
x<-Data$Iterations
y0<- Data$LSE91
y1<-Data1$LSE91
y2<-Data2$LSE91

ggplot(data.frame(x,y0,y1,y2),aes(x=x,y=y2))+geom_line(color="yellow")+geom_line(y=y1,color="blue")+geo
```


Results comparison for LSE91
Penalty Cost
22.5
20.0
17.5
0
50000
100000
150000
Iterations