

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
```

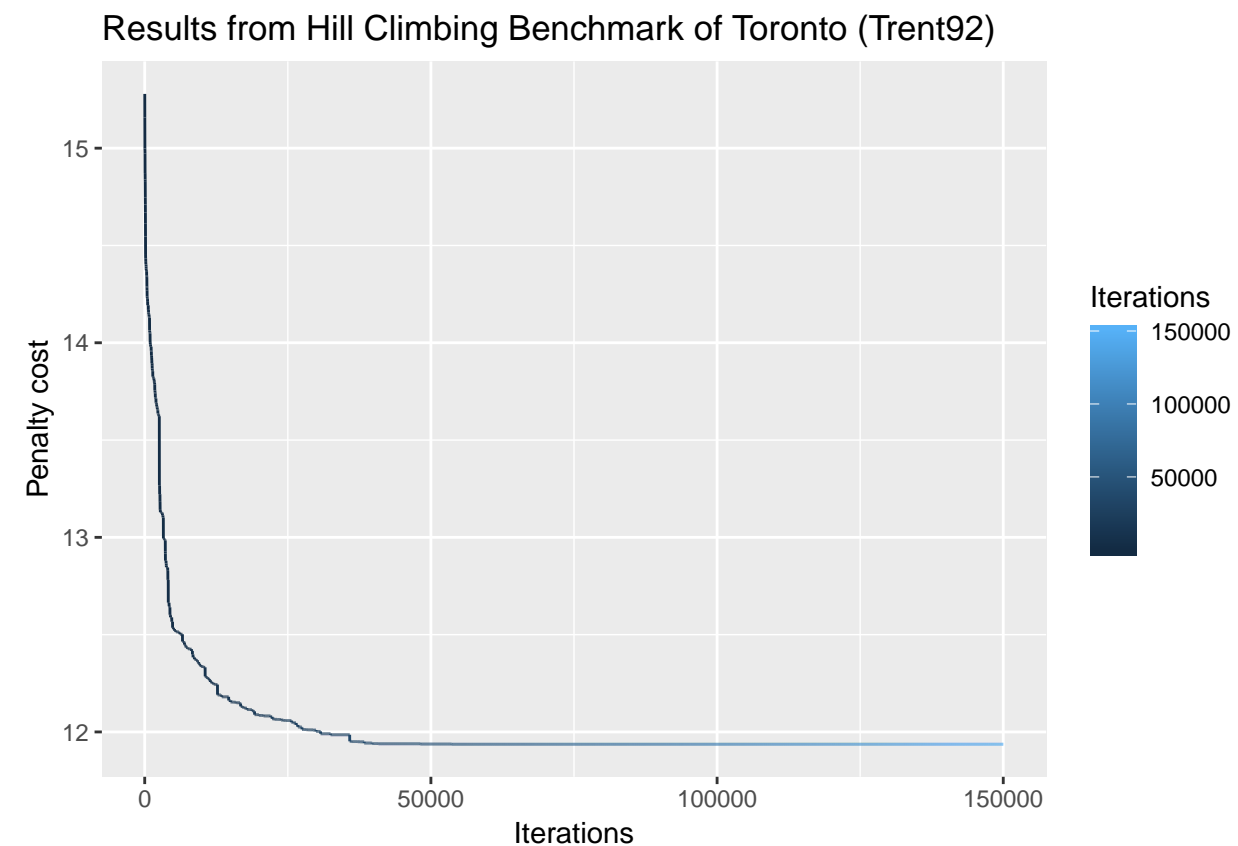
```
Data<- read.csv("Hill.csv",header=T)
```

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

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

```
p<-ggplot(Data,aes(Iterations))
```

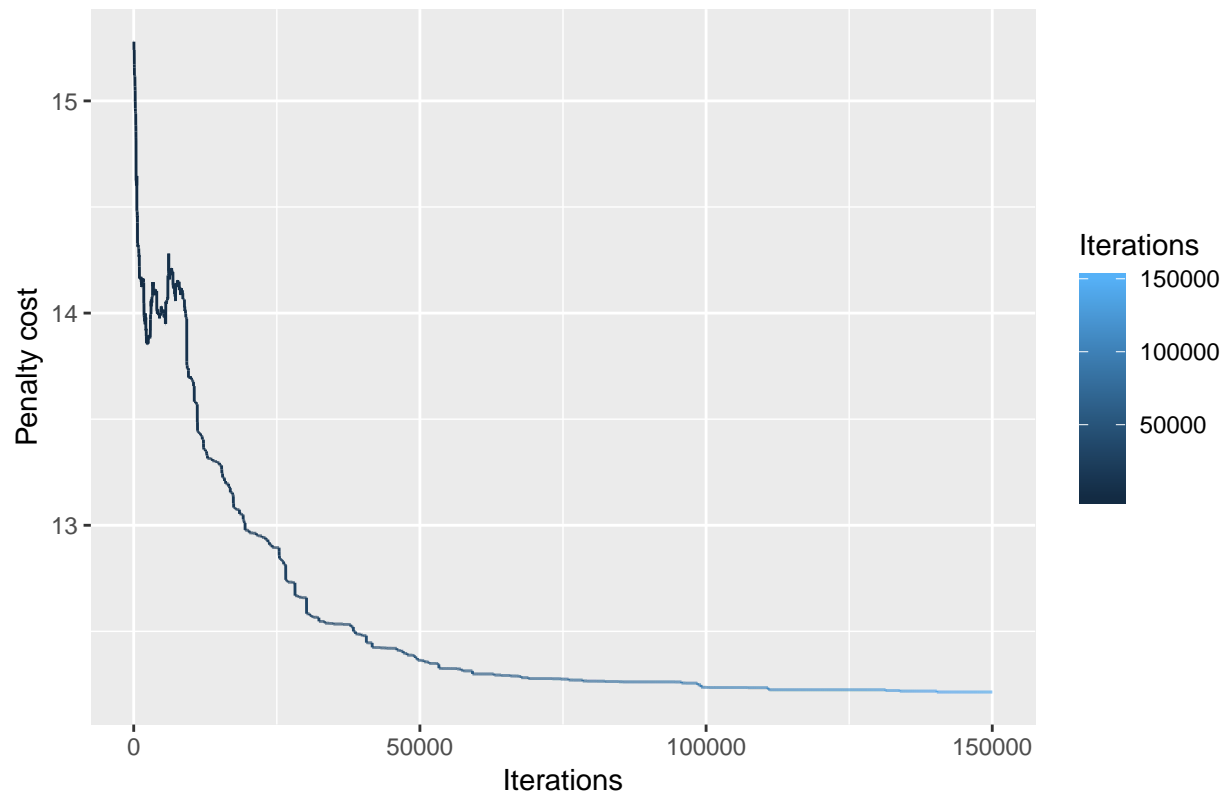
```
p<-p+geom_line(aes(y=Data$Trent92,colour=Iterations))+ggtitle("Results from Hill Climbing Benchmark of Toronto (Trent92)")
```



```
v<-ggplot(Data1,aes(Iterations))
```

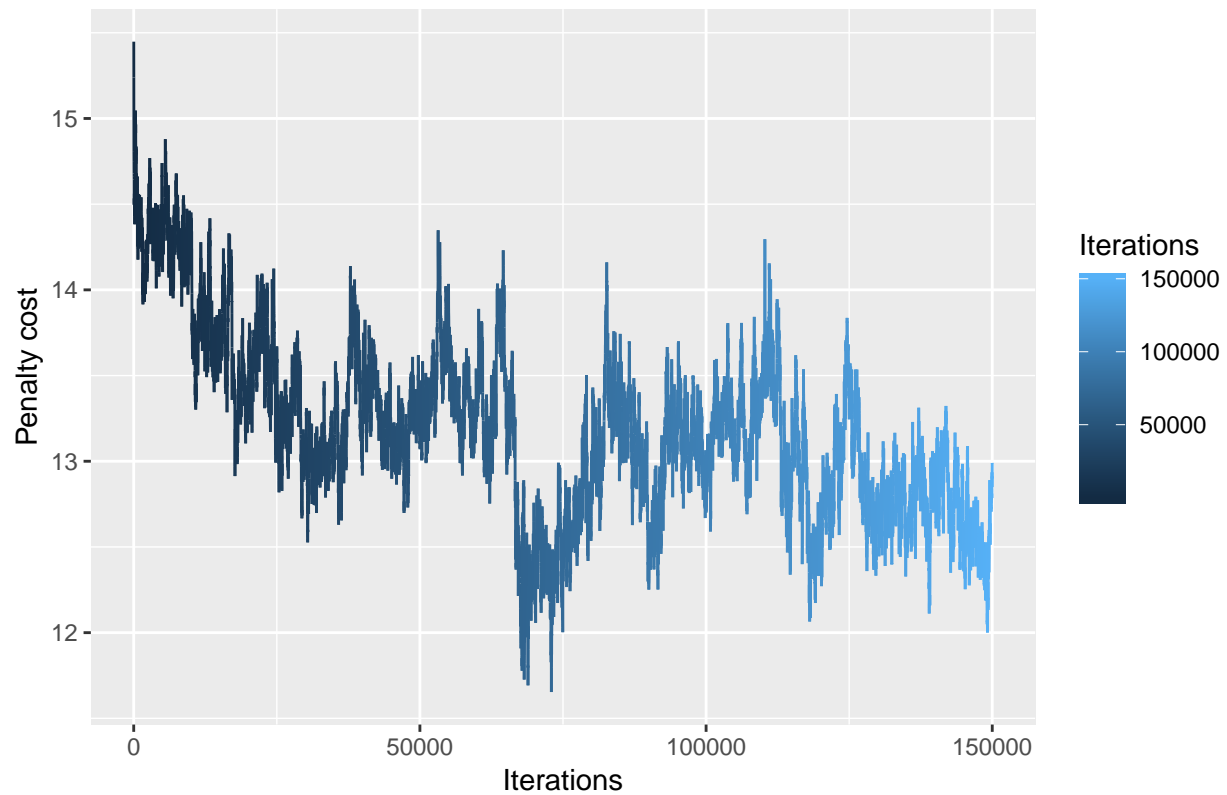
```
v<-v+geom_line(aes(y=Data1$Trent92,colour=Iterations))+ggtitle("Results from Simulated annealing Benchmark of Toronto (Trent92)")
```

Results from Simulated annealing Benchmark of Toronto (Trent92)



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

Results from Tabu search Benchmark of Toronto (Trent92)



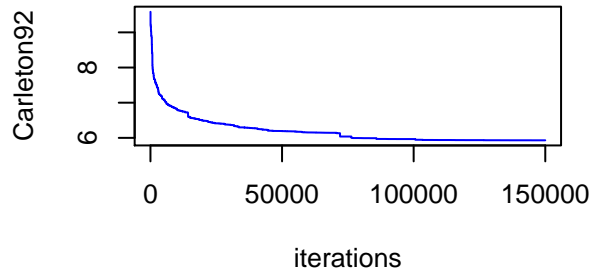
```
##p<-ggplot(Data2,aes(Iterations))
##p<-p+geom_line(aes(y=Data2$test1,colour=Iterations))+ggtitle("Results from Tabu search Benchmark of T
##p
```

#hill climbing line plot

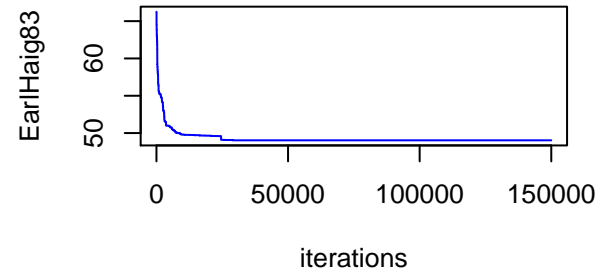
```
t=Data$Iterations
```

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

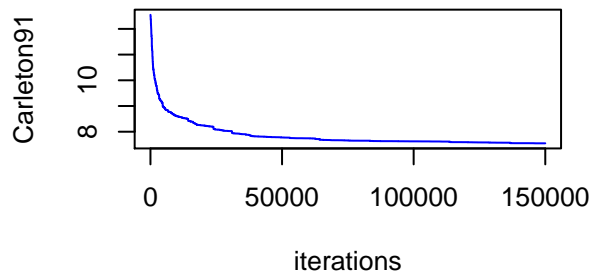
Hill-Climbing Carleton92



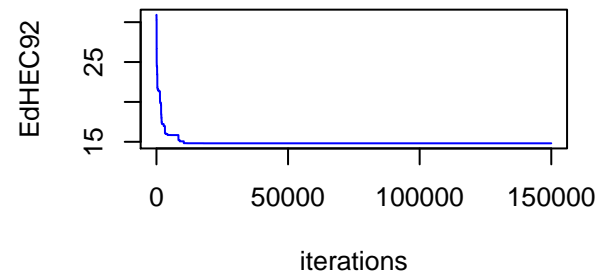
Hill-Climbing EarlHaig83



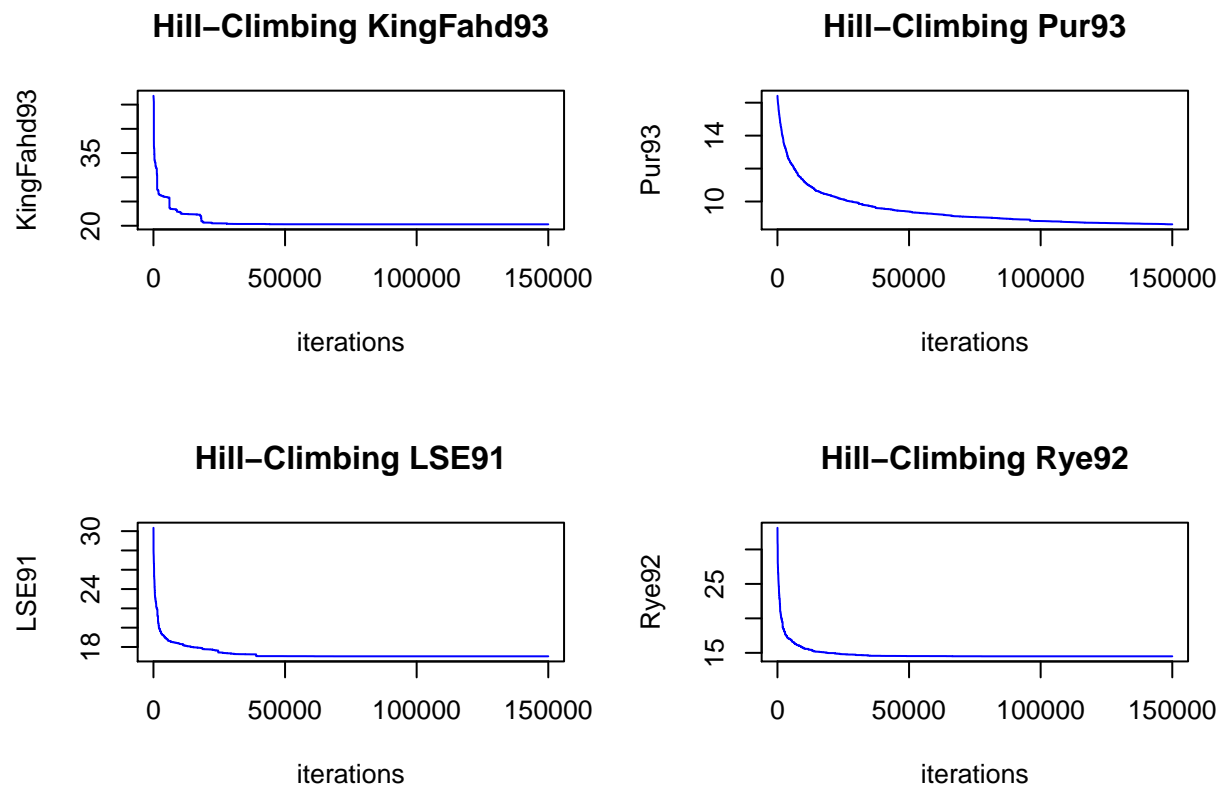
Hill-Climbing Carleton91



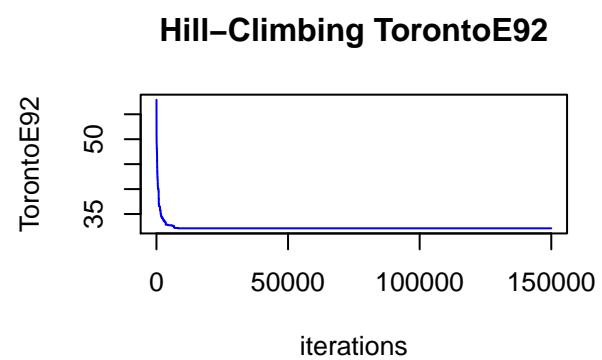
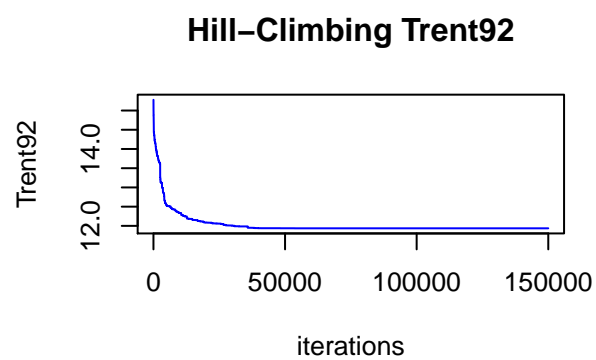
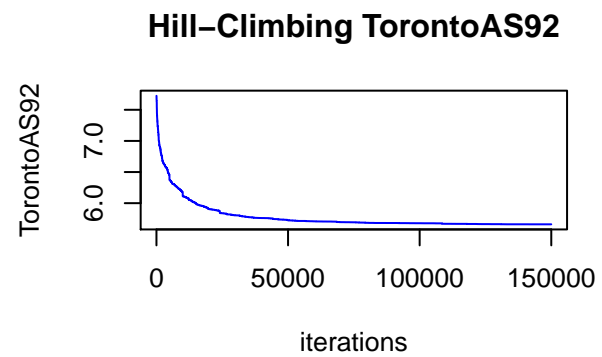
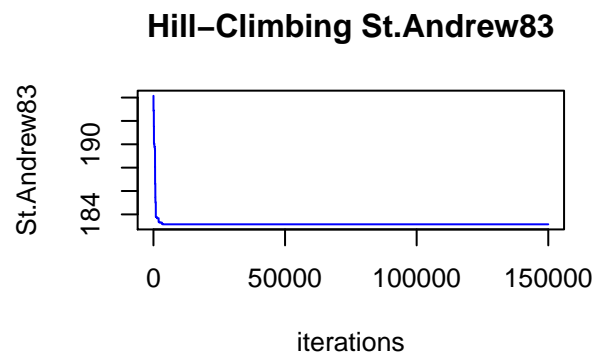
Hill-Climbing EdHEC92



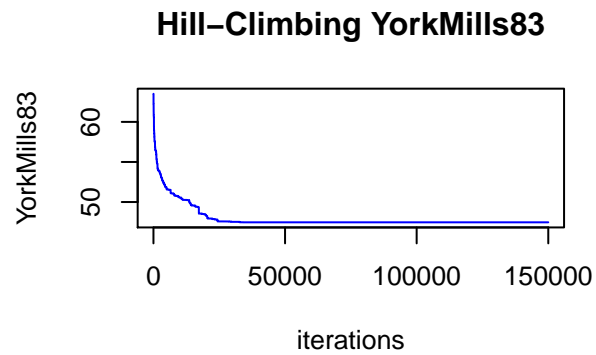
```
plot(t,Data$KingFahd93,type="l", col="blue", lwd=1, xlab="iterations", ylab="KingFahd93", main="Hill-Climbing KingFahd93")
plot(t,Data$LSE91,type="l", col="blue", lwd=1, xlab="iterations", ylab="LSE91", main="Hill-Climbing LSE91")
plot(t,Data$Pur93,type="l", col="blue", lwd=1, xlab="iterations",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



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



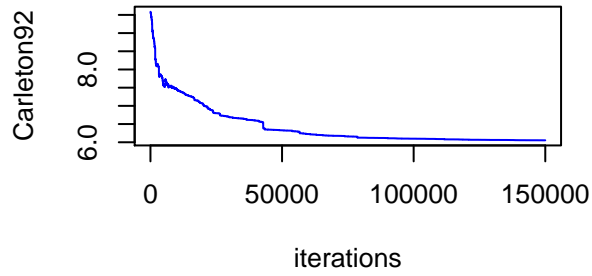
```
plot(t,Data$YorkMills83,type="l", col="blue", lwd=1, xlab="iterations", ylab="YorkMills83", main="Hill-
```



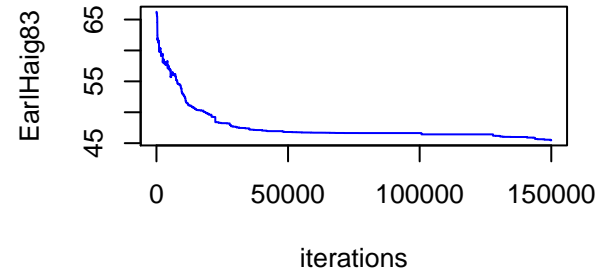
#simulate annealing line plot

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

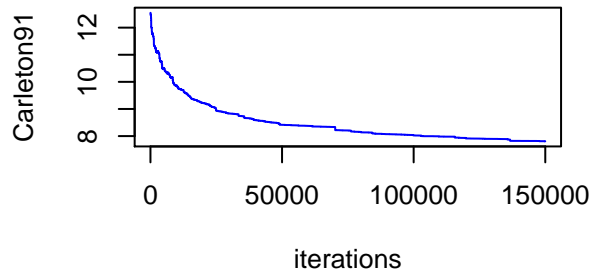
simulated annealing Carleton92



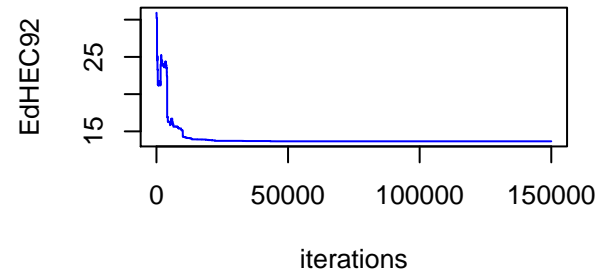
simulated annealing EarlHaig83



simulated annealing Carleton91

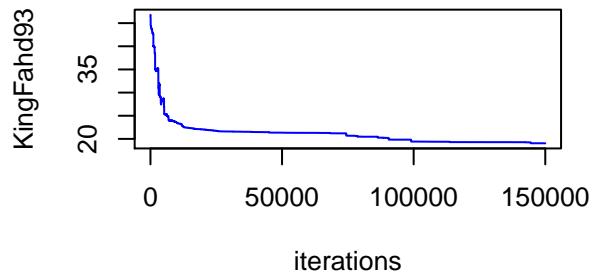


simulated annealing EdHEC92

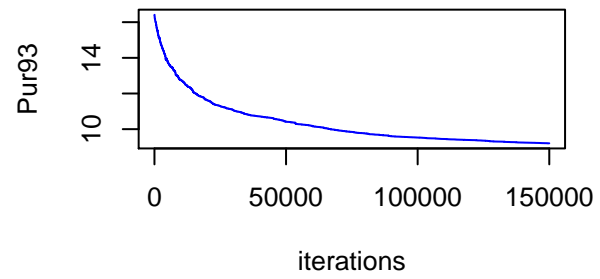


```
plot(t,Data1$KingFahd93,type="l", col="blue", lwd=1, xlab="iterations", ylab="KingFahd93", main="simulated annealing KingFahd93")
plot(t,Data1$LSE91,type="l", col="blue", lwd=1, xlab="iterations", ylab="LSE91", main="simulated annealing LSE91")
plot(t,Data1$Pur93,type="l", col="blue", lwd=1, xlab="iterations",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

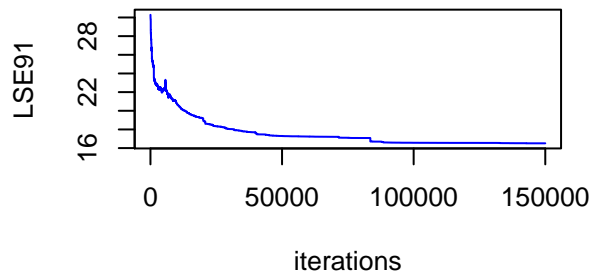

simulated annealing KingFahd93



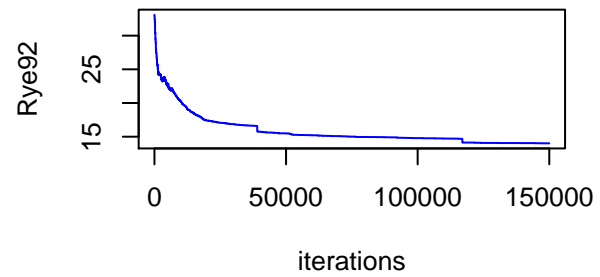
simulated annealing Pur93



simulated annealing LSE91

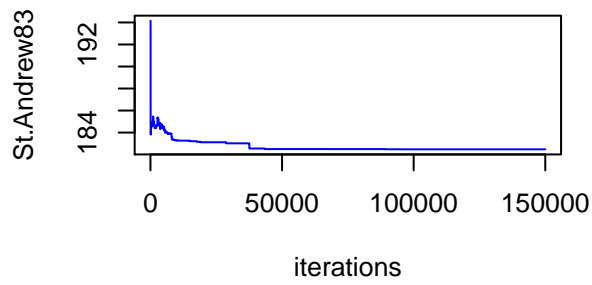


simulated annealing Rye92

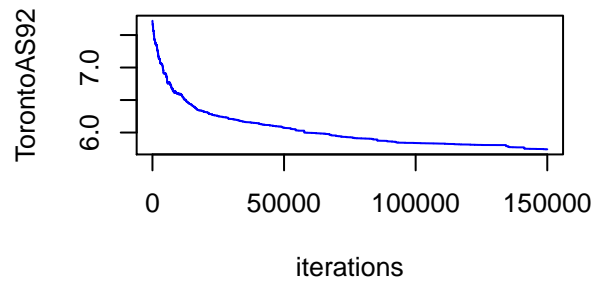


```
plot(t,Data1$St.Andrews83,type="l", col="blue", lwd=1, xlab="iterations", ylab="St.Andrew83", main="simulated annealing St.Andrews83")
plot(t,Data1$Trent92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Trent92", main="simulated annealing Trent92")
plot(t,Data1$TorontoAS92,type="l", col="blue",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

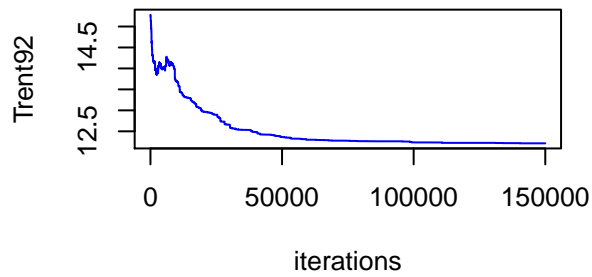
simulated annealing St.Andrew83



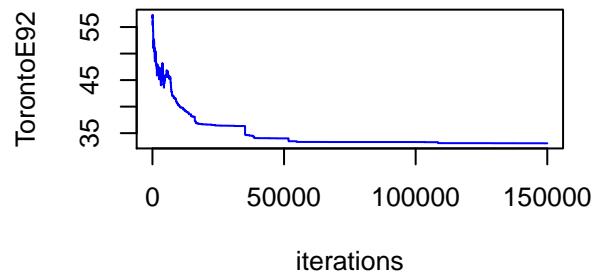
simulated annealing TorontoAS92



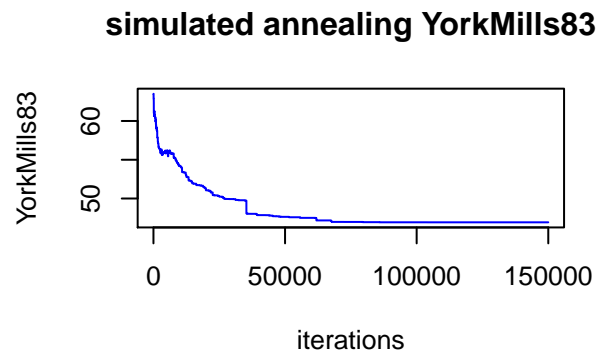
simulated annealing Trent92



simulated annealing TorontoE92



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



#Tabu search

```
t=Data2$Iterations
```

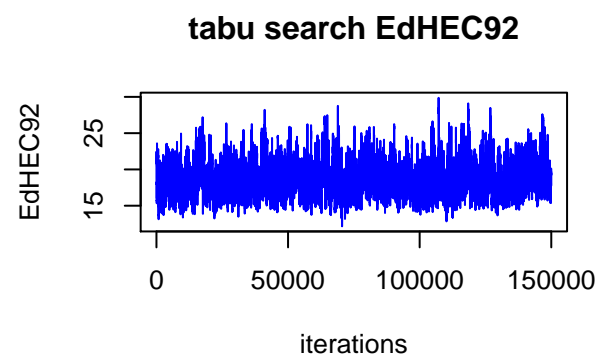
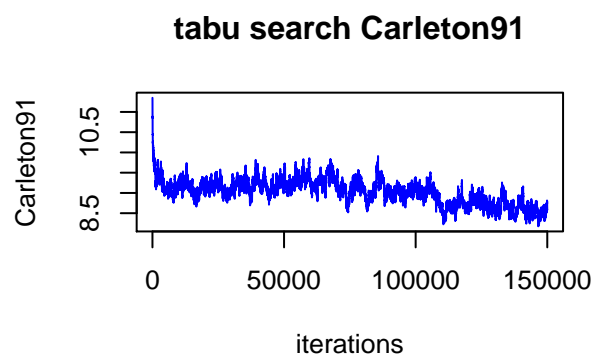
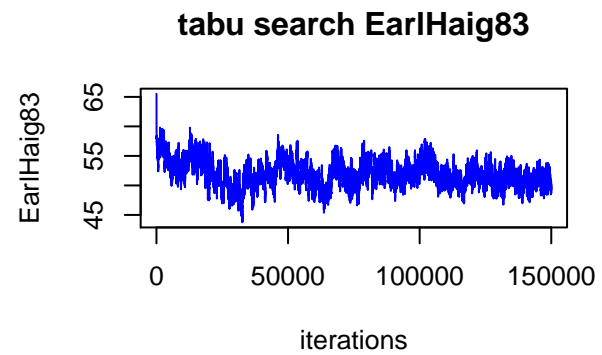
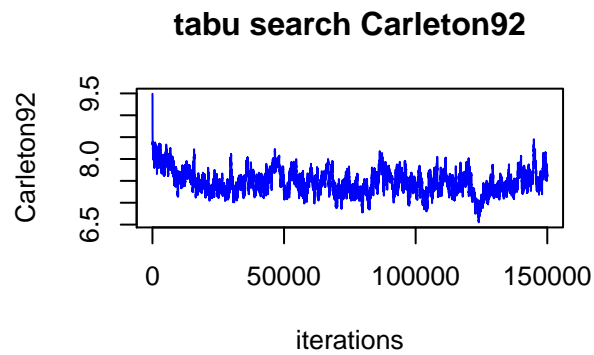
```
par(mfcol=c(2,2))
```

```
plot(t,Data2$Carleton92,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton92", main="tabu search Carleton92")
```

```
plot(t,Data2$Carleton91,type="l", col="blue", lwd=1, xlab="iterations", ylab="Carleton91", main="tabu search Carleton91")
```

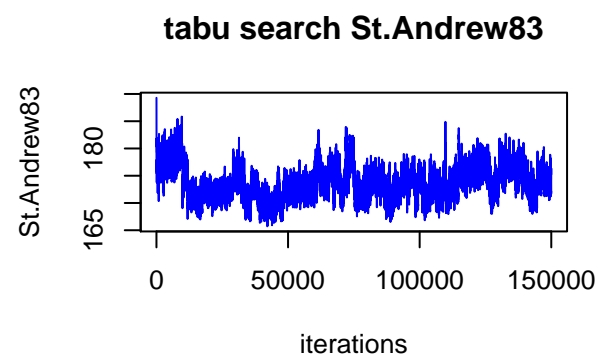
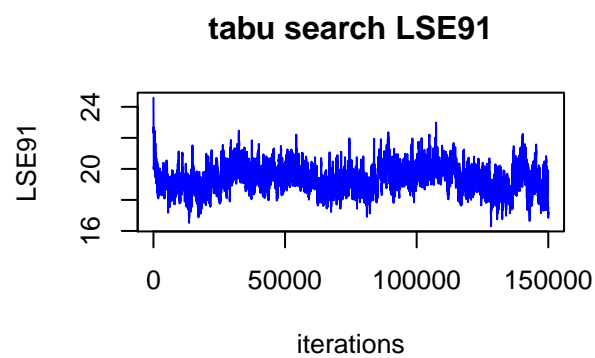
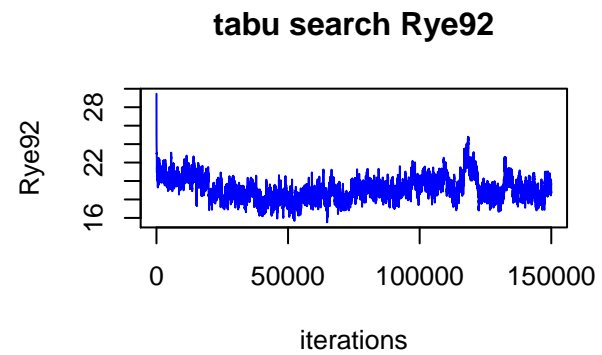
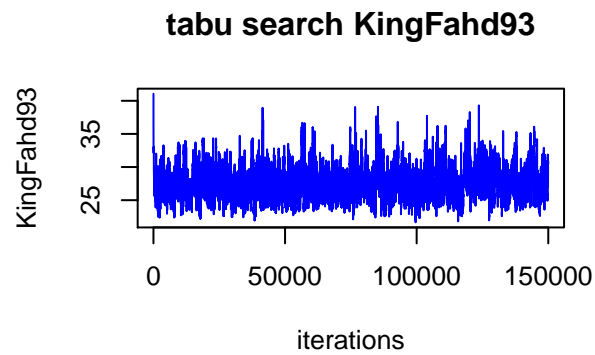
```
plot(t,Data2$EarlHaig83,type="l", col="blue", lwd=1, xlab="iterations", ylab="EarlHaig83", main="tabu search EarlHaig83")
```

```
plot(t,Data2$EdHEC92,type="l", col="blue", lwd=1, xlab="iterations", ylab="EdHEC92", main="tabu search EdHEC92")
```

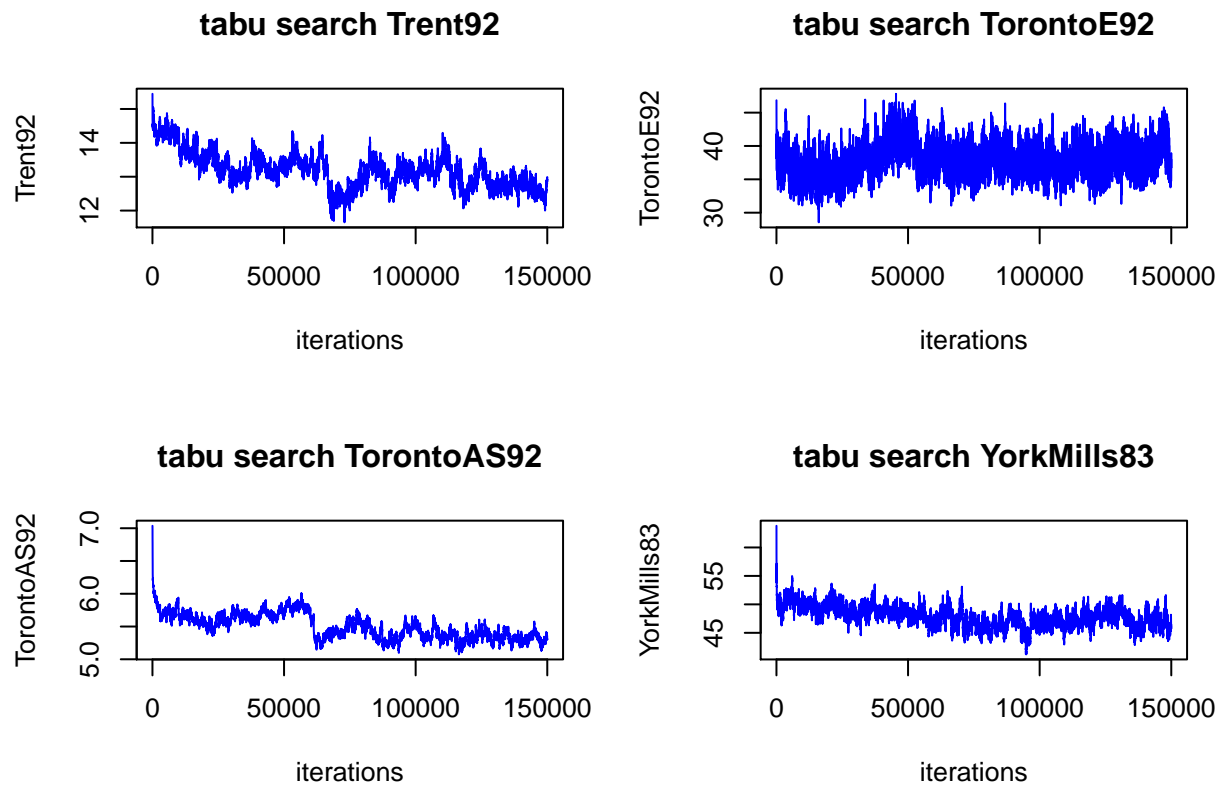


```
plot(t,Data2$KingFahd93,type="l", col="blue", lwd=1, xlab="iterations", ylab="KingFahd93", main="tabu search KingFahd93")
plot(t,Data2$LSE91,type="l", col="blue", lwd=1, xlab="iterations", ylab="LSE91", main="tabu search LSE91")

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



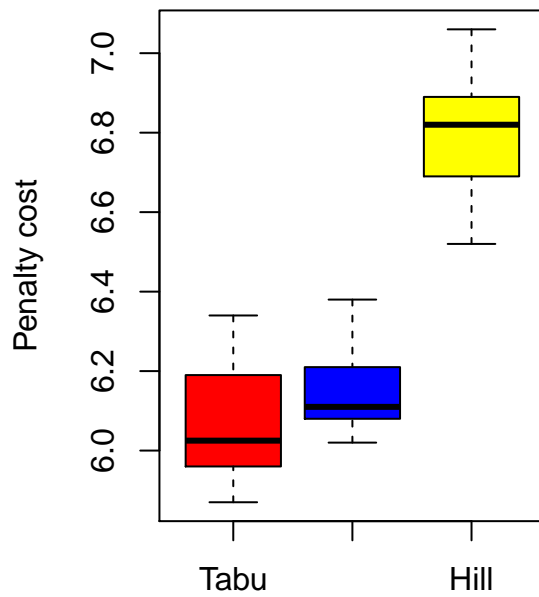
```
plot(t,Data2$Trent9,type="l", col="blue", lwd=1, xlab="iterations", ylab="Trent92", main="tabu search T
plot(t,Data2$TorontoAS92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoAS92", main="tabu
plot(t,Data2$TorontoE92,type="l", col="blue", lwd=1, xlab="iterations", ylab="TorontoE92",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



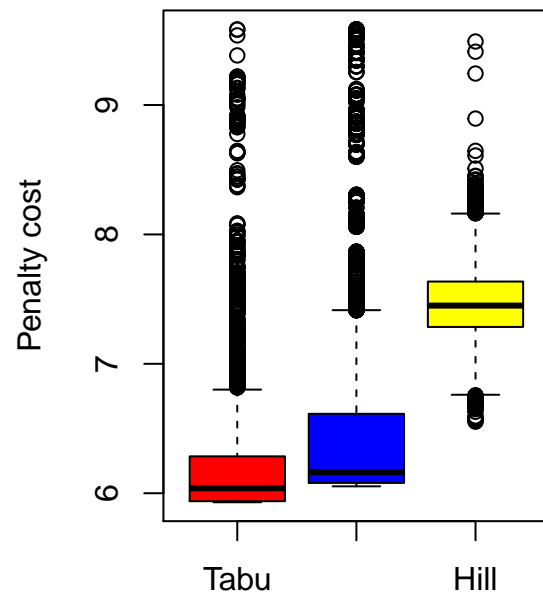
#Boxplots car f.92

```
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
```

Result after 10 runs Carleton92



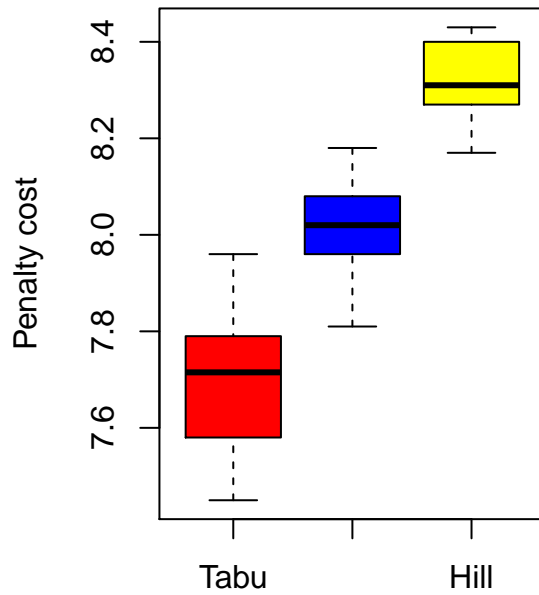
Best Run Carleton92



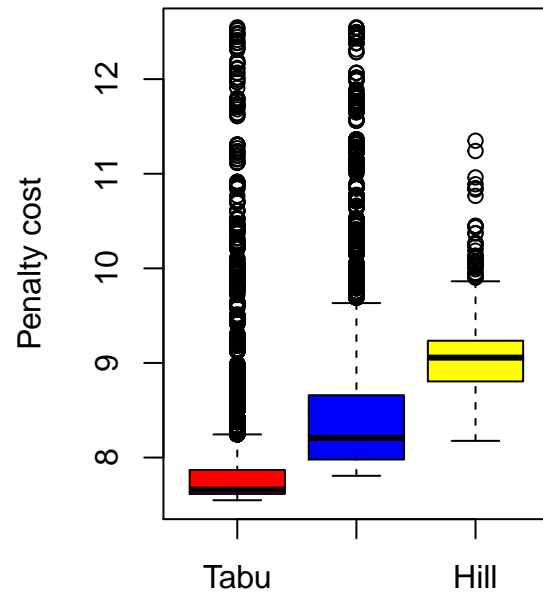
#Boxplots car f.91

```
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
```

Result after 10 runs Carleton91



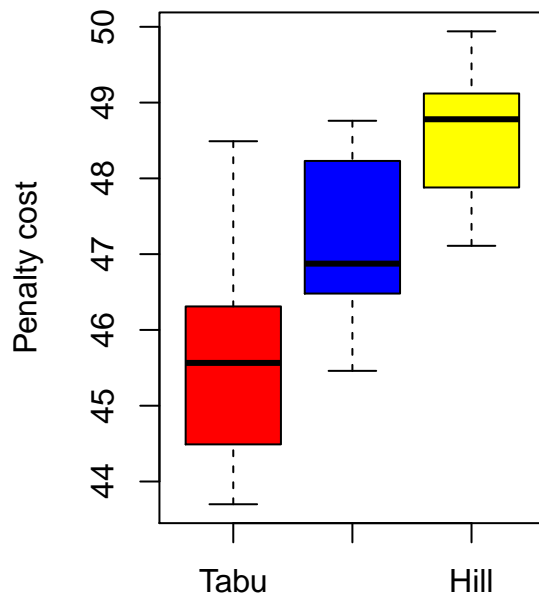
Best Run Carleton91



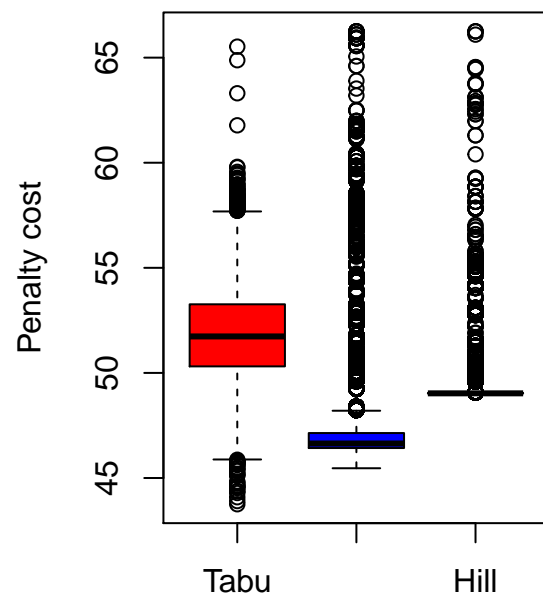
#Boxplots Ear-f-83

```
par(mfcol=c(1,2))
boxplot(Data2$Ear.f.83 ,Data1$Ear.f.83,Data$Ear.f.83 ,names = c("Tabu","Simulated","Hill"),main="Result after 10 runs Ear-f-83")
boxplot(Data2$EarlHaig83,Data1$EarlHaig83,Data$EarlHaig83,names = c("Tabu","Simulated","Hill"),main="Best Run Ear-f-83")
```


Result after 10 runs EarlHaig83



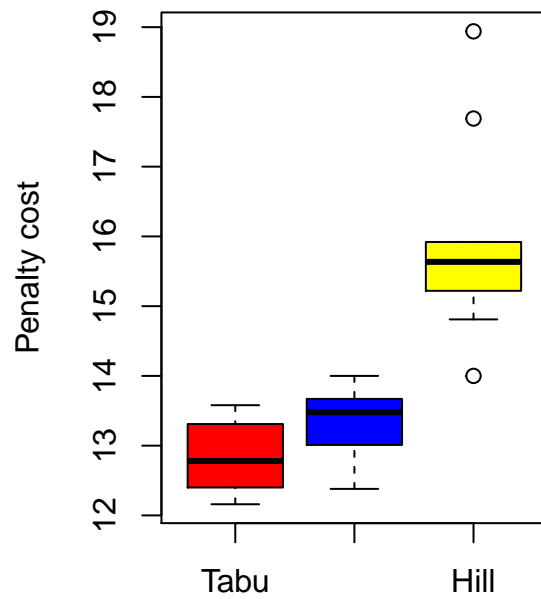
Best Run EarlHaig83



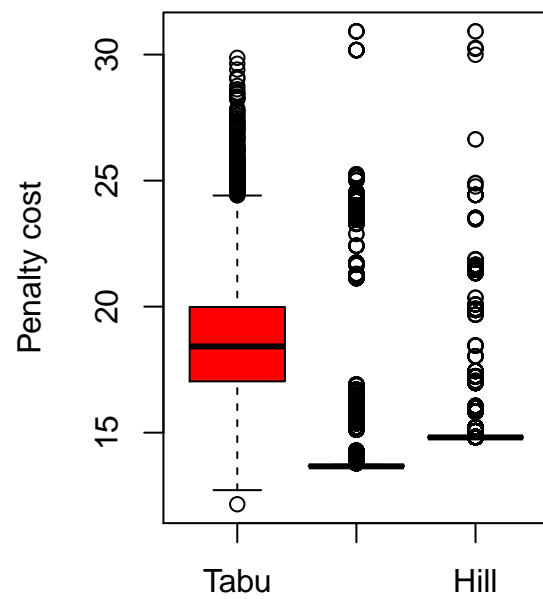
#Boxplots Hec-s-92

```
par(mfcol=c(1,2))
boxplot(Data2$Hec.s.92,Data1$Hec.s.92,Data$Hec.s.92,names = c("Tabu","Simulated","Hill"),main="Result after 10 runs EarlHaig83")
boxplot(Data2$EdHEC92,Data1$EdHEC92,Data$EdHEC92,names = c("Tabu","Simulated","Hill"),main="Best Run EarlHaig83")
```

Result after 10 runs EdHEC92



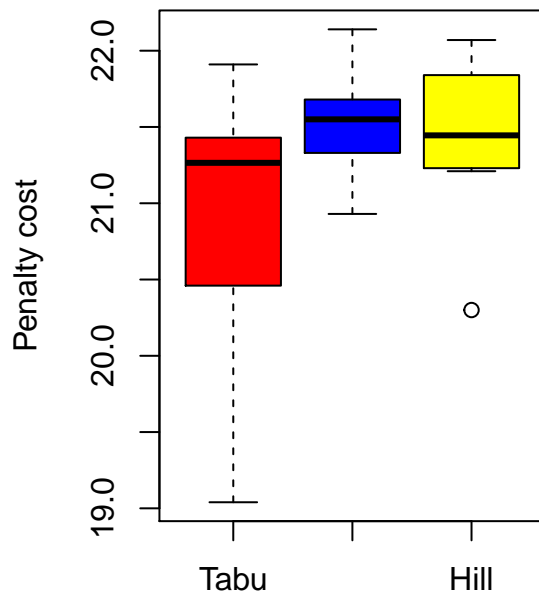
Best Run EdHEC92



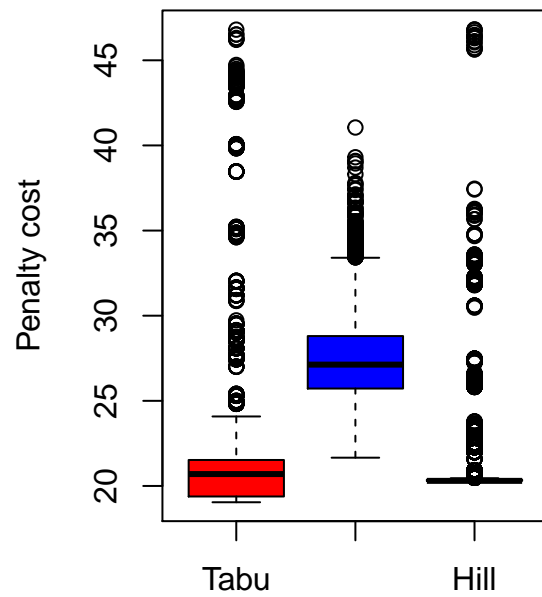
#Boxplots Kfu-s-93

```
par(mfcol=c(1,2))
boxplot(Data1$Kfu.s.93 ,Data2$Kfu.s.93,Data$Kfu.s.93 ,names = c("Tabu", "Simulated", "Hill"),main="Result after 10 runs EdHEC92")
boxplot(Data1$KingFahd93,Data2$KingFahd93,Data$KingFahd93,names = c("Tabu", "Simulated", "Hill"),main="Best Run EdHEC92")
```

Result after 10 runs KingFahd93



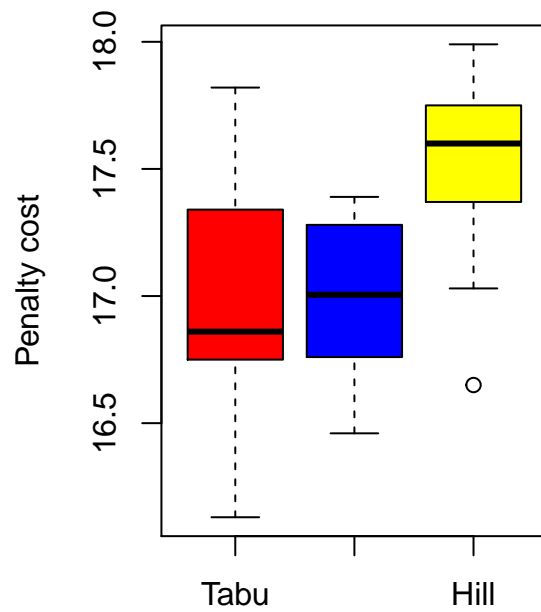
Best Run KingFahd93



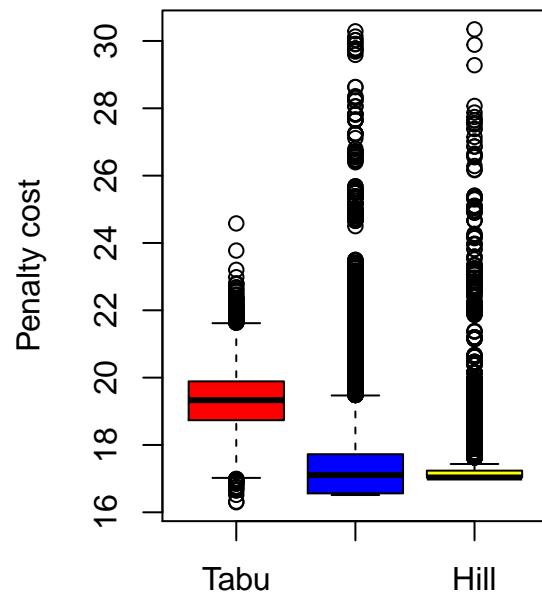
#Boxplots Lse-f-91

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

Result after 10 runs LSE91



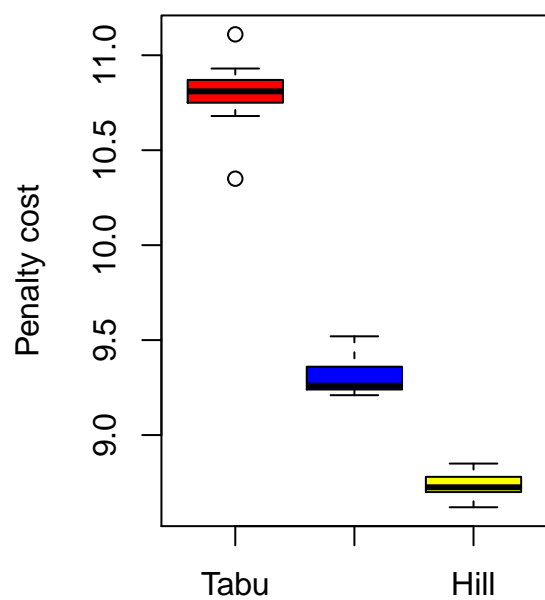
Best Run LSE91



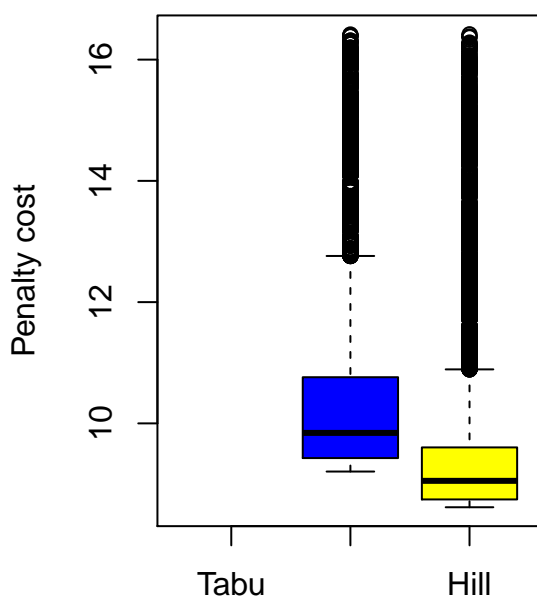
#Boxplots Pur-s-93 NOT SO GOOD

```
par(mfcol=c(1,2))
boxplot(Data2$Pur.s.93,Data1$Pur.s.93,Data$Pur.s.93,names = c("Tabu","Simulated","Hill"),main="Result after 10 runs Pur-s-93")
boxplot(Data2$Pur93,Data1$Pur93,Data$Pur93,names = c("Tabu","Simulated","Hill"),main="Best Run Pur93",col=c("red","blue","yellow"))
```

Result after 10 runs Pur93



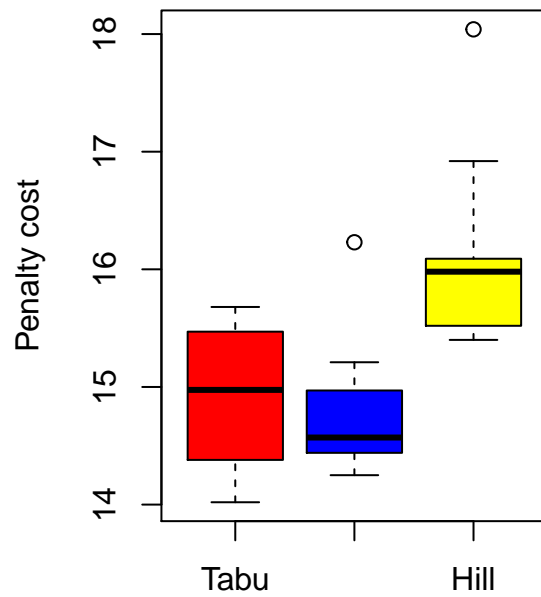
Best Run Pur93



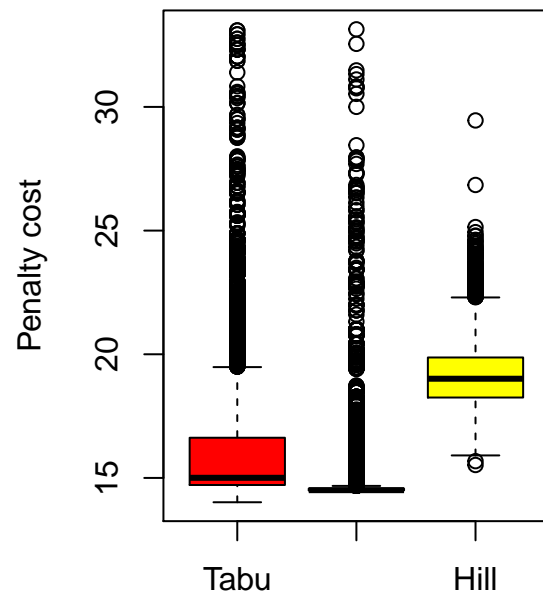
#Boxplots Rye-s-93

```
par(mfcol=c(1,2))
boxplot(Data1$Rye.s.93 ,Data$Rye.s.93 ,Data2$Rye.s.93 ,names = c("Tabu","Simulated","Hill"),main="Result after 10 runs Pur93")
boxplot(Data1$Rye92,Data$Rye92,Data2$Rye92,names = c("Tabu","Simulated","Hill"),main="Best Run Rye92",col=c("red","blue","yellow"))
```

Result after 10 runs Rye92



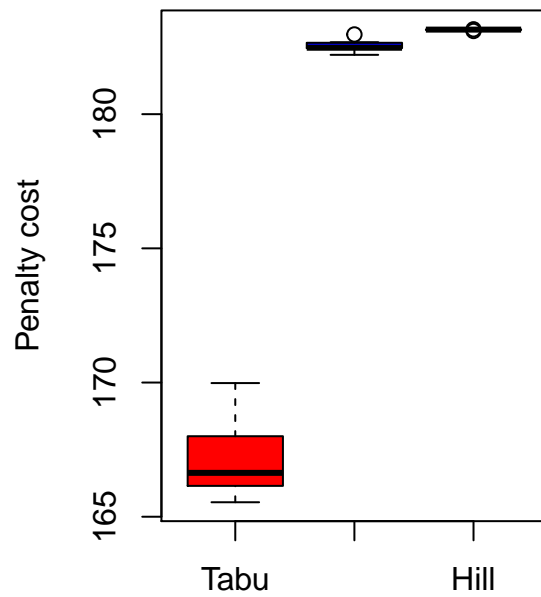
Best Run Rye92



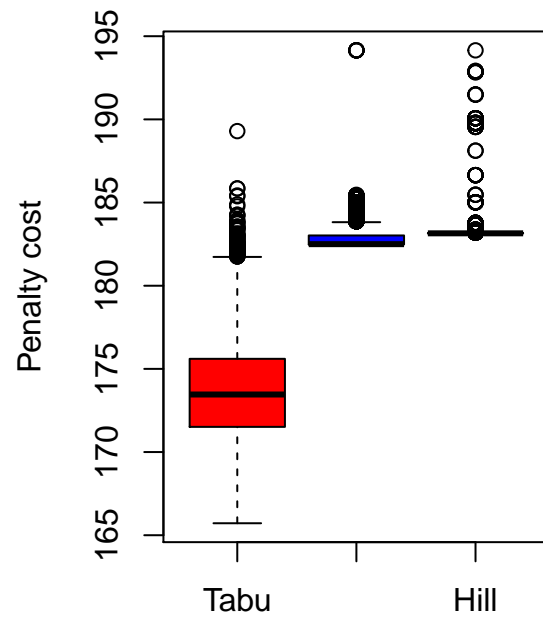
#Boxplots Sta-f-83

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

Result after 10 runs St.Andrews8



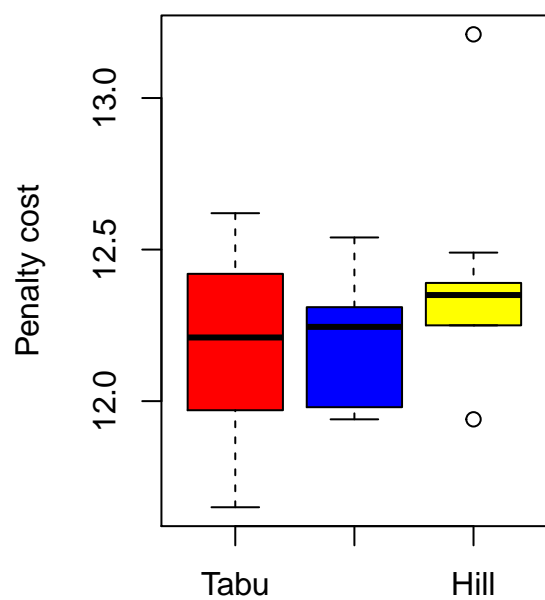
Best Run St.Andrews83



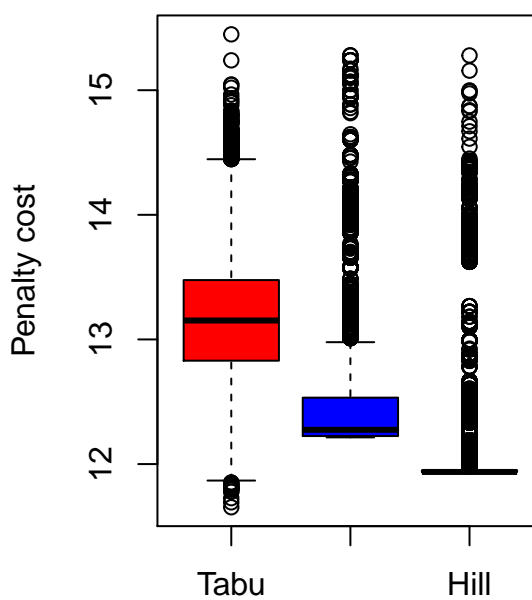
#Boxplots Tre-s-92

```
par(mfcol=c(1,2))
boxplot(Data2$Tre.s.92, Data1$Tre.s.92, Data$Tre.s.92, names = c("Tabu", "Simulated", "Hill"), main="Result after 10 runs St.Andrews8")
boxplot(Data2$Trent92, Data1$Trent92, Data$Trent92, names = c("Tabu", "Simulated", "Hill"), main="Best Run St.Andrews83")
```

Result after 10 runs Trent92



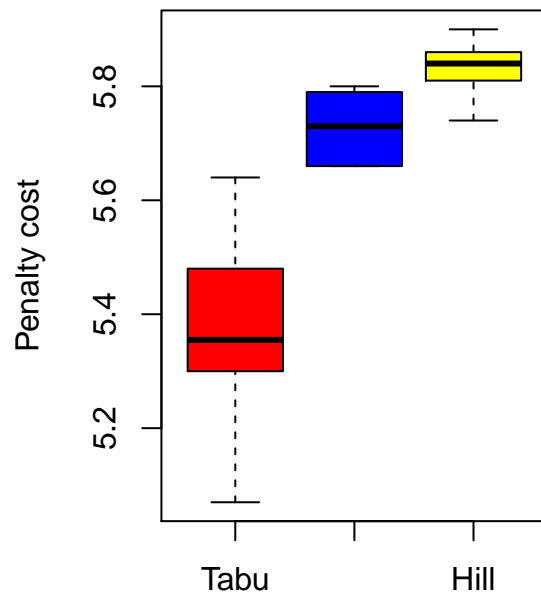
Best Run Trent92



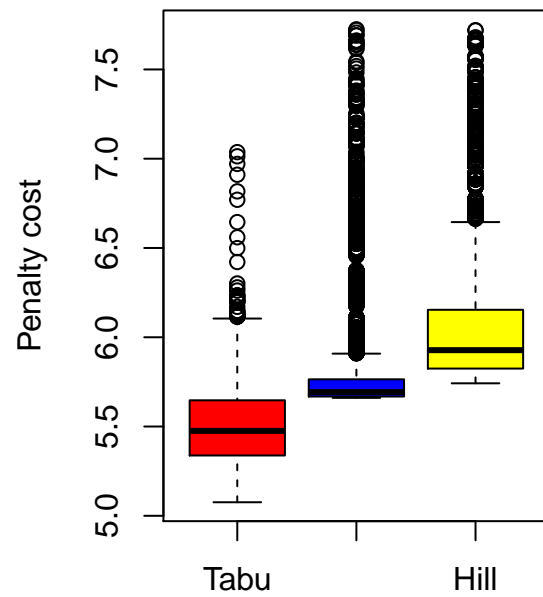
#Boxplots Uta-s-92

```
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=
```


Result after 10 runs TorontoAS9



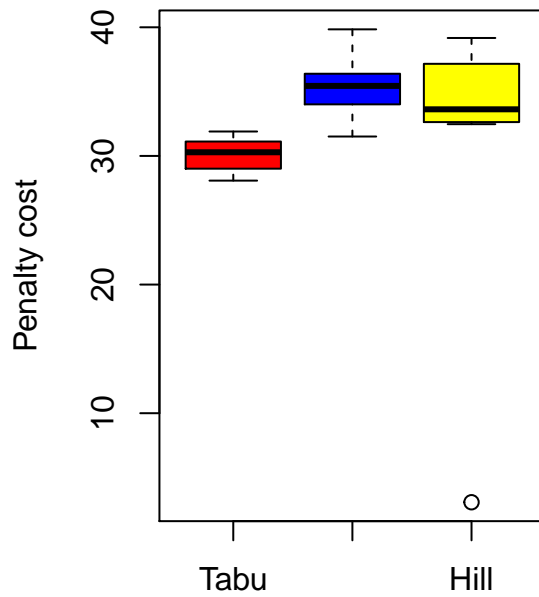
Best Run TorontoAS92



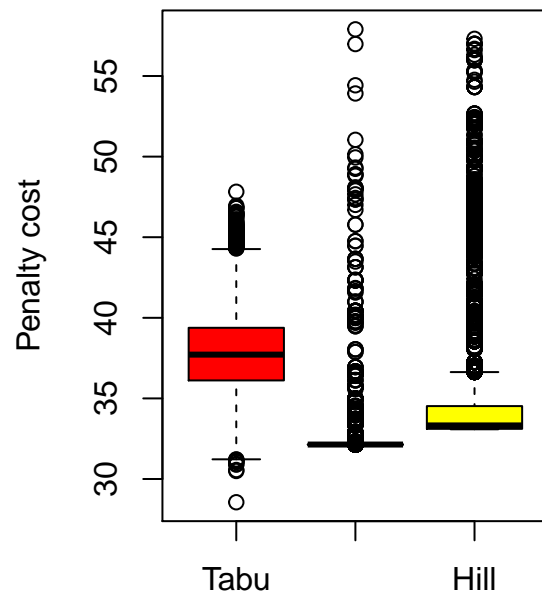
#Boxplots Ute-s-92

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

Result after 10 runs TorontoE92



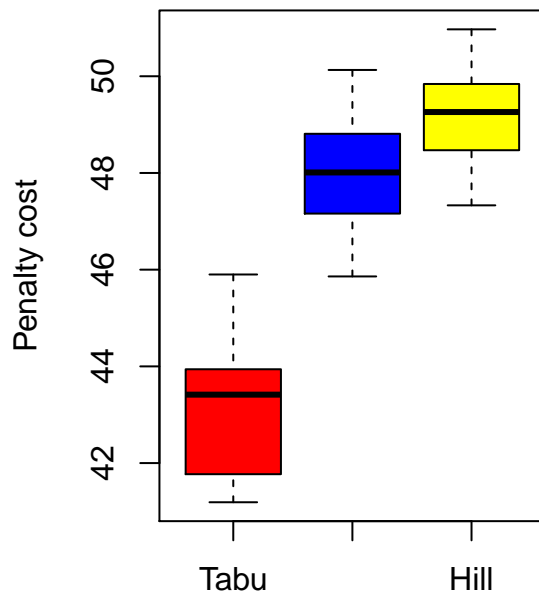
Best Run TorontoE92



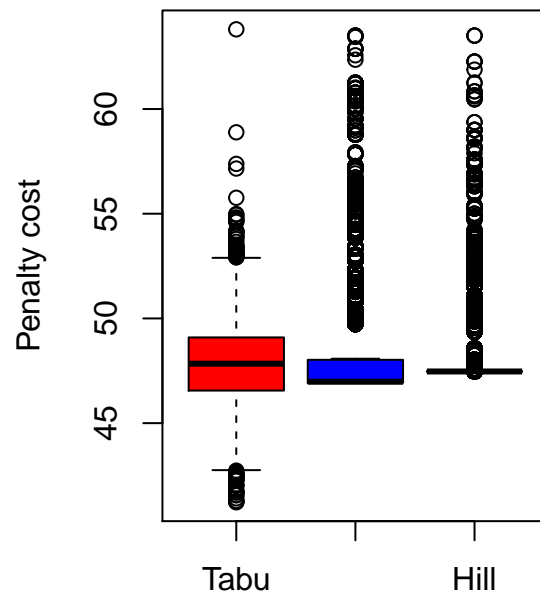
#Boxplots yor-f-83

```
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=
```

Result after 10 runs YorkMills83



Best Run YorkMills83



#DATASET OF YORKMILLS83

```
x<-Data$Iterations
```

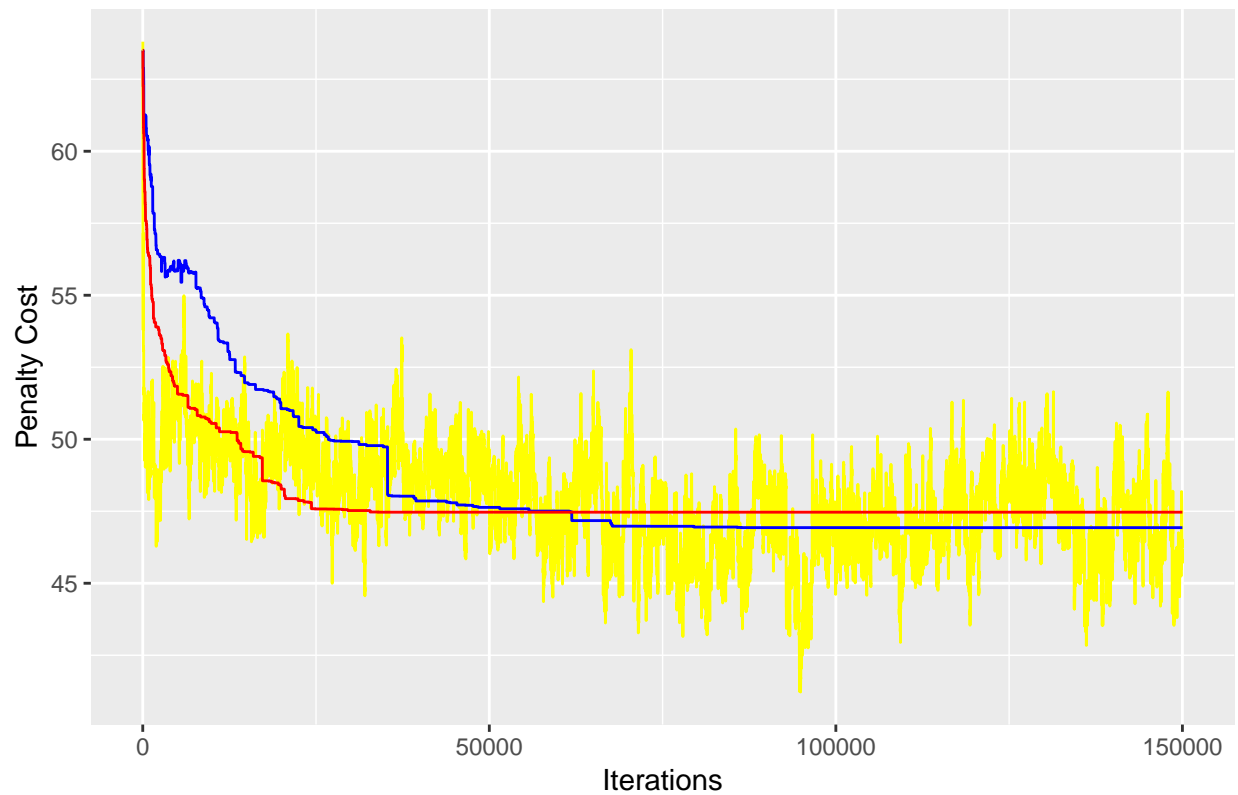
```
y0<- Data$YorkMills83
```

```
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")+geom_line(y=y0,color="red")
```

Results comparison for yorkmills83

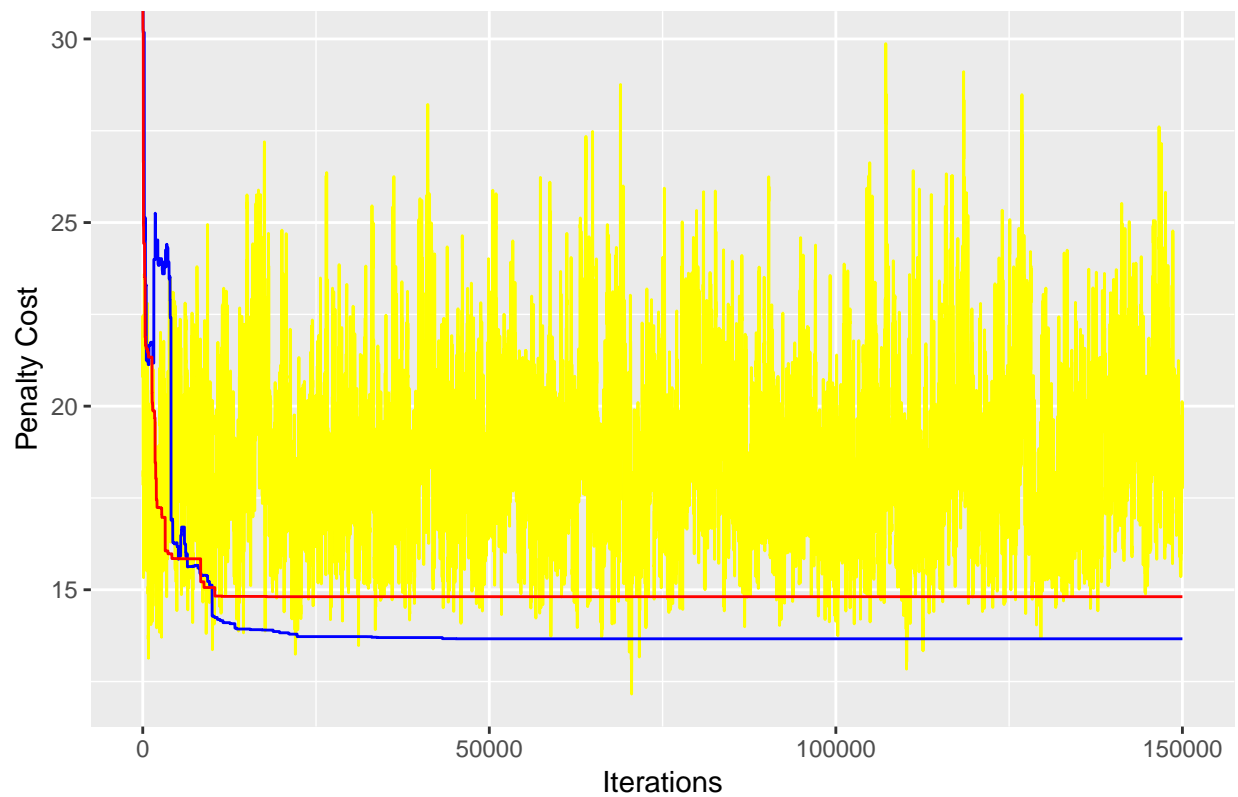


##DATASET OF EDHEC92

```
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")+geom_line(y=y0,color="red")
```

Results comparison for yorkmills83



##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")+geom_line(y=y0,color="red")
```

Results comparison for LSE91

