

Testing [mopsocd](#) (Multi-objective Particle Swarm Optimization with Crowding Distance) and mopsopsa algorithm v.1

Here are results of running mopsocd and mopsopsa_v1 on testing functions.

Load algorithms, test functions and utilities:

```
source('../mopsocd.R')
source('../mopsocds.R')
source('../moea.test.dtlz4.R')
source('../mopsopsa_v1.R')
```

Set number of points to be generated for True Pareto Front:

```
pfpoints <- 10000
```

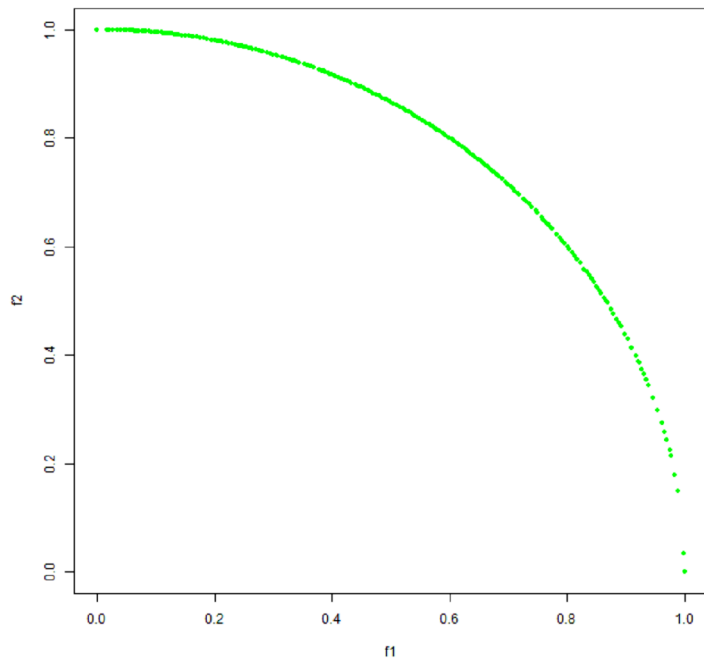
Visualizations of solutions MOPSOCD vs MOPSOPSA_V1

Color conventions: Black = True Pareto front, Green = Nondominated solutions, Red = All stored solutions

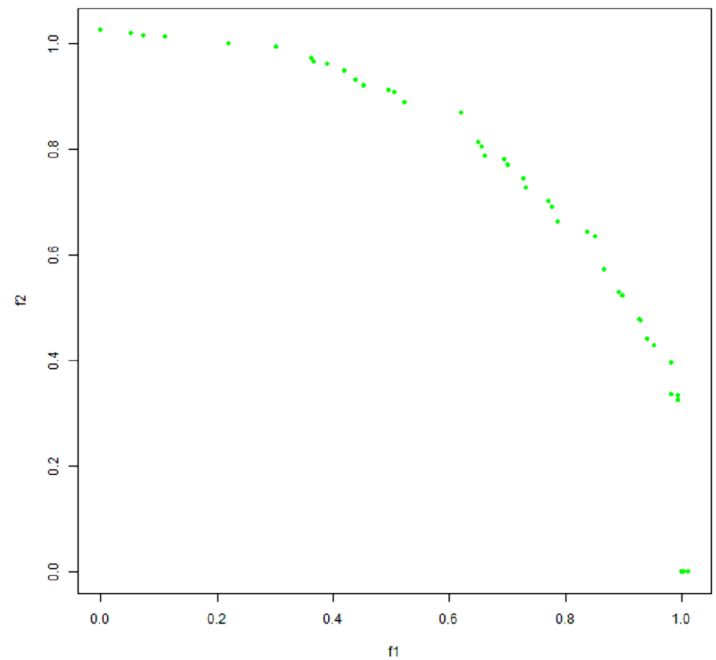
DTLZ4 Test Functions

```
d <- 11
s1 <- mopsocds(dtlz4_2, varcnt=d, fncnt=2, lowerbound=rep(0, d), upperbound=rep(1,d), opt=0)
s2 <- mopsopsa_v1(dtlz4_2, varcnt=d, fncnt=2, lowerbound=rep(0, d), upperbound=rep(1,d), opt=0)
draw_n(s1, s2, dtlz4_2front, pfpoints)
```

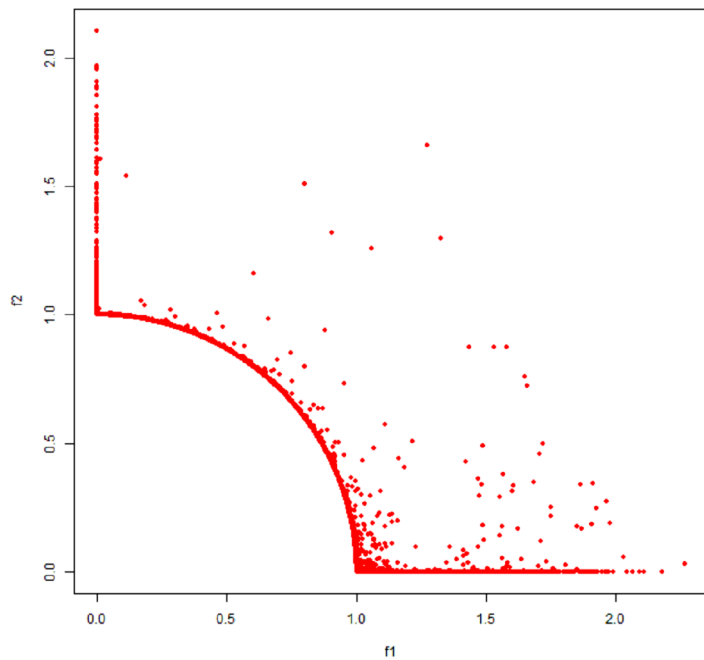
Nondominated solutions



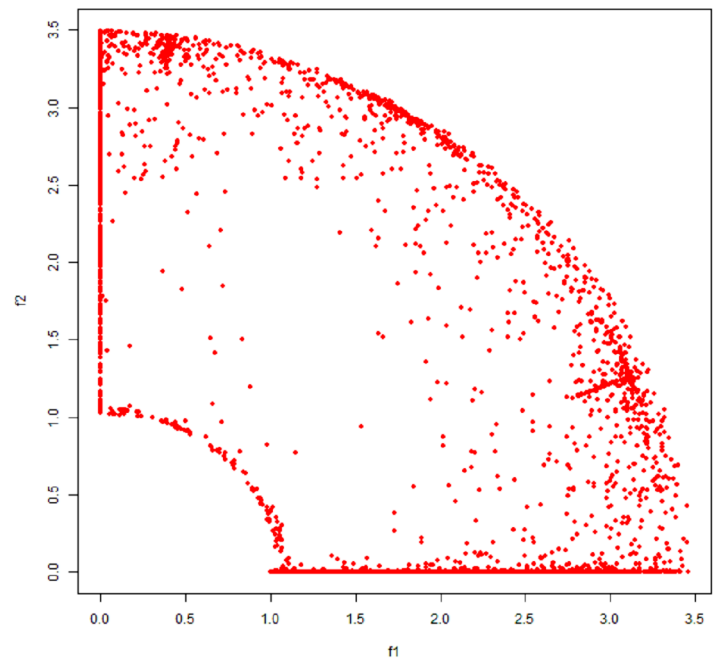
Nondominated solutions



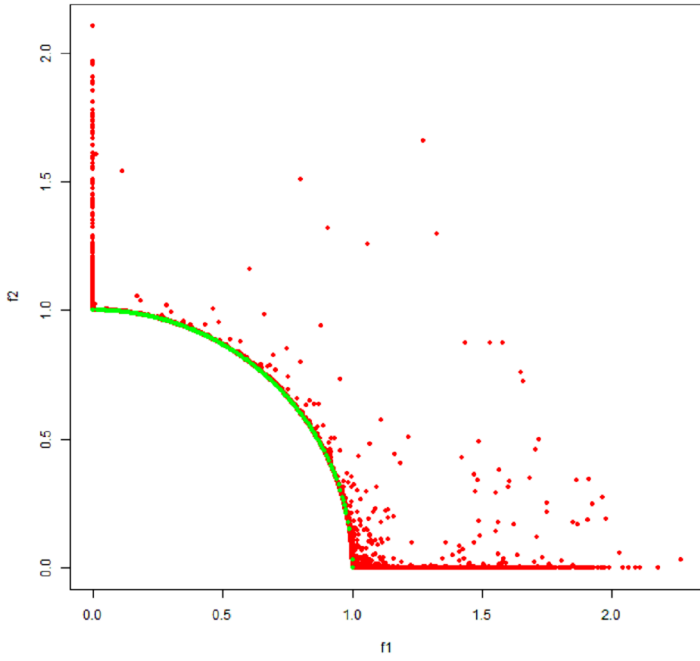
All solutions



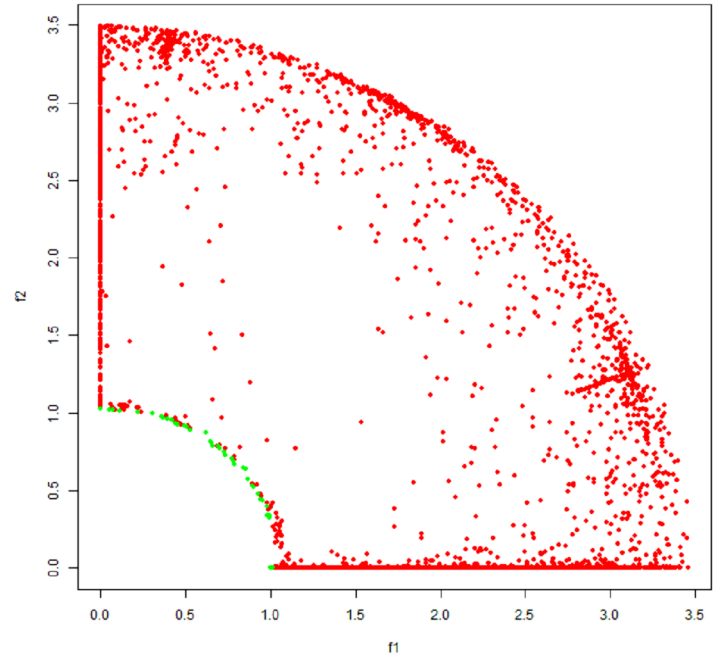
All solutions



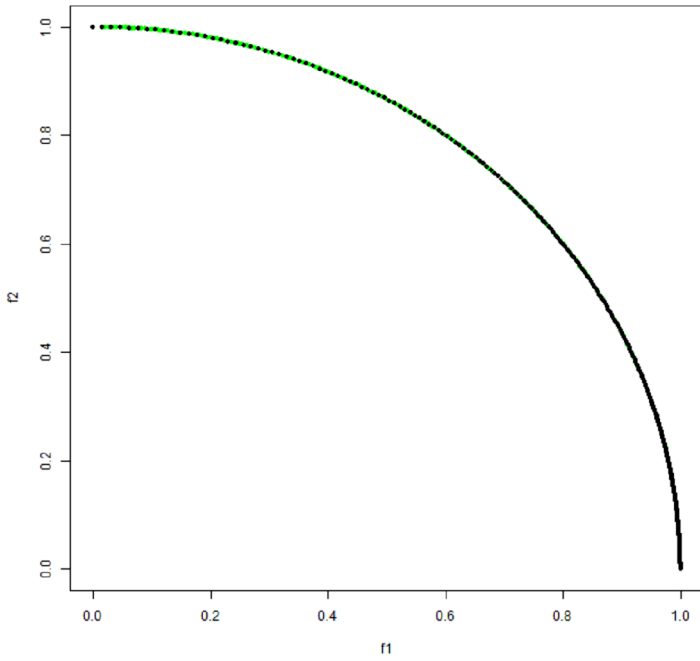
All and nondominated solutions



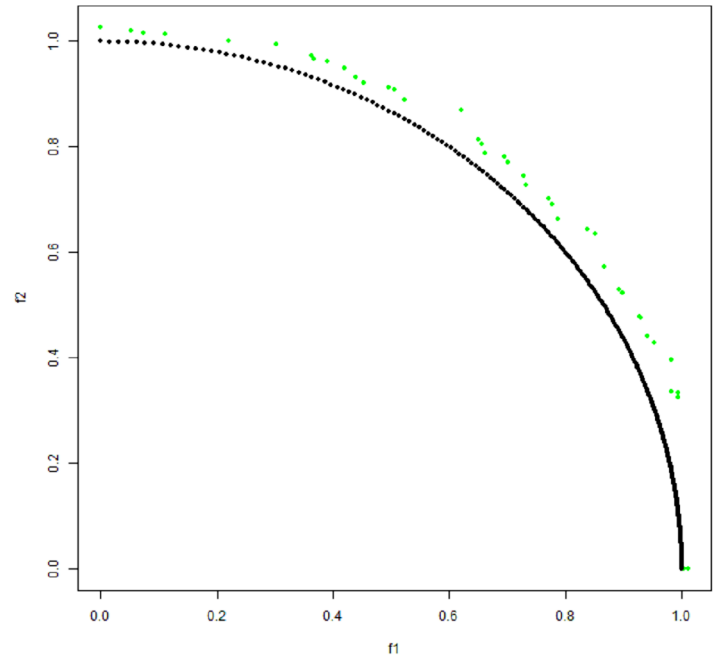
All and nondominated solutions



Nondominated solutions and true Pareto front

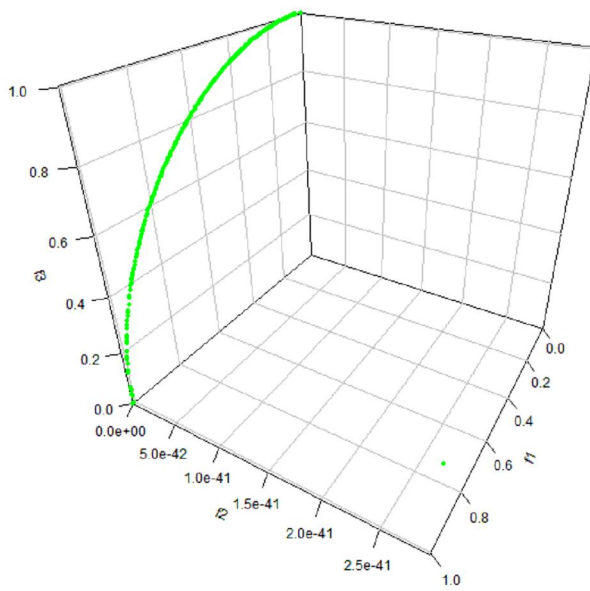


Nondominated solutions and true Pareto front

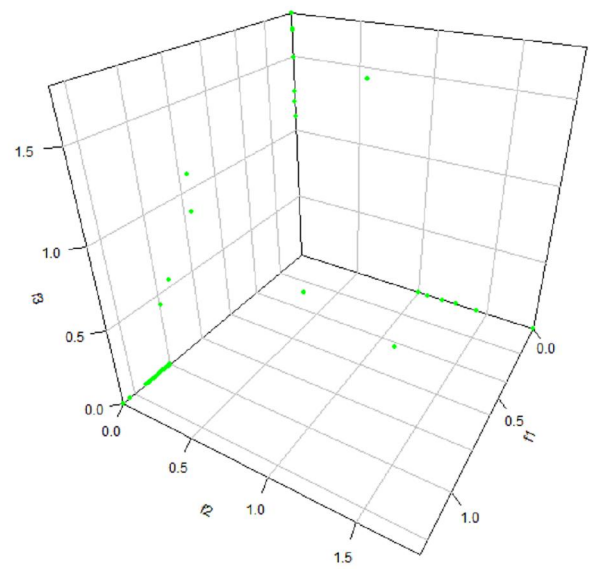


```
d <- 12
s1 <- mopsoods(dtlz4_□, varcnt=d, fncnt=□, lowerbound=rep(0, d), upperbound=rep(1,d), opt=0)
s2 <- mopsoopsa_v1(dtlz4_□, varcnt=d, fncnt=□, lowerbound=rep(0, d), upperbound=rep(1,d), opt=0)
draw_n(s1, s2, dtlz4_□front, pfpaints)
```

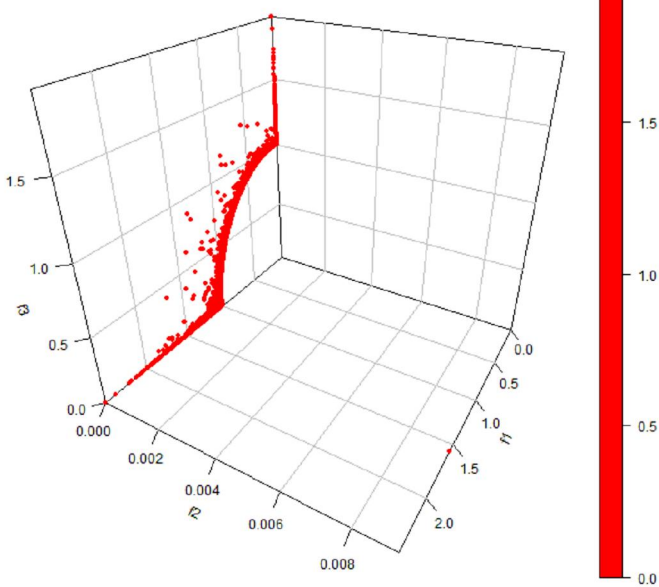
Nondominated solutions



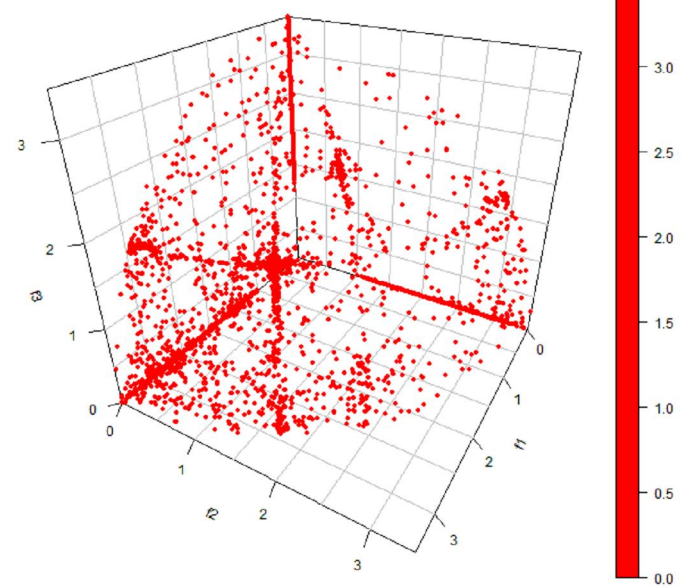
Nondominated solutions



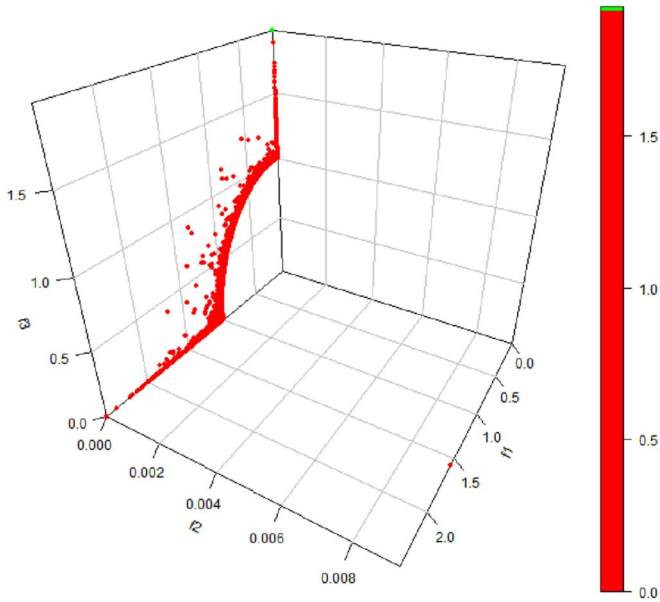
All solutions



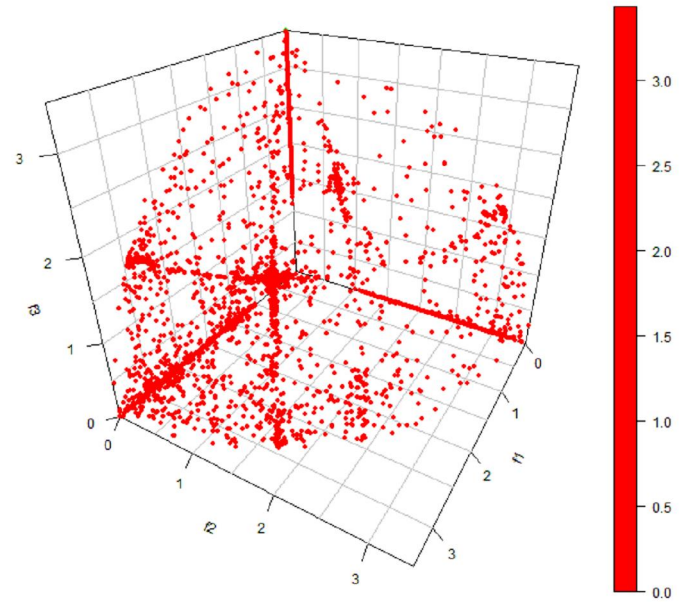
All solutions



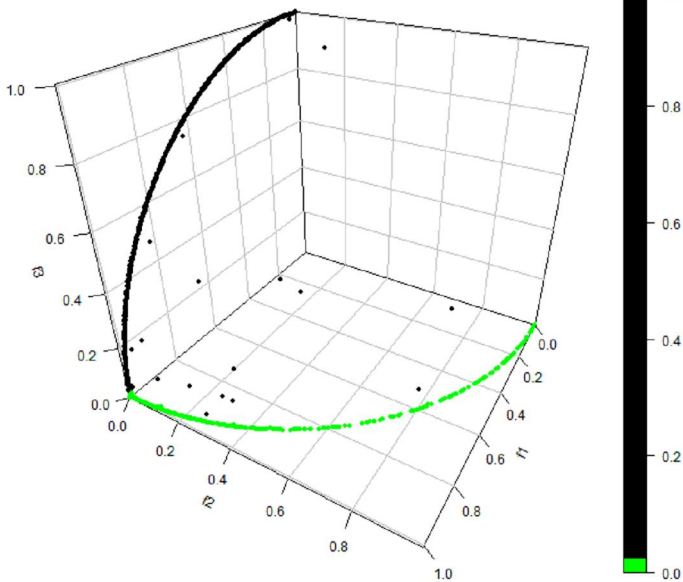
All and nondominated solutions



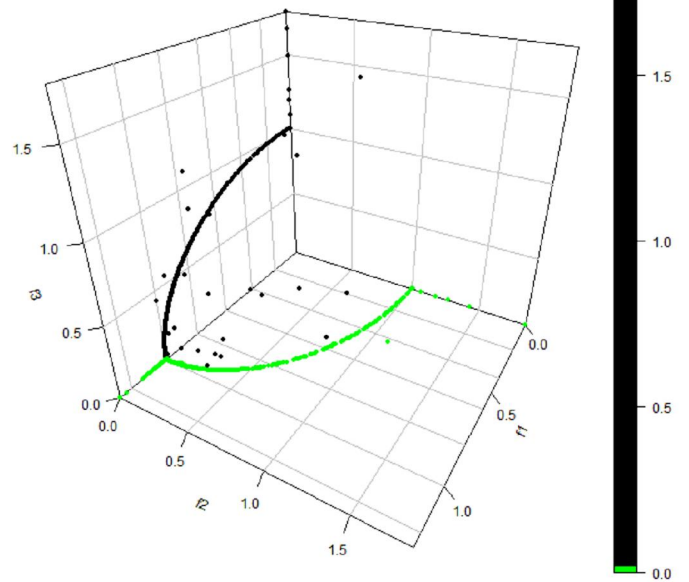
All and nondominated solutions



Nondominated solutions and true Pareto front



Nondominated solutions and true Pareto front



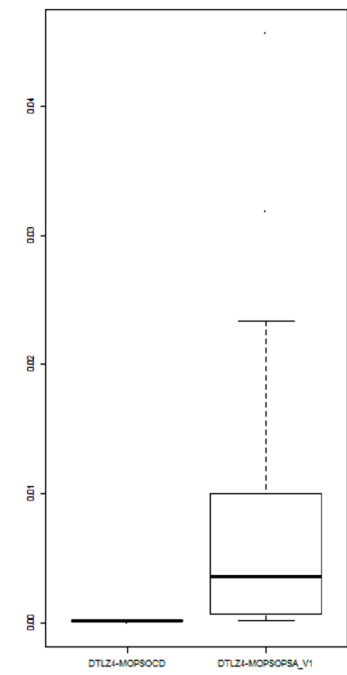
Boplots of results from 20 independent runs of MOPSOCD and MOPSOPSA_V1 on test functions for 2 objectives:

```
n <- 20
ob <- 2
mat <- per_es(n, test_functions2, test_functions_fronts2, ob=2, d=11, pfpoints, al_func=c(mopsocds, mopsopsa_v1))
```

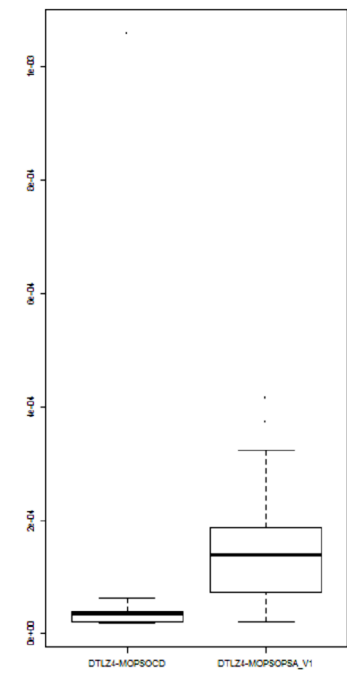
```
## [1] "can't calculate performance measure 1st algorithm found no solutions" ## value assigned"
## [1] "can't calculate performance measure 1st algorithm found no solutions" ## value assigned"
## [1] "can't calculate performance measure 1st algorithm found no solutions" ## value assigned"
## [1] "can't calculate performance measure 1st algorithm found no solutions" ## value assigned"
## [1] "can't calculate performance measure 1st algorithm found no solutions" ## value assigned"
## [1] "can't calculate performance measure 1st algorithm found no solutions" ## value assigned"
## [1] "can't calculate performance measure 1st algorithm found no solutions" ## value assigned"
```

```
titles = c('DTLZ4-MOPSOCD', 'DTLZ4-MOPSOPSA_V1')
per_ops(n, mat, titles)
```

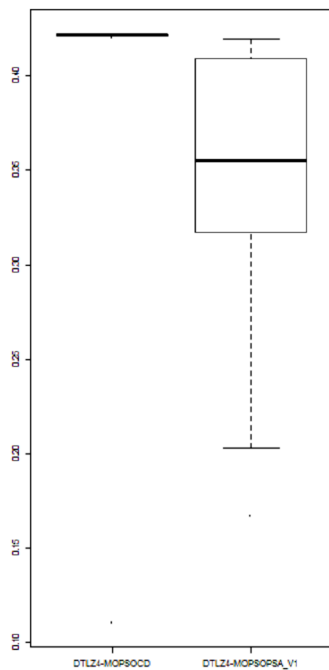
```
## [1] "performance measures on 20 runs"
```



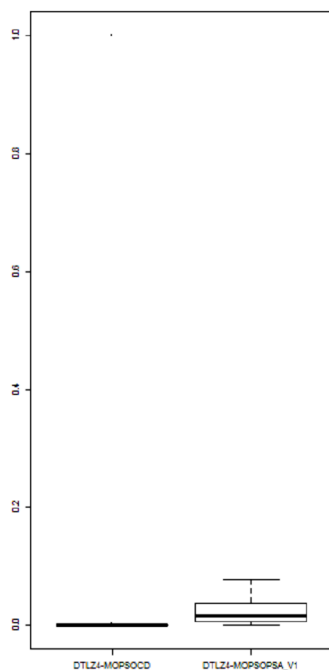
DTLZ4-MOPSOCD DTLZ4-MOPSOBSA_V1 "Box plot performance measures on 20 runs"



DTLZ4-MOPSOCD DTLZ4-MOPSOBSA_V1 "Box plot performance measures on 20 runs"



```
## 010 "00 performance measures on 20 runs"
```



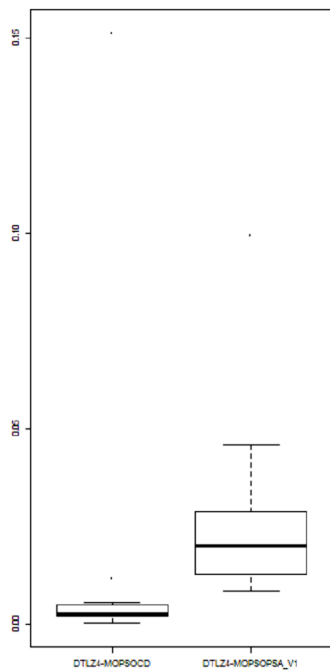
```
mat_2ob <- as.data.frame(mat)
```

```
ob <- 0
mat <- perf_test(n, test_functions, test_functions_fronts, ob=0, d=12, pfpnts, al_func=c(mopsocds, mopsosa_v1))
```

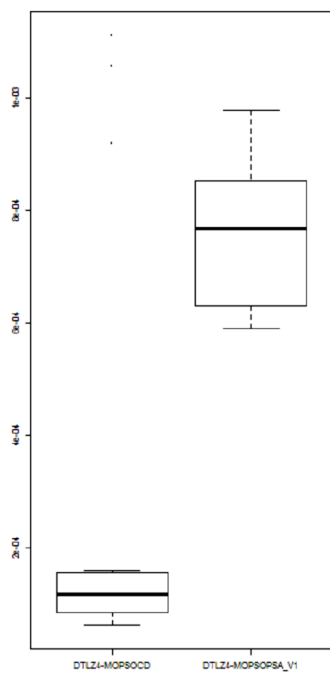
```
## 010 "can't calculate performance measure 1st algorithm found no solutions 00 value assigned"
```

```
titles = c('00004-M000000', '00004-M000000_01')
perf_boxplots(n, mat, titles)
```

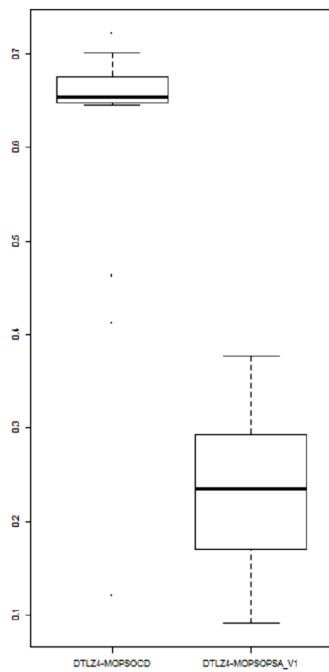
```
## 010 "00 performance measures on 20 runs"
```



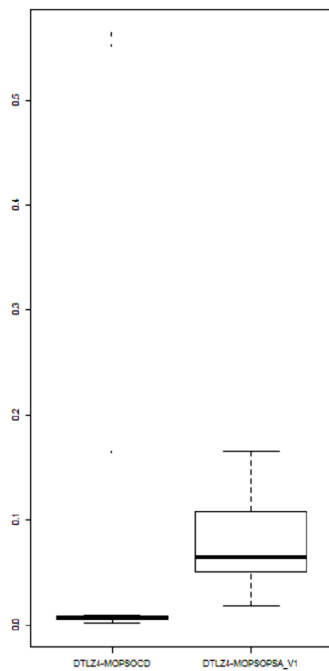
DTLZ4-MOPSOSA_V1 "DTLZ4-MOPSOSA_V1 performance measures on 20 runs"



DTLZ4-MOPSOSA_V1 "DTLZ4-MOPSOSA_V1 performance measures on 20 runs"



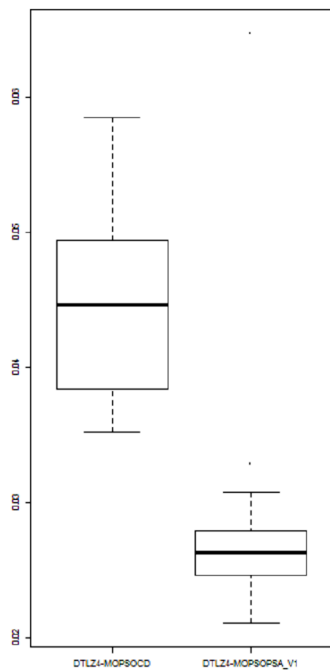
```
## 010 "00 performance measures on 20 runs"
```



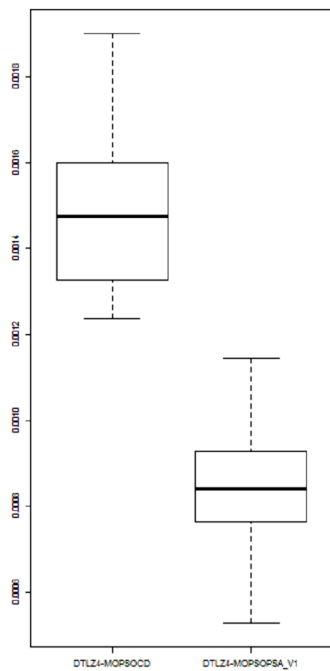
```
mat_0ob <- as.data.frame(mat)
```

```
ob <- 4
mat <- perf_test(n, test_functions4, test_functions_fronts4, ob=4, d=1, pfpoints, al_func=c(mopsocd, mopsopsa_v1))
titles = c('00004-M00000', '00004-M00000_01')
perf_boxplots(n, mat, titles)
```

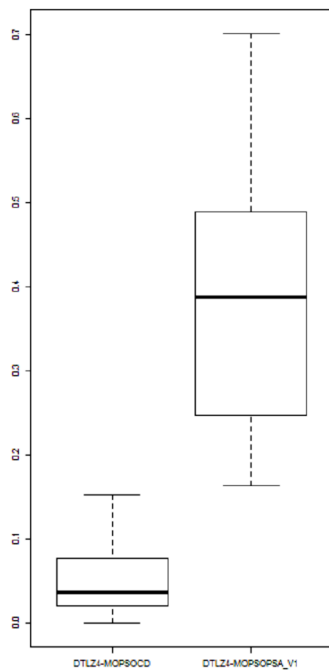
```
## 010 "00 performance measures on 20 runs"
```

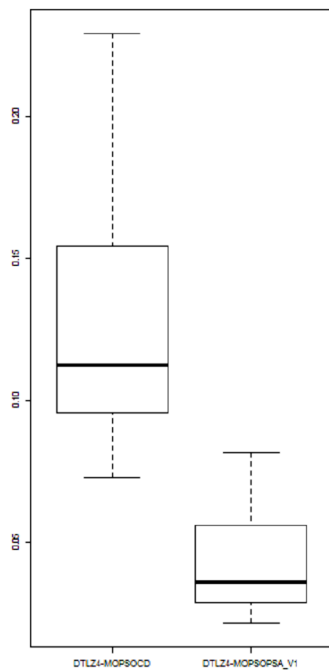
DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "Box plot performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "Box plot performance measures on 20 runs"



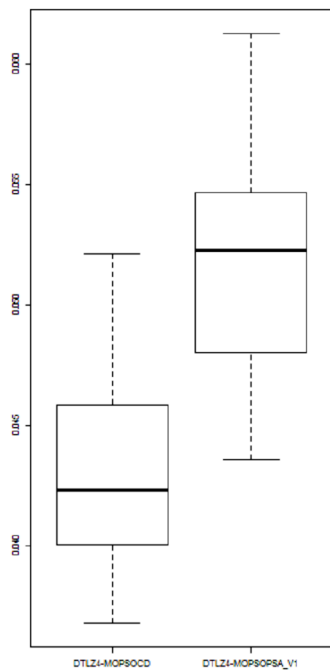
```
## 10 "10 performance measures on 20 runs"
```



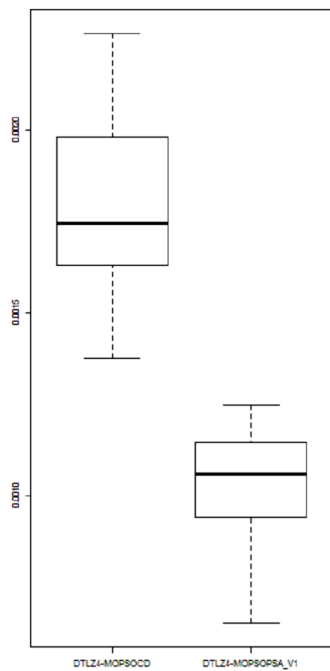
```
mat_4ob <- as.data.frame(mat)
```

```
ob <- 10
mat <- perf_test(n, test_functions, test_functions_fronts, ob=10, d=14, pfpoints, al_func=c(mopsocd, mopsopsa_v1))
titles = c('10-MOPSocD', '10-MOPSopsA_V1')
perf_boxplots(n, mat, titles)
```

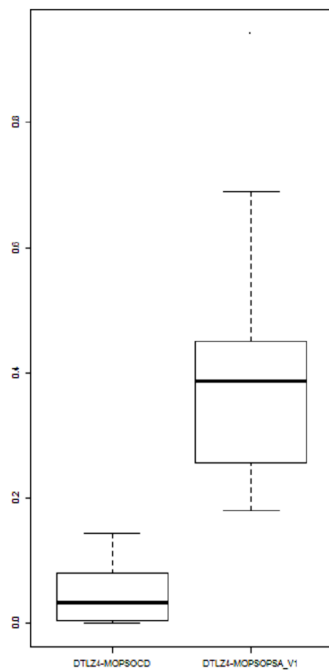
```
## 10 "10 performance measures on 20 runs"
```



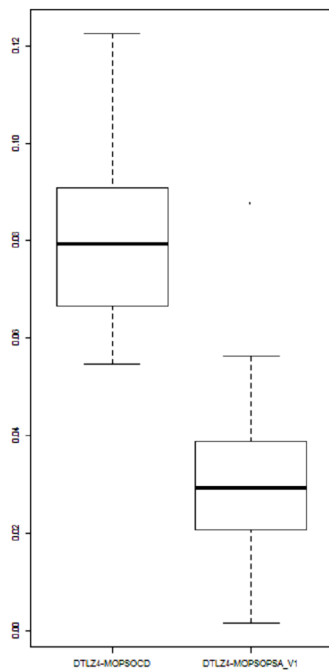
DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "Box plot performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "Box plot performance measures on 20 runs"



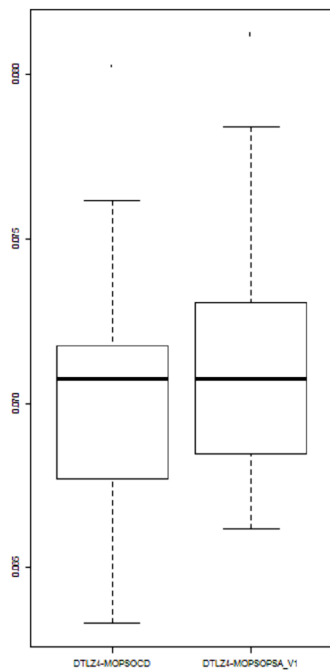
```
## [1] "## performance measures on 20 runs"
```



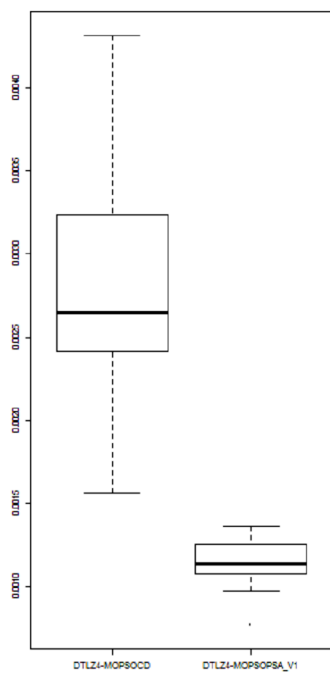
```
mat_obj <- as.data.frame(mat)
```

```
ob <- 
mat <- perf_test(n, test_functions, test_functions_fronts, ob=, d=1, pfpnts, al_func=c(mopsocd, mopsopsa_v1))
titles = c('4-M', '4-M_01')
perf_boxplots(n, mat, titles)
```

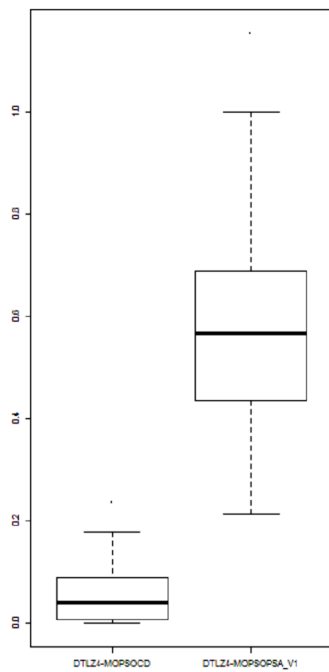
```
## [1] "## performance measures on 20 runs"
```



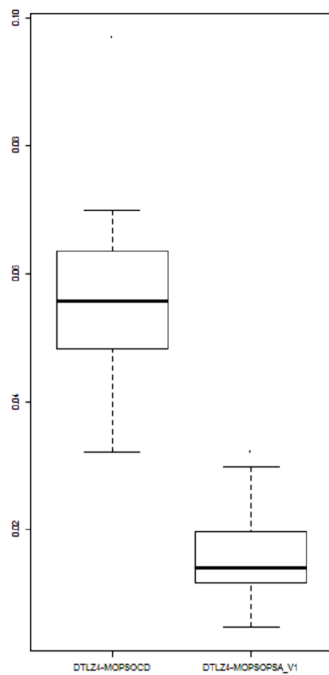
DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "performance measures on 20 runs"



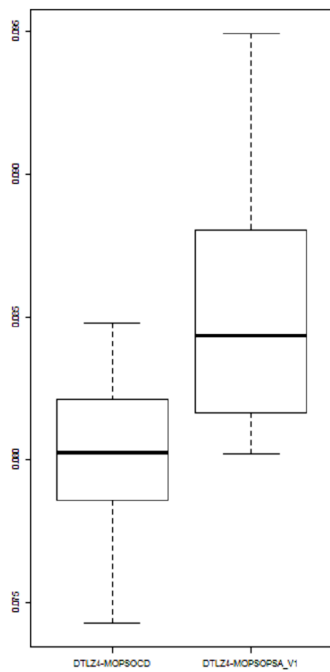
```
## 10 "Performance measures on 20 runs"
```



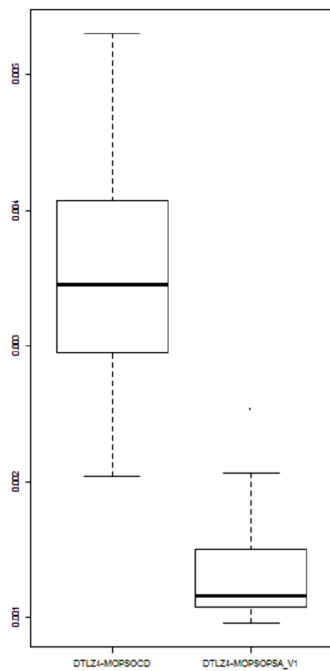
```
mat_obj <- as.data.frame(mat)
```

```
obj <- 
mat <- perf_test(n, test_functions, test_functions_fronts, obj=, d=1, pfpoints, al_func=c(mopsocd, mopsopsa_v1))
titles = c('DTLZ4-MOPSocD', 'DTLZ4-MOPSopsA_V1')
perf_boxplots(n, mat, titles)
```

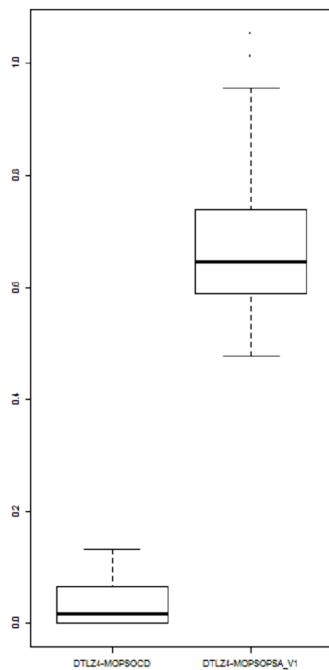
```
## 10 "Performance measures on 20 runs"
```



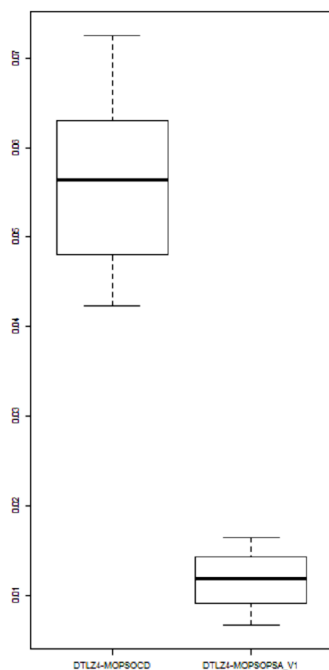
DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "performance measures on 20 runs"



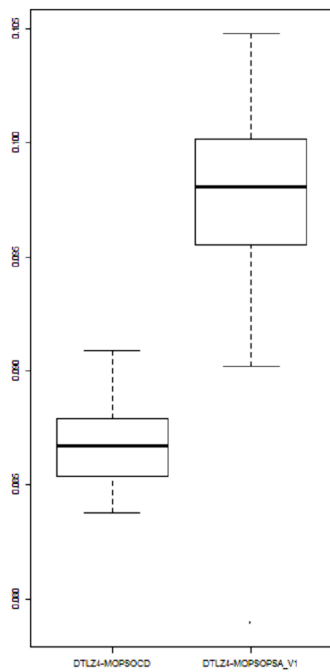
```
## 010 "00 performance measures on 20 runs"
```



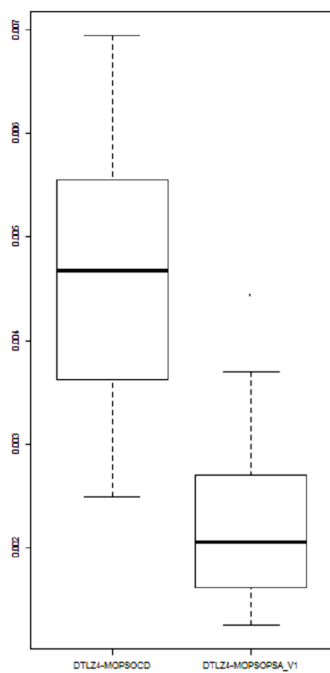
```
mat_0ob <- as.data.frame(mat)
```

```
ob <- 0
mat <- perf_test(n, test_functions_00, test_functions_fronts_00, ob_0=0, d=10, pfpoints, al_0_func=c(mopsocd, mopsopsa_v1))
titles = c('000004-M000000', '000004-M000000_01')
perf_boxplots(n, mat, titles)
```

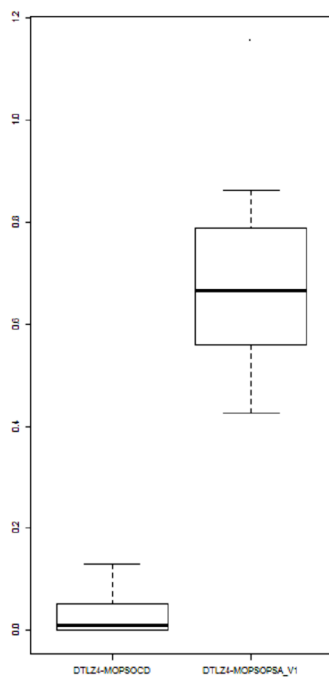
```
## 010 "00 performance measures on 20 runs"
```

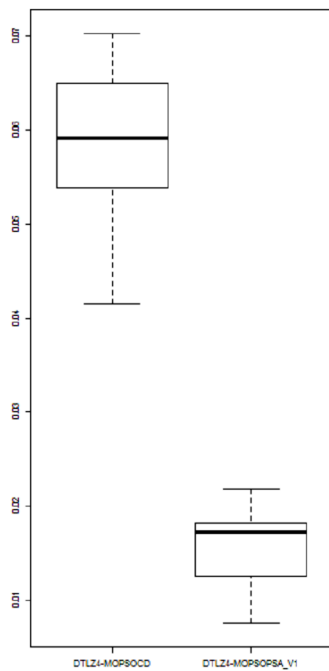
DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "DTLZ4-MOPSOPSA_V1 performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "DTLZ4-MOPSOPSA_V1 performance measures on 20 runs"



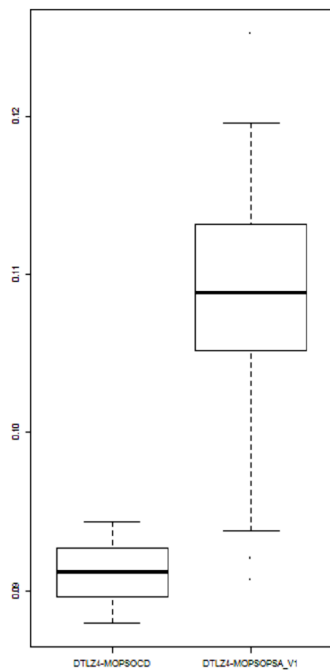
```
## 10 "10 performance measures on 20 runs"
```



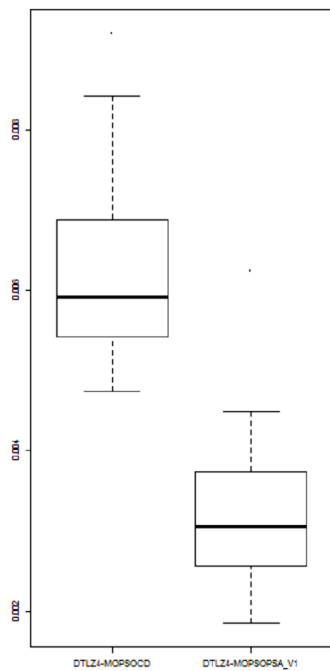
```
mat_obj <- as.data.frame(mat)
```

```
ob <- 10
mat <- perf_test(n, test_functions10, test_functions_fronts10, ob=10, d=1, pfpnts, al_func=c(mopsocd, mopsopsa_v1))
titles = c('DTLZ4-MOPSocD', 'DTLZ4-MOPSopsA_V1')
perf_boxplots(n, mat, titles)
```

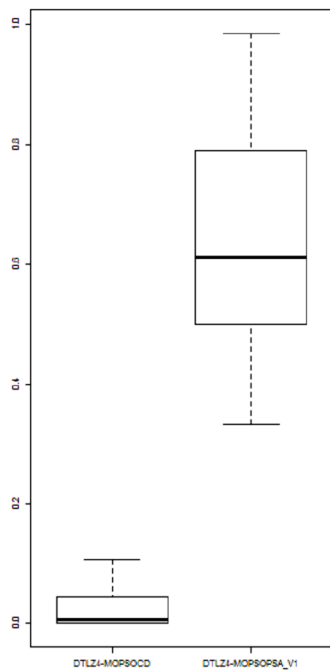
```
## 10 "10 performance measures on 20 runs"
```



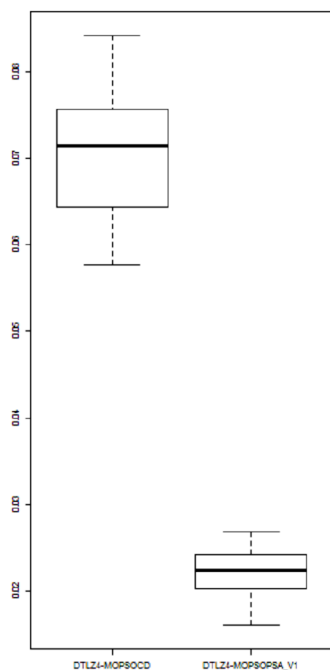
DTLZ4-MOPSOC DTLZ4-MOPSORSA_V1 "Box plot performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSORSA_V1 "Box plot performance measures on 20 runs"



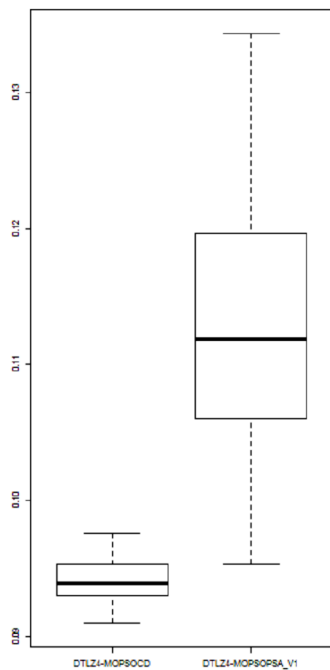
```
## 10 " performance measures on 20 runs"
```



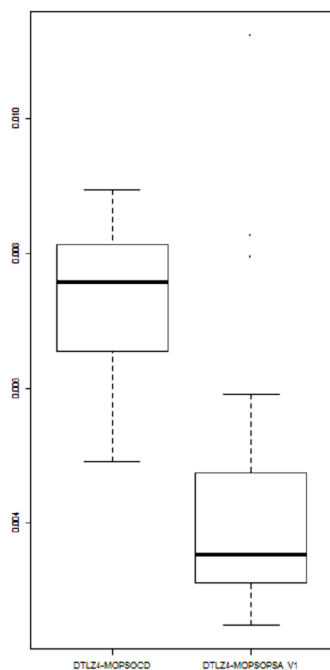
```
mat_10ob <- as.data.frame(mat)
```

```
ob <- 12
mat <- perf_test(n, test_functions12, test_functions_fronts12, ob=12, d=21, pfpoints, al_func=c(mopsocd, mopsopsa_v1))
titles = c('DTLZ4-MOPSocD', 'DTLZ4-MOPSopsA_V1')
perf_boxplots(n, mat, titles)
```

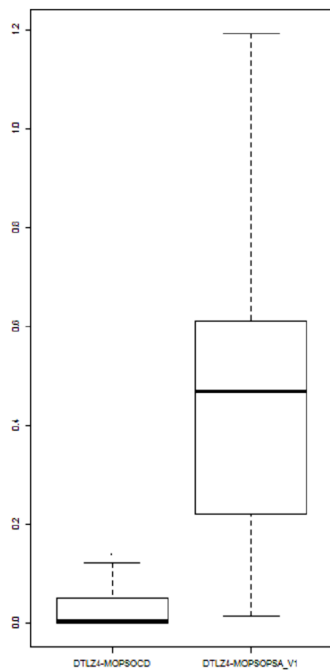
```
## 10 " performance measures on 20 runs"
```



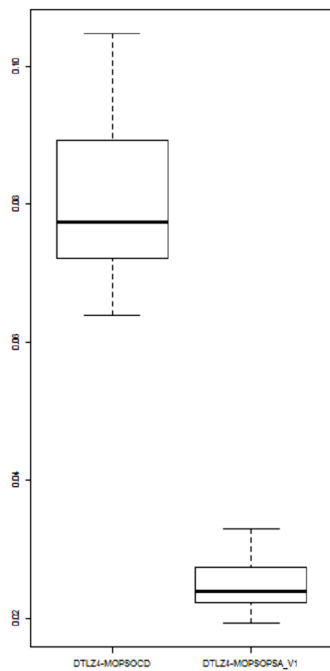
DTLZ4-MOPSOC DTLZ4-MOPSORSA_V1 "Box plot performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSORSA_V1 "Box plot performance measures on 20 runs"



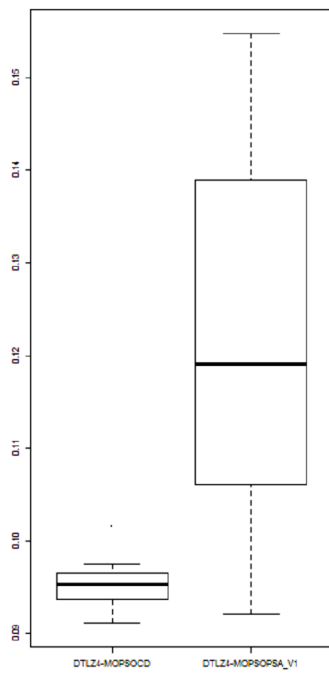
```
## 10 "10 performance measures on 20 runs"
```



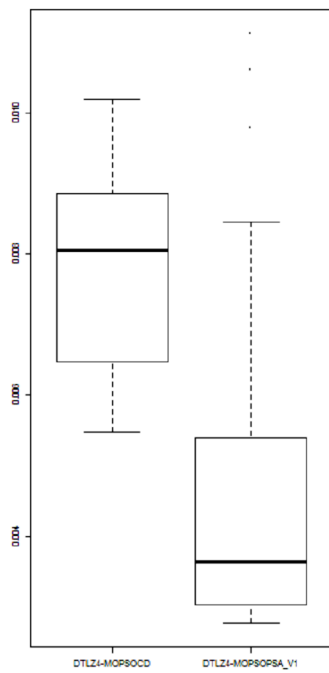
```
mat_12ob <- as.data.frame(mat)
```

```
ob <- 10
mat <- perf_test(n, test_functions10, test_functions_fronts10, ob=10, d=24, pfpnts, al_func=c(mopsocd, mopsopsa_v1))
titles = c('DTLZ4-MOPSOC', 'DTLZ4-MOPSOPSA_V1')
perf_boxplots(n, mat, titles)
```

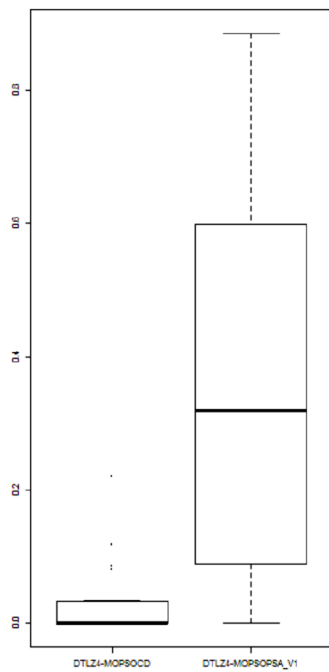
```
## 10 "10 performance measures on 20 runs"
```



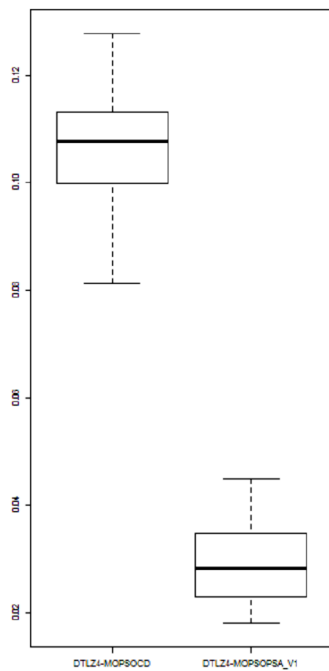
```
11 "Performance measures on 20 runs"
```



```
11 "performance measures on 20 runs"
```



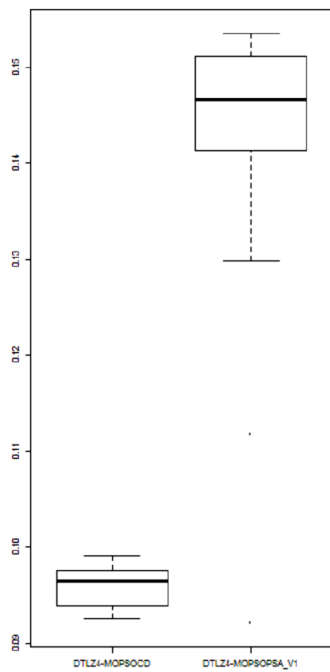
```
## 10 "10 performance measures on 20 runs"
```



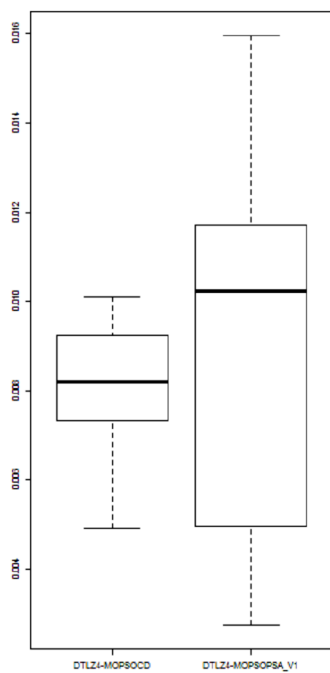
```
mat_10ob <- as.data.frame(mat)
```

```
ob <- 10
mat <- perf_test(n, test_functions10, test_functions_fronts10, ob=10, d=20, pfpnts, al_func=c(mopsocd, mopsopsa_v1))
titles = c('10-4-M', '10-4-M_1')
perf_boxplots(n, mat, titles)
```

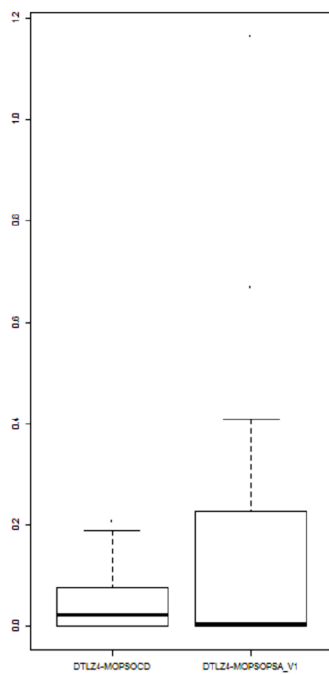
```
## 10 "10 performance measures on 20 runs"
```

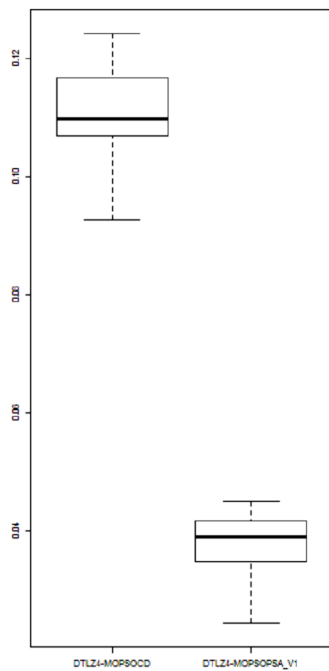
DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "Box plot performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "Box plot performance measures on 20 runs"



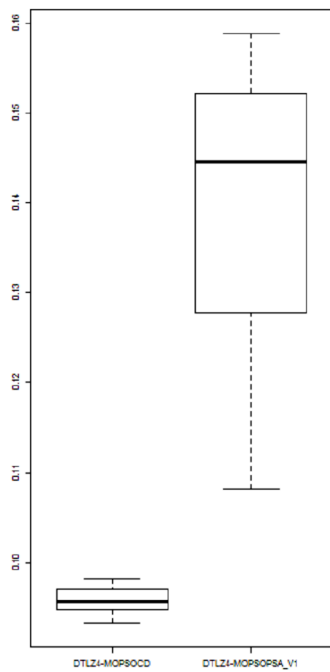
```
## 10 "Performance measures on 20 runs"
```



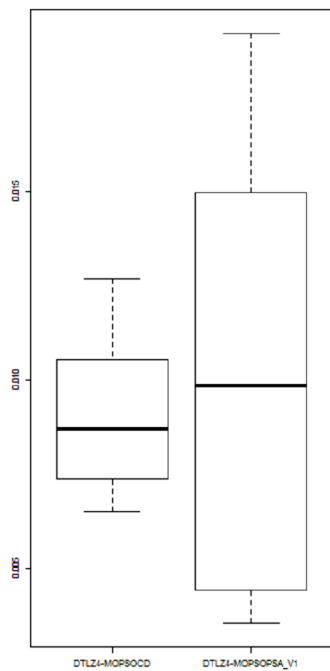
```
mat_10ob <- as.data.frame(mat)
```

```
ob <- 20
mat <- perf_test(n, test_functions20, test_functions_fronts20, ob=20, d=2, pfpnts, al_func=c(mopsocd, mopsopsa_v1))
titles = c('DTLZ4-MOPSOC', 'DTLZ4-MOPSOPSA_V1')
perf_boxplots(n, mat, titles)
```

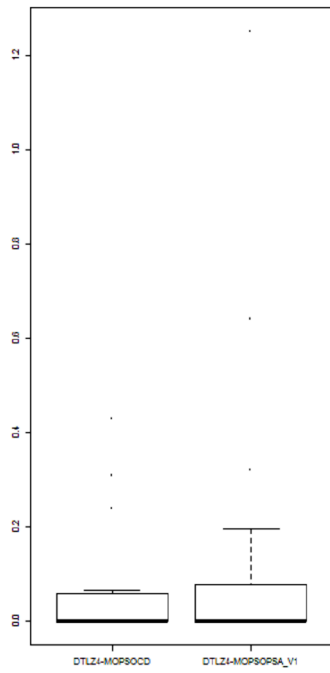
```
## 10 "Performance measures on 20 runs"
```



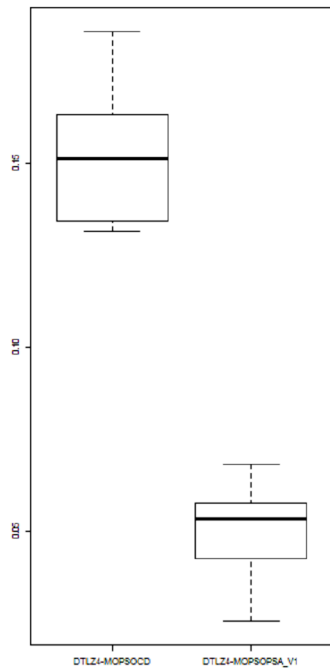
DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "DTLZ4-MOPSOPSA_V1 performance measures on 20 runs"



DTLZ4-MOPSOC DTLZ4-MOPSOPSA_V1 "DTLZ4-MOPSOPSA_V1 performance measures on 20 runs"



```
boxplot("Performance measures on 20 runs")
```



```
mat_20ob <- as.data.frame(mat)
```