

Results

June 18, 2010

1 Tables of Friedman, Bonferroni-Dunn, Holm, Hochberg and Hommel Tests

1

Table 1: Average Rankings of the algorithms

Algorithm	Ranking
DE	3.1842105263157885
CHC	1.8421052631578942
G-CMA-ES	1.81578947368421
VXQR1	3.1578947368421053

Friedman statistic considering reduction performance (distributed according to chi-square with 3 degrees of freedom: 20.5421052631578. Inman and Davenport statistic considering reduction performance (distributed according to F-distribution with 3 and 54 degrees of freedom: 10.142052836725782.

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value $\leq 0.016666666666666666$.

Holm's procedure rejects those hypotheses that have a p-value ≤ 0.05 .

Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.025 .

Hommel's procedure rejects those hypotheses that have a p-value ≤ 0.05 .

Table 2: Holm / Hochberg Table for $\alpha = 0.05$

i	algorithm	$z = (R_0 - R_i) / SE$	p	Holm/Hochberg/Hommel
3	DE	3.2670604846752243	0.0010867046009095658	0.016666666666666666
2	VXQR1	3.204232398431472	0.0013542311595120182	0.025
1	CHC	0.06282808624375452	0.9499034004565577	0.05

Table 3: Holm / Hochberg Table for $\alpha = 0.10$

i	algorithm	$z = (R_0 - R_i) / SE$	p	Holm/Hochberg/Hommel
3	DE	3.2670604846752243	0.0010867046009095658	0.033333333333333333
2	VXQR1	3.204232398431472	0.0013542311595120182	0.05
1	CHC	0.06282808624375452	0.9499034004565577	0.1

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value $\leq 0.033333333333333333$.
 Holm's procedure rejects those hypotheses that have a p-value ≤ 0.1 .
 Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.05 .
 Hommel's procedure rejects those hypotheses that have a p-value ≤ 0.05 .

Table 4: Adjusted p -values

i	algorithm	unadjusted p	p_{Bonf}	p_{Holm}	p_{Hoch}	p_{Hommel}
1	DE	0.0010867046009095658	0.003260113802728697	0.003260113802728697	0.0027084623190240364	0.0021734092018191316
2	VXQR1	0.0013542311595120182	0.0040626934785360546	0.003260113802728697	0.0027084623190240364	0.0027084623190240364
3	CHC	0.9499034004565577	2.8497102013696733	0.9499034004565577	0.9499034004565577	0.9499034004565577

Table 5: Holm / Shaffer Table for $\alpha = 0.05$

i	algorithms	$z = (R_0 - R_i) / SE$	p	Holm	Shaffer
6	DE vs. G-CMA-ES	3.2670604846752243	0.0010867046009095658	0.008333333333333333	0.008333333333333333
5	G-CMA-ES vs. VXQR1	3.204232398431472	0.0013542311595120182	0.01	0.016666666666666666
4	DE vs. CHC	3.2042323984314693	0.0013542311595120314	0.0125	0.016666666666666666
3	CHC vs. VXQR1	3.1414043121877175	0.0016813974144126683	0.016666666666666666	0.016666666666666666
2	CHC vs. G-CMA-ES	0.06282808624375452	0.9499034004565577	0.025	0.025
1	DE vs. VXQR1	0.06282808624375187	0.9499034004565597	0.05	0.05

Nemenyi's procedure rejects those hypotheses that have a p-value $\leq 0.008333333333333333$.

Holm's procedure rejects those hypotheses that have a p-value ≤ 0.025 .
 Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.008333333333333333$.
 Bergmann's procedure rejects these hypotheses:

- DE vs. CHC
- DE vs. G-CMA-ES
- CHC vs. VXQR1
- G-CMA-ES vs. VXQR1

Table 6: Holm / Shaffer Table for $\alpha = 0.10$

i	algorithms	$z = (R_0 - R_i) / SE$	p	Holm	Shaffer
6	DE vs. G-CMA-ES	3.2670504846752243	0.0010867046009095658	0.016666666666666666	0.016666666666666666
5	G-CMA-ES vs. VXQR1	3.204232398431472	0.0013542311595120182	0.016666666666666666	0.033333333333333333
4	DE vs. CHC	3.2042323984314693	0.0013542311595120314	0.025	0.033333333333333333
3	CHC vs. VXQR1	3.1414043121877175	0.0016813974144126683	0.033333333333333333	0.033333333333333333
2	CHC vs. G-CMA-ES	0.06282808624375452	0.9499034004565577	0.05	0.05
1	DE vs. VXQR1	0.06282808624375187	0.9499034004565597	0.1	0.1

Nemenyi's procedure rejects those hypotheses that have a p-value $\leq 0.008333333333333333$.
 Holm's procedure rejects those hypotheses that have a p-value ≤ 0.05 .
 Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.016666666666666666$.
 Bergmann's procedure rejects these hypotheses:

- DE vs. CHC
- DE vs. G-CMA-ES
- CHC vs. VXQR1
- G-CMA-ES vs. VXQR1

Table 7: Adjusted p -values

i	hypothesis	unadjusted p	p_{Nermc}	$p_{H olm}$	p_{Shaf}	p_{Berg}
1	DE vs .G-CMA-ES	0.0010867046009095658	0.006520227605457394	0.006520227605457394	0.006520227605457394	0.006520227605457394
2	G-CMA-ES vs .VXQR1	0.0013542311595120182	0.008125386957072109	0.006771155797560091	0.006520227605457394	0.006520227605457394
3	DE vs .CHC	0.0013542311595120314	0.008125386957072189	0.006771155797560091	0.006520227605457394	0.006520227605457394
4	CHC vs .VXQR1	0.0016813974144126683	0.01008838448647601	0.006771155797560091	0.006520227605457394	0.006520227605457394
5	CHC vs .G-CMA-ES	0.9499034004565577	5.699420402739347	1.8998068009131155	1.8998068009131155	1.8998068009131155
6	DE vs .VXQR1	0.9499034004565597	5.699420402739358	1.8998068009131155	1.8998068009131155	1.8998068009131155