# Tests

January 30, 2018

## 1 Tables

Table 1: Winners in *benchmark* UF

| Algorithm | HV | IGD | $\epsilon$ |
|---|---|---|---|
| MOEADDRA | 6 | 8 | 8 |
| NSGAII | 2 | 2 | 2 |
| IBEA | 2 | 0 | 0 |

Table 2: Mean and Standard Deviation

| | MOEADDRA | NSGAII | IBEA |
|---|---|---|---|
| | **HV** | | |
| UF1 | $0.63521_{0.6352}$ | $0.54546_{0.5455}$ | $0.53134_{0.5313}$ |
| UF2 | $0.64695_{0.6469}$ | $0.63528_{0.6353}$ | $0.62329_{0.6233}$ |
| UF3 | $0.50272_{0.5027}$ | $0.45859_{0.4586}$ | $0.3519_{0.3519}$ |
| UF4 | $0.27773_{0.2777}$ | $0.27248_{0.2725}$ | $0.26143_{0.2614}$ |
| UF5 | $0.00355_{0.0036}$ | $0.22558_{0.2256}$ | $0.15014_{0.1501}$ |
| UF6 | $0.06903_{0.069}$ | $0.26246_{0.2625}$ | $0.21387_{0.2139}$ |
| UF7 | $0.47185_{0.4718}$ | $0.43335_{0.4333}$ | $0.30412_{0.3041}$ |
| UF8 | $0.22624_{0.2262}$ | $0.15183_{0.1518}$ | $0.20503_{0.205}$ |
| UF9 | $0.59501_{0.595}$ | $0.55818_{0.5582}$ | $0.54771_{0.5477}$ |
| UF10 | $0.00886_{0.0089}$ | $0.01476_{0.0148}$ | $0.05438_{0.0544}$ |
| | **EP** | | |
| UF1 | $0.06601_{0.066}$ | $0.17137_{0.1714}$ | $0.20745_{0.2074}$ |
| UF2 | $0.06956_{0.0696}$ | $0.0854_{0.0854}$ | $0.13763_{0.1376}$ |
| UF3 | $0.22293_{0.2229}$ | $0.33182_{0.3318}$ | $0.50245_{0.5024}$ |
| UF4 | $0.03274_{0.0327}$ | $0.04251_{0.0425}$ | $0.07558_{0.0756}$ |
| UF5 | $0.49588_{0.4959}$ | $0.33798_{0.338}$ | $0.62591_{0.6259}$ |
| UF6 | $0.42806_{0.4281}$ | $0.33079_{0.3308}$ | $0.54229_{0.5423}$ |
| UF7 | $0.08982_{0.0898}$ | $0.18338_{0.1834}$ | $0.50492_{0.5049}$ |
| UF8 | $0.27084_{0.2708}$ | $0.71276_{0.7128}$ | $0.70359_{0.7036}$ |
| UF9 | $0.14042_{0.1404}$ | $0.34525_{0.3452}$ | $0.38318_{0.3832}$ |
| UF10 | $0.88315_{0.8831}$ | $0.88808_{0.8881}$ | $0.90939_{0.9094}$ |
| | **IGD** | | |
| UF1 | $0.00077_{8e-04}$ | $0.00344_{0.0034}$ | $0.00453_{0.0045}$ |
| UF2 | $0.00069_{7e-04}$ | $0.0011_{0.0011}$ | $0.00288_{0.0029}$ |
| UF3 | $0.00346_{0.0035}$ | $0.00706_{0.0071}$ | $0.0117_{0.0117}$ |
| UF4 | $0.00125_{0.0013}$ | $0.0014_{0.0014}$ | $0.00164_{0.0016}$ |
| UF5 | $0.06119_{0.0612}$ | $0.04592_{0.0459}$ | $0.09776_{0.0978}$ |
| UF6 | $0.00624_{0.0062}$ | $0.0079_{0.0079}$ | $0.01447_{0.0145}$ |
| UF7 | $0.00082_{8e-04}$ | $0.0027_{0.0027}$ | $0.01062_{0.0106}$ |
| UF8 | $0.00121_{0.0012}$ | $0.00275_{0.0028}$ | $0.00561_{0.0056}$ |
| UF9 | $0.00097_{0.001}$ | $0.00161_{0.0016}$ | $0.00302_{0.003}$ |
| UF10 | $0.00356_{0.0036}$ | $0.0037_{0.0037}$ | $0.00692_{0.0069}$ |

# 2 HV

Table 3: WilcoxonUF1 UF2 UF3 UF4 UF5 UF6 UF7 UF8 UF9 UF10

| | NSGAII | | | | | | | | | | IBEA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOEADDRA | ▲ | ▲ | ▲ | ▲ | ▽ | ▽ | ▲ | ▲ | ▲ | – | ▲ | ▲ | ▲ | ▲ | ▽ | ▽ | ▲ | ▲ | ▲ | ▽ |
| NSGAII | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▽ | – | ▽ |

Table 4: Kruskal-WallisUF1 UF2 UF3 UF4 UF5 UF6 UF7 UF8 UF9 UF10

| | NSGAII | | | | | | | | | | IBEA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOEADDRA | ▲ | ▲ | ▲ | ▲ | ▽ | ▽ | ▲ | ▲ | ▲ | ▽ | ▲ | ▲ | ▲ | ▲ | ▽ | ▽ | ▲ | ▲ | ▲ | ▽ |
| NSGAII | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▽ | ▲ | ▽ |

# 3 EP

Table 5: WilcoxonUF1 UF2 UF3 UF4 UF5 UF6 UF7 UF8 UF9 UF10

| | NSGAII | | | | | | | | | | IBEA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOEADDRA | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▽ | ▽ | ▽ | – | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | – |
| NSGAII | | | | | | | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ | ▽ | – |

Table 6: Kruskal-WallisUF1 UF2 UF3 UF4 UF5 UF6 UF7 UF8 UF9 UF10

| | NSGAII | | | | | | | | | | IBEA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOEADDRA | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | – |
| NSGAII | | | | | | | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ | ▽ | ▽ |

# 4 IGD

Table 7: WilcoxonUF1 UF2 UF3 UF4 UF5 UF6 UF7 UF8 UF9 UF10

| | NSGAII | | | | | | | | | | IBEA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOEADDRA | ▽ | ▽ | ▽ | ▽ | ▲ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| NSGAII | | | | | | | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |

Table 8: Kruskal-WallisUF1 UF2 UF3 UF4 UF5 UF6 UF7 UF8 UF9 UF10

| | NSGAII | | | | | | | | | | IBEA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOEADDRA | ▽ | ▽ | ▽ | ▽ | ▲ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| NSGAII | | | | | | | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |