|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Functions** | **2-D** | | | | | | | | **3-D** | | | | | | | |
| **Average** | | | | **STD** | | | | **Average** | | | | **STD** | | | |
| **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** |
| **Separable Functions** | | | | | | | | | | | | | | | | |
| **f1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Low or Moderate Condition Functions** | | | | | | | | | | | | | | | | |
| **f6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f7** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **High Condition Functions** | | | | | | | | | | | | | | | | |
| **f10** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f11** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f12** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f14** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Multi-Modal Functions** | | | | | | | | | | | | | | | | |
| **f15** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f16** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f17** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f18** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f19** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Multi-Modal with Weak Global Structure Functions** | | | | | | | | | | | | | | | | |
| **f20** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f21** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f22** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f23** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f24** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Functions** | **5-D** | | | | | | | | **10-D** | | | | | | | |
| **Average** | | | | **STD** | | | | **Average** | | | | **STD** | | | |
| **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** |
| **Separable Functions** | | | | | | | | | | | | | | | | |
| **f1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Low or Moderate Condition Functions** | | | | | | | | | | | | | | | | |
| **f6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f7** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **High Condition Functions** | | | | | | | | | | | | | | | | |
| **f10** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f11** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f12** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f14** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Multi-Modal Functions** | | | | | | | | | | | | | | | | |
| **f15** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f16** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f17** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f18** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f19** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Multi-Modal with Weak Global Structure Functions** | | | | | | | | | | | | | | | | |
| **f20** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f21** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f22** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f23** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f24** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Functions** | **20-D** | | | | | | | | **Combined** | | | | | | | |
| **Average** | | | | **STD** | | | | **Average** | | | | **STD** | | | |
| **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** | **SHC** | **CMAES** | **DE** | **IPOP** |
| **Separable Functions** | | | | | | | | | | | | | | | | |
| **f1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Low or Moderate Condition Functions** | | | | | | | | | | | | | | | | |
| **f6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f7** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **High Condition Functions** | | | | | | | | | | | | | | | | |
| **f10** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f11** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f12** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f14** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Multi-Modal Functions** | | | | | | | | | | | | | | | | |
| **f15** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f16** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f17** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f18** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f19** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Multi-Modal with Weak Global Structure Functions** | | | | | | | | | | | | | | | | |
| **f20** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f21** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f22** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f23** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **f24** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |