Evolutionary Computation Theory and Application Assessment III - Function Minimization

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Thursday, 1 June 2017

1 Hyper parameters

Population size (λ)	15
Number of genes (N)	2 & 12
Number of generations	1000
Step size (σ)	0.3
μ ($\lambda/2$)	7
weights ($w_i \propto (\mu - i + 1)$)	$\begin{bmatrix}0.2381 & 0.2063 & 0.1746 & 0.1429 & 0.1111 & 0.0794 & 0.0476\end{bmatrix}$
μ_{eff} ($1/\sum w_i^2$)	5.845
c_μ (μ_{eff}/N^2)	0.0057

2 Solution

Function	Minimum value
frosen 2D	0.015679
frosen 12D	5.5009
frastrigin 2D	-80.7066
frastrigin 12D	-478.2697

3 Statistical Evaluation

The following box plot shows the median fitness evolution after 20 runs of 1000 generations each.

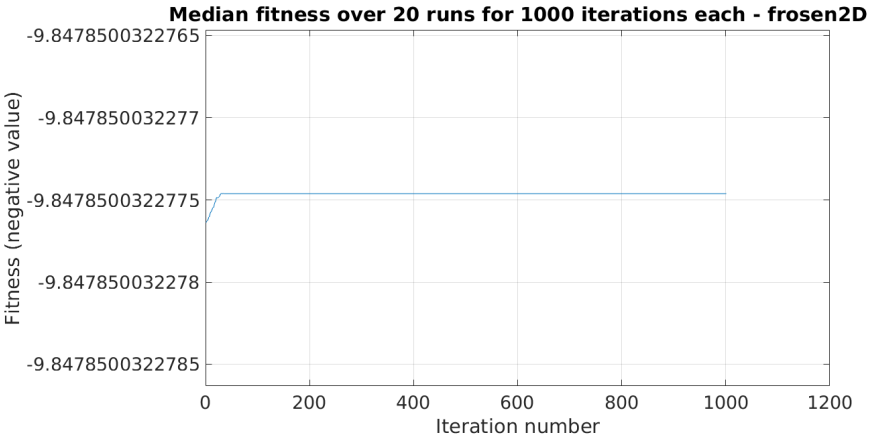

Figure 1: *median fitness of 20 runs over 1000 generations - frosen 2D*

Figure 2: *median fitness of 20 runs over 1000 generations - frosen 12D*

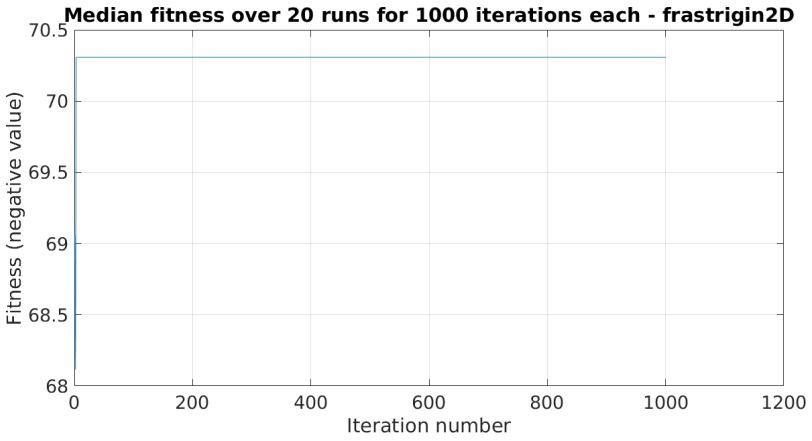

Figure 3: *median fitness of 20 runs over 1000 generations - frastrigin 2D*

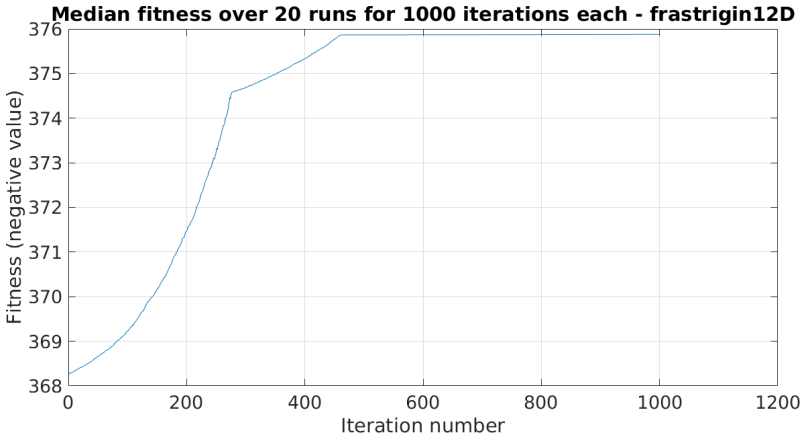

Figure 4: *median fitness of 20 runs over 1000 generations - frastrigin 12D*

The following box plot shows the fitness distribution of the best children after 20 runs of 1000 generations each.

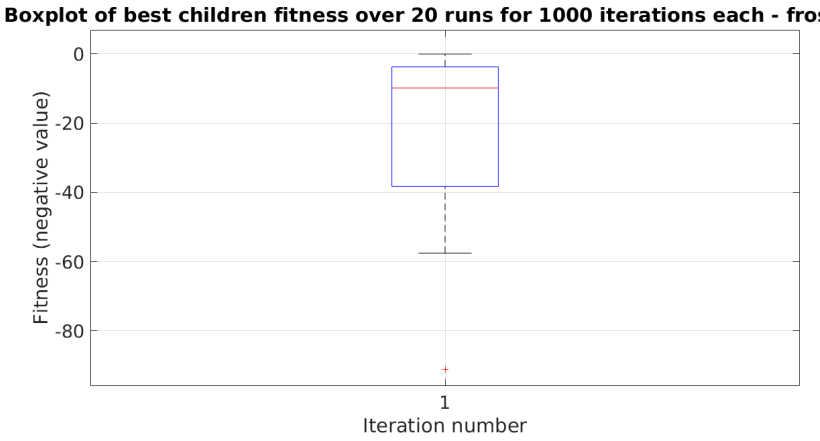

Figure 5: *Box plot for the distribution of fitness of the best children over 20 runs - frosen 2D*

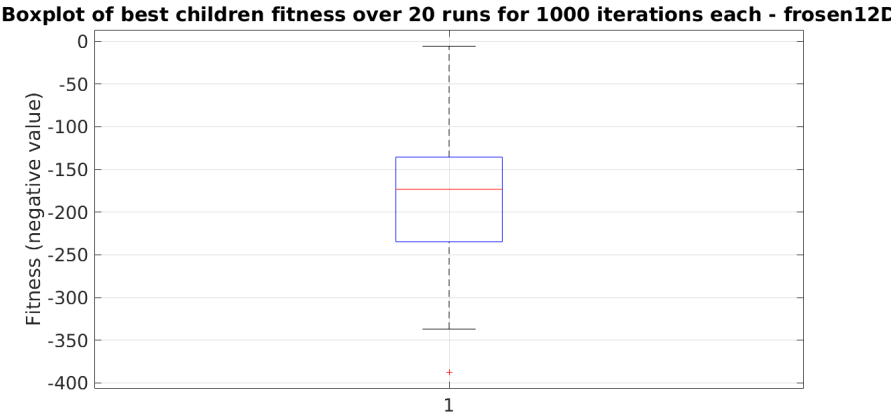

Figure 6: *Median fitness progression over 60 generations of 20 runs - frosen 12D*

Figure 7: *Box plot for the distribution of fitness of the best children over 20 runs - frastrigin 2D*

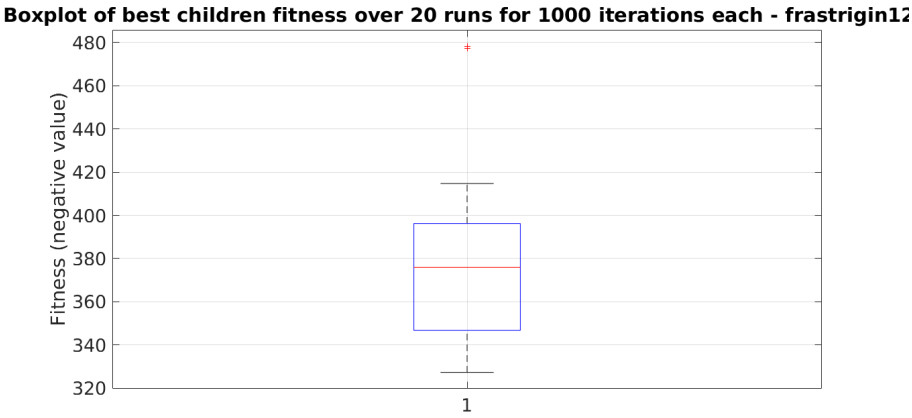

Figure 8: *Median fitness progression over 60 generations of 20 runs - frastrigin 12D*