

Introduction to Evolutionary Computation (22753)

Course Work I (10%): Function Optimisation **Due: October 30, 2009: 12pm**

Consider the following multi-modal continuous function

$$f(x) = - \sum_{i=1}^n \left(x_i \sin \left(\sqrt{|x_i|} \right) \right) \quad (1)$$

with $n = 30$ variables and $\forall i : x_i \in [-500, 500]$.

Design an evolutionary algorithm (EA), which includes recombination, mutation and selection, to find the *global minimum* of this function. You are also required to document your work and the submitted report should include *at least* the following:

1. A description *and* justification of the design of the EA, including comments on your choice of
 - recombination,
 - mutation,
 - selection,
 - replacement (e.g., generational vs. steady-state; elitism; $(\mu + \lambda)$, etc.).
2. A copy of your working program in Java/C/C++.
3. The parameter values used for the EA in your experiments (e.g., crossover rate). *Justify* your choices.
4. The results from your program. You should carry out 30 *independent* runs (trials) of your algorithm on the function shown above. Each trial should have an upper limit of 10000 fitness evaluations. The results should be reported in both a table and 2 figures: The table shows the 30 independent results, the mean and the standard deviation. One figure shows the evolutionary process of all trials, the other shows the mean and standard deviation of all trials.
5. A signed declaration that the work is entirely written and done by yourself, unless it is noted otherwise. Submission to be done online, as per instructions shown on the course web site. No late submissions.