ML4AAD

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1 Introduction

In this summary, we provide a brief explanation on how our optimizer works.

2 Optimizer

First of all we initialize the population and assign the gender randomly to each population member.
(Population-Member = (configuration, age, gender))
(gender = competitive C or non-competitive NC)

- Select top X % of C (competitive set) from a readily sorted list (The sorting happens by racing each new competitive member against old members).

- Select $(\frac{200}{A}$ ％) from NC.

- Each member of the top X % of C will be mated with every member of the set that consists of $(\frac{200}{A}$ ％) of NC. The children gender will be assigned randomly and their parameters are going to be inherited at random from their parents.

- Mutate children:

  - By the probability of M %, each parameter of the offspring will be altered.
  - The new values come from a new random configuration.

- Increase age and remove old configurations (with age $> A$) except for the incumbent.

2.1 Sexual Selection

Instead of choosing $(\frac{200}{A}$ ％) potential mates randomly from NC, A new way of selection is introduced.
The NC members are randomly permuted for each member in C. After

1

the permutation, the NC set is divided into 2 parts and each member of those 2 parts are raced against each other in parallel.

The winners are assigned to the *attractive* set and the losers are assigned accordingly to the *unattractive* set.

The attractive members are given twice the chance of being mated than the unattractive ones. After that, the algorithm flows like the vanilla one. The Sexual selection does not introduce strict competitiveness to the NC population because, some of the unattractive members will likely be superior to some attractive ones. However, the members are randomized for each member in C, so good members are more likely to wind up in the *attractive* camp than not. Adding such randomness to the selection process will preserve diversity among the offspring while increasing the chance of mating based on the fitness of the NC population.