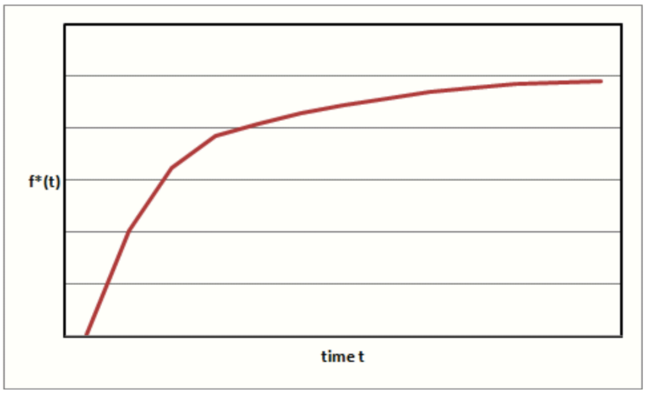
A51. Typical performance graph.

w/ deterministic rank based, elitism, (μ + λ) strategy, no mutation for parents



it never goes down because the best fitness value of the prior generation is kept in the current generation - due to elitism and (μ + λ) strategy with no mutation for parents.

A52. Hamming-Cliffs w.r.t. EA

Hamming Cliff: It is produced when the binary coding of two adjacent values differs in each one of their bits. e.g.) 01111 and 10000 represent the values 31 and 32, respectively, and the values of each one of their positions are different.

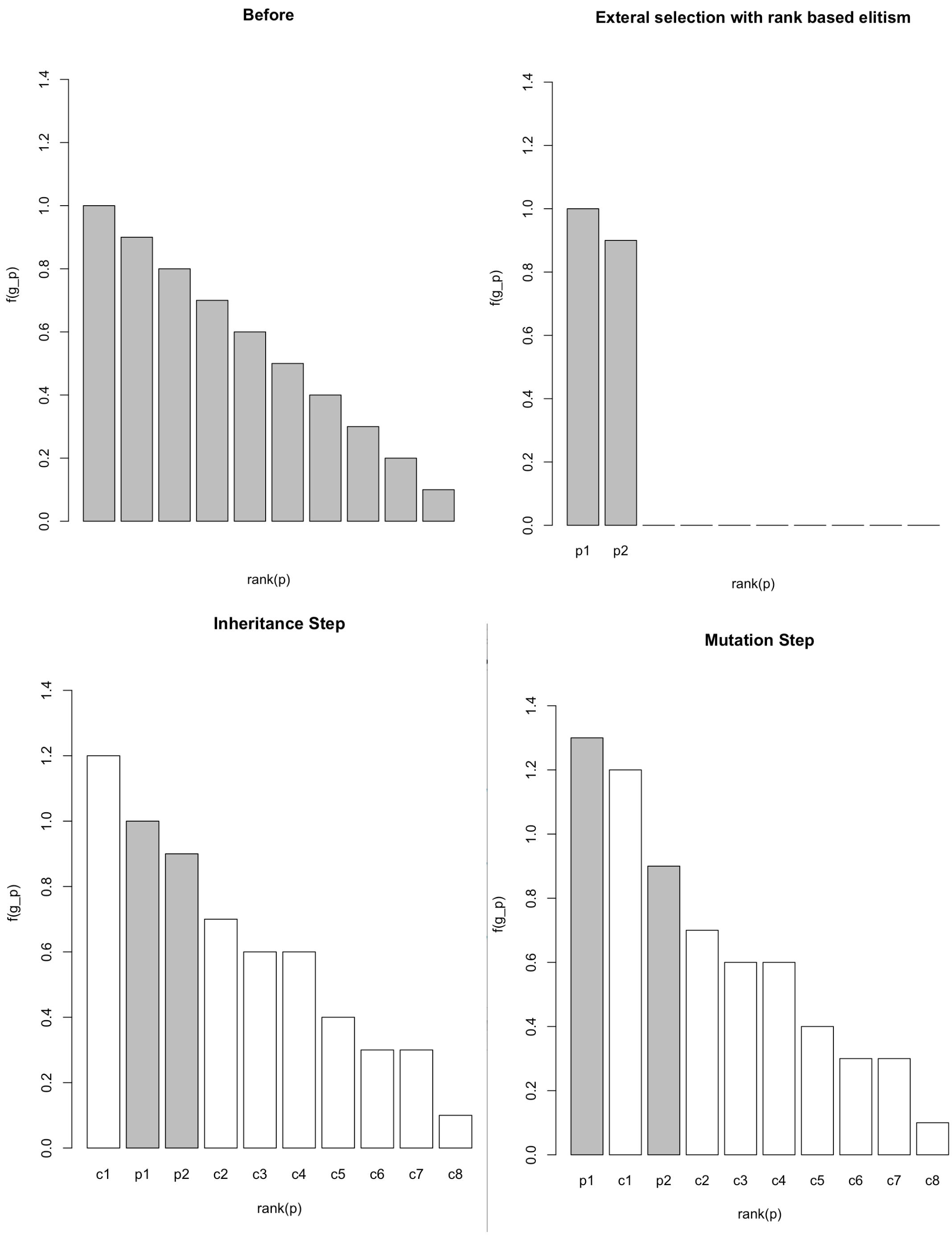
By Creeping up and down, real-coded GAs can easily do hillclimbing in the underlying decision space, but with bitwise complement (bit-flipping) mutation, binary coded-genes can become stuck on Hamming cliffs.

The hamming cliff may produce problems under some conditions, such as the convergence towards no global optimum.

[Reference]

- K. K. Roopesh, P.K. Umesha and M.S. Kalappa, "Software based on heuristic technique for optimization of transmission line towers", 2006
- Goldberg, D.E., “Real-Coded Genetic Algorithms, Virtual Alphabets, and Blocking”, 1991

A53.



A54. Advantages of EA

- Applicable in problems where no (good) method is available:
  - Discontinuities, non-linear constraints, multi-modalities.
  - Discrete variable space.
  - Noisy problems.

- Most suitable in problems where multiple solutions are required:
  - Multi-modal optimization problems.
  - Multi-objective optimization problems.

- Parallel implementation is easier.