

A Comparison of Parallel and Sequential Niching Methods

Introduction

Niching methods for GA search of **multiple solutions**

Niching promote formation and maintenance of **subpopulations**

Parallel niching: niches within a single population

- Sharing

- Crowding

Sequential niching:

- Multiple runs of GA

- Maintains best solution of each run offline

Sharing (Goldberg and Richardson, 1987)

Sharing derates each string's fitness depending on the number of similar individuals in the population

$$f' = f/\text{niche count}$$

Sharing function is used to have niche count

This mechanism **limits the uncontrolled growth of particular species** within a population

Crowding (De Jong 1975)

The individual with the highest similarity is replaced
by new string

The replacement of individuals by similar individuals
tends to maintain **diversity** within the population and
reserve room for **two or more species**

Sequential niching (Beasley, Bull and Martin (1993))

Multiple runs of GA

Maintains best solution of each run offline

To avoid converging to the same area of the search space, SN at each run depresses the fitness at all points within some radius (niche radius) of the previous solution