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

\[ f' = \frac{f}{\text{niche count}} \]

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 Matin (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