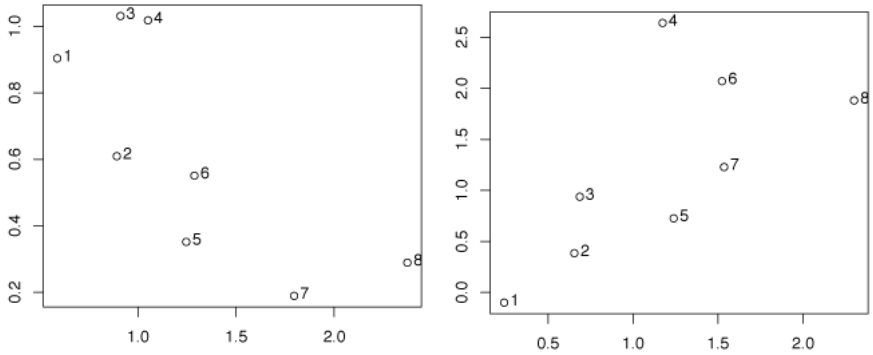
INF3490 exercises - week 3 2014

Problem 1

In what ways does the island model and the diffusion model handle migration differently? With the population arranged into a grid of 3×5 subpopulations, how many iterations would at least be needed for a mutation in one corner of the grid to reach the corner at the opposite end with 4 neighbors (N,S,E,W) and with 8 neighbors (N,NE,E,SE,S,SW,W,NW)?

Problem 2



For each of the two figures above, find the Pareto optimal set when

- Minimizing both f_1 and f_2
- Minimizing f_1, maximizing f_2
- Maximizing f_1, minimizing f_2
- Maximizing both f_1 and f_2

Problem 3

In the two figures above, what would be the maximum point when using weighted sum with the weights

- $w_1 = 1$, $w_2 = 1$
- $w_1 = -1$, $w_2 = 1$

Problem 4

Why can hybrid algorithms make it harder to maintain diversity?

Problem 5

In a 0-1 knapsack problem, how could you implement a repair mutation to transform infeasible solutions into feasible ones (i.e. make the sum of costs of the selected items go below the budget)?

Problem 6

Why is it usually better to use the number of fitness function evaluations as a time measure, rather than the number of generations, or the amount of CPU time spent?