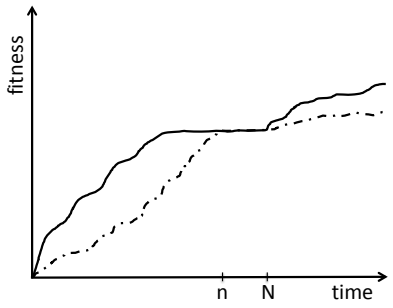
Evolutionary Computing

October 21, 2019

1. The following picture shows the maximum and average fitness curves of an evolving population. What can we infer regarding the population diversity at generation n?



A Nothing
B The first derivative of the diversity curve is zero
C Diversity must be at its maximum
D Diversity must be at its minimum

2. We tackle the n-queens problem with a GA using a bitstring representation where 1 (0) denotes the presence (absence) of a queen on a square. What is the dimensionality of the search space?

A $2n$
B $n!$
C n^2
D n

3. We want to optimise the function $f(x, y) = x + y$ with Differential Evolution. Consider the following population of 6 individuals:

i	1	2	3	4	5	6
x_i	0.2	0.1	0.4	0.9	0.3	0.7
y_i	0.3	0.1	0.5	0.2	0.8	0.3

The first step in creating the next generation is the creation of a mutant vector population. What is mutant vector $\overline{v}_4$ if the base vector $\overline{a}_4$ is individual 5, the difference vector

is defined by $\overline{b}_4$ = individual 1 and $\overline{c}_4$ = individual 2, and the scaling factor is $F = 0.5$?

A $\overline{v}_4 = \langle 0.2, 0.5 \rangle$
B $\overline{v}_4 = \langle 0.25, 0.9 \rangle$
C $\overline{v}_4 = \langle 0.35, 0.9 \rangle$
D $\overline{v}_4 = \langle 0.4, 1.0 \rangle$

4. What is parameter tuning?

A Parameter tuning is adjusting parameters of the evolutionary algorithm before a run
B Parameter tuning is adjusting parameters of the evolutionary algorithm during a run
C Parameter tuning is adjusting parameters of the evolutionary algorithm during a run based on time
D Parameter tuning is adjusting parameters of the evolutionary algorithm by coding them in the genome