

# Softcomputing

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## Result:

max: 407

[400, 401, 401, 395, 193, 260, 293, 316, 395, 366, 392, 373, 399, 399, 398, 403, 405, 405, 405, 405, 405, 405, 405, 407, 406, 405, 398, 397, 396, 396, 402, 393, 394, 394, 397, 403, 403, 402, 403, 403, 403, 403, 403, 404, 403, 403, 402, 402, 403, 403, 403, 405, 404, 403, 403, 405, 407, 407, 406, 407, 403, 403, 403, 403, 403, 403, 403, 403, 407, 407, 407, 407, 402, 402, 407, 407, 407, 407, 407, 407, 407, 407, 400, 407, 407, 403, 403, 407, 407, 407, 407, 407, 407, 407, 407, 407, 407, 407, 407, 407, 407]

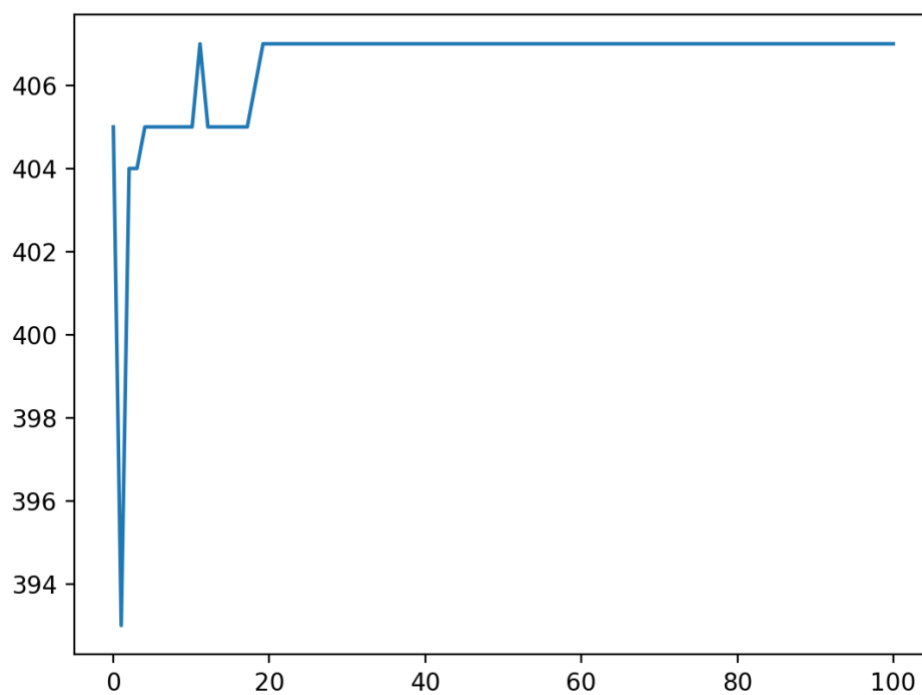


Figure1 Maximum Value of Genetic Algorithms(recombination80% variation5%)

max: -602

[-590, -590, -590, -589, -589, -589, -589, -589, -589, -601, -602, -602, -593, -602, -602, -602, -602, -602, -602, -602, -602, -602, -602, -602, -602, -602, -602, -602, -600, -600, -600, -599, -602, -602, -602, -602, -600, -602, -600, -600, -600, -600, -600, -598, -596, -600, -597, -599, -600, -600, -600, -600, -602, -600, -600, -600, -597, -600, -597, -597, -597, -592, -592, -592, -590, -592, -592, -592, -592, -592, -599, -592, -594, -591, -597, -597, -597, -599, -599, -599, -598, -598, -598, -597, -597, -599, -599, -599, -599]

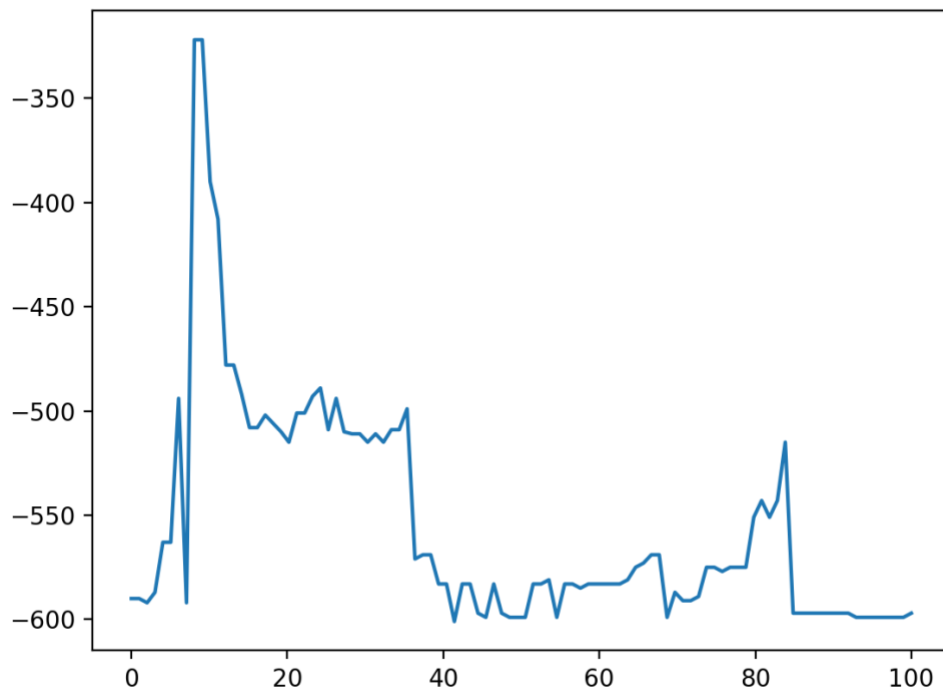


Figure2 Minimum Value of Genetic Algorithms(recombination80% variation5%)

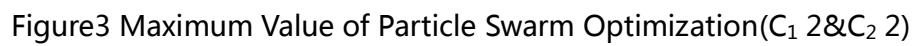
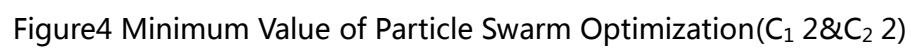
[illegible]

Figure3 Maximum Value of Particle Swarm Optimization( $C_1$  2& $C_2$  2)

[illegible]

突然変異の確率をゼロにすると、どういった問題が生じると考えられるか？

The exploratory ability of the algorithm decreases and it is difficult to find the global optimal value.

**Reason:**

When the variation rate is 0%, only the existing genotypes can be exchanged, and no new genotypes can be found. The existing genotypes are limited, so the global optimal combination cannot be found.

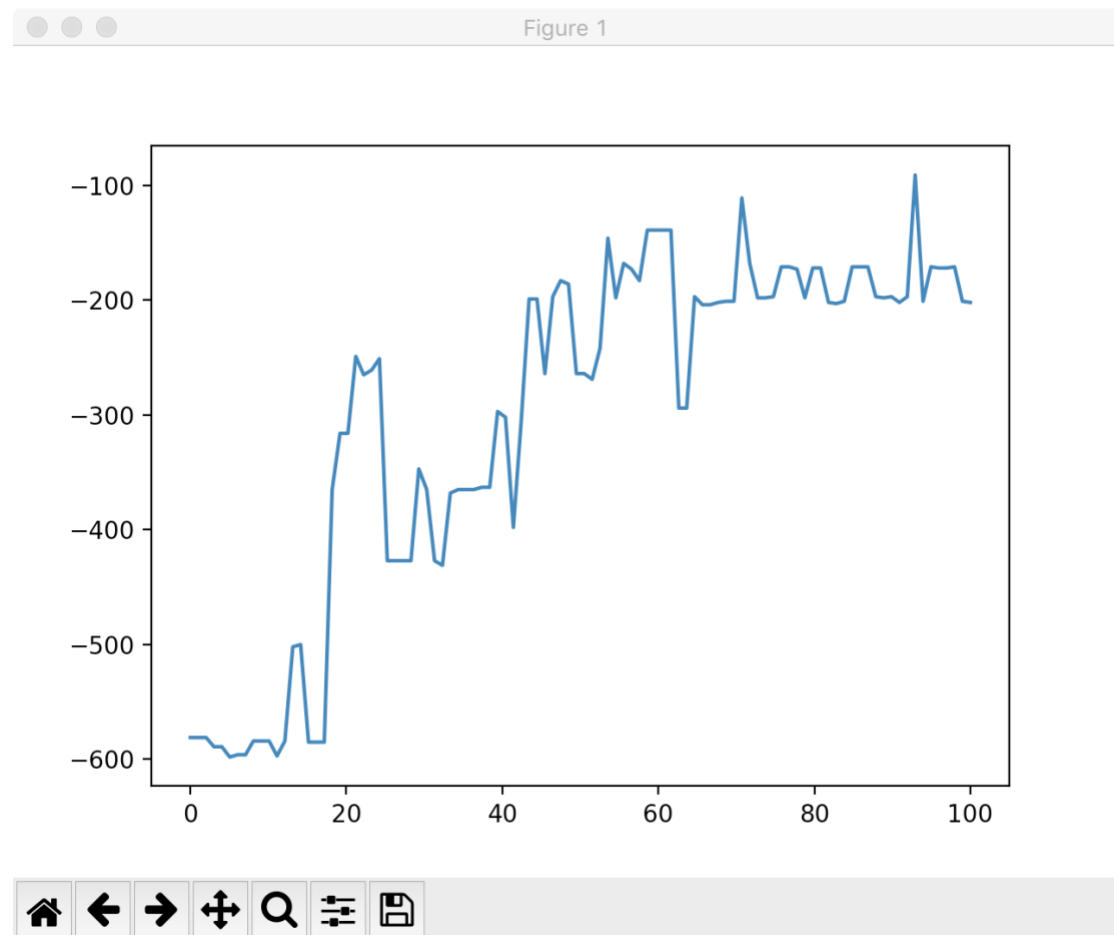


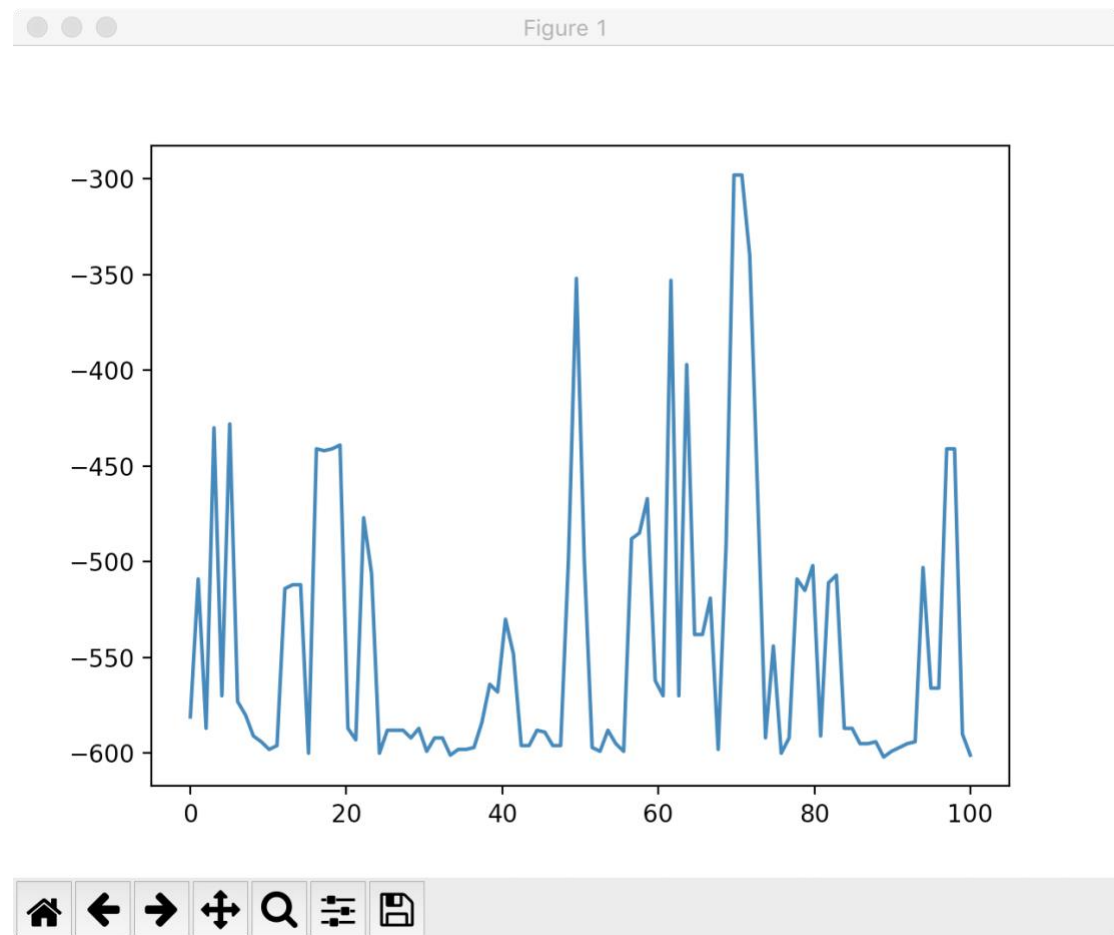
Figure5 Minimum Value of Genetic Algorithms(VARIATION = 0%)

突然変異の確率を 50%にすると、こういった問題が生じると考えられるか？

The convergence of the algorithm decreases and the curve vibrates greatly.

**Reason:**

When the variation rate is 50%, a large number of new genotypes will be produced in each generation. It is difficult to preserve genotypes whose performances are good in last generation, so the optimum values for each generation change from top to bottom.



PSO(Particle Swarm Optimization) parameter

粒子群最適化法の更新式

$$(1) \ v = wv + c_1 r_1 (G_{best} - x) + c_2 r_2 (P_{best} - x)$$

$$(2) \ x = x + v$$

1.  $w$

Its value is larger, its global search ability is strong, and its local search ability is weak.

Its value is smaller, its global search ability is weak, and its local search ability is strong.

Dynamic optimization results are better than fixed values. Dynamics can be changed linearly during PSO search, or dynamically according to a measure function of PSO performance.

2.  $C_1$ & $C_2$

$C_1$  is the individual learning factor for each particle.

$C_2$  latter is the social learning factor for each particle.

Suganthan's experiments show that a better solution can be obtained when  $C_1$  and  $C_2$  are constant.  $C_1 = C_2 = 2$  is usually set, but not necessarily equal to 2. (generally, range from 0 to 4)