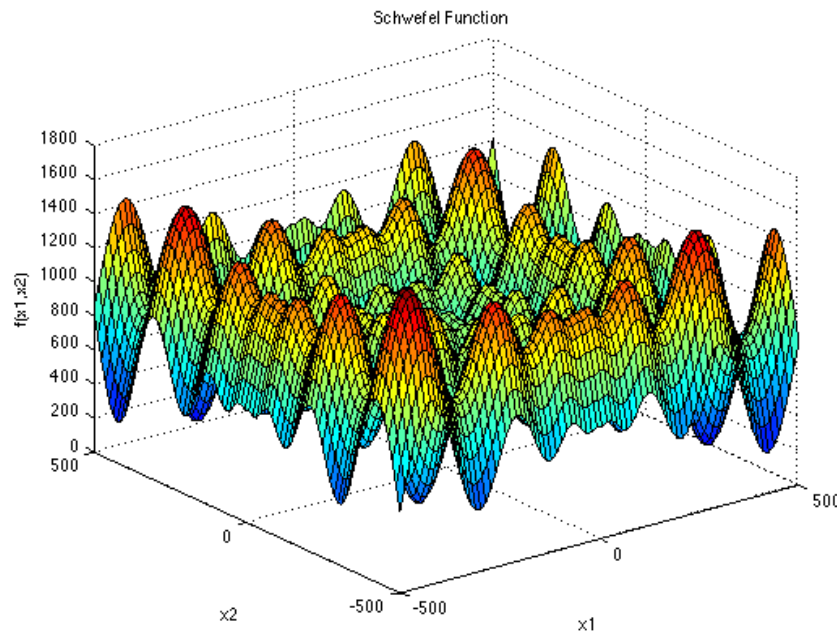# Bio-inspired Computing Assignment 1

2021/11/02

Real parameter optimization is all-important in many industrial applications. Commonly, we can test the performance of an algorithm using some benchmark functions. A well-known benchmark function is the Schwefel's function:

Schwefel Function

$$f(x) = 418.9829n - \sum_{i=1}^{n} x_i \sin \sqrt{x_i}$$

$$x_i \in [-512, 512]$$

Use genetic algorithms (GAs) to solve the Schwefel's function.

Implementation

Please implement different variations of GAs according to the following table.

Representation	Bit strings ($L = 100$)	Real-valued ($n = 10$)
Crossover ($p_c = 0.9$)	Uniform	
	2-point	Whole arithmetic
Mutation	Bit-flip ($p_m = 1/L$)	Random resetting ($p_m = 1/n$)
Parent Selection	k-tournament ($k = 2$)	
Survivor Selection	$\mu + \lambda$	
Population size	100	
Termination	500 Generations	

Analysis

1. Compare these methods using anytime behavior. You have to compare them in terms of solution quality and convergence speed. For each setting, please run at least 30 trials, and use the average results for comparisons.
2. Compare different parameter settings, including
   a) Crossover rate p_c
   b) Mutation rate p_m
   c) Tournament size k
   d) Population size μ
   e) Number of generations
3. Try to solve the Schwefel's function with higher dimension (n = 100).

Requirement

1. Write your program in C, C++, or Java.
2. You have to turn in your source code and a report for the assignment.
3. The due day is 2020/11/16. Every delay takes a penalty of 10 scores per day.
4. Upload your files in a zip file in the format: SCH_StudentID.zip, where StudentID is your student ID.