Computer Exercise1: Genetic Algorithms

Goal: To find the minimum or maximal of the fitness function and its corresponding locations.

Task: You are required to perform optimization on 2 fitness functions, where the 1st one may be chosen from functions f_1 and f_2, and the 2nd one may be chosen from f_3, f_4,and f_5, which are defined as follows,

$$\max f_1(x,y) = \frac{\sin x}{x} \cdot \frac{\sin y}{y} \qquad x.y. \in [-10.0000 \quad , \quad 10.0000]$$

$$\max f_2(x,y) = 0.9\exp\left(-\frac{(x+5)^2+(y+5)^2}{10}\right) + 0.99996\exp\left(-\frac{(x-5)^2+(y-5)^2}{20}\right)$$

$$x.y. \in [-10.0000 \quad , \quad 10.0000]$$

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$$\min f_3(x_1,x_2) = 100(x_2 - x_1^2)^2 + (1-x_1)^2 \quad , \quad -5.0000 \le x_1, x_2 \le 5.0000$$

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$$\min f_4(x_1,x_2) = 20 + x_1^2 + x_2^2 - 10(\cos 2\pi x_1 + \cos 2\pi x_2) \quad , \quad -5.0000 \le x_1, x_2 \le 5.0000$$

$$\max f_5(x_1,x_2) = x_1 \sin(10\pi x_1) + x_2 \sin(10\pi x_2) \quad , \quad -1.0000 \le x_1, x_2 \le 2.0000$$

Requirements:

1) Computer programming in any programming languages, i.e., C, C++, VC++, or .m, etc, **EXCEPT** the GA toolbox.
2) Research report, including **Introduction**, **Methods**, **Results**, **Conclusions**, and **Source Code**.
3) Your manuscript should be typed in size 11 with 2 columns and 1.5X spacing on A4 papers, Double sided printing is preferred. The source code could be typed in size 9.
4) Only typescripts are acceptable, electronic files are NOT allowed.
5) Ph.D students are required to complete the report in English, master students are encouraged to do so.
6) This homework MUST be completed independently, copying is NOT allowed.
7) Due: Oct 16, 2018