

CO528 Intelligent systems Assessment: Genetic Algorithms

This assessment is worth 25% of the total marks of the module. This assessment **must** be done in groups of size three or four. Group members should work independently on the assignment; then arrange a meeting well before the deadline to discuss and compare their results. The aim of this is to understand differences in results and to develop a strategy to solve the problem effectively. Only one document should be submitted per group. All students in the group will get the same mark. Queries to Dominique Chu (D.F.Chu@kent.ac.uk).

Assignment:

Below you find plotted a number of points that have been generated using a so-called polynomial function that is a function of the form:

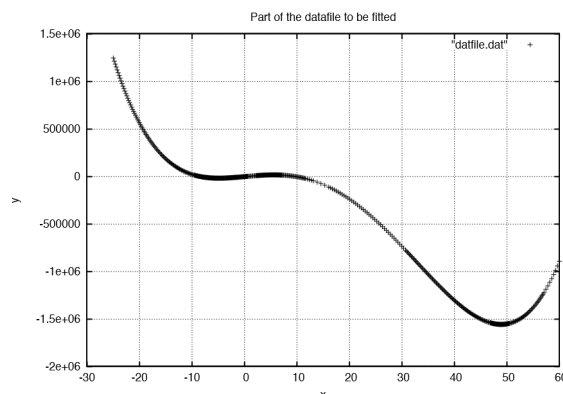
$$f(x)=a + bx + cx^2 + dx^3 + ex^4 + fx^5$$

So, for example, if, $a=b=c=d=e=1$ then

$$f(1)=6 ,$$

$$f(2)=1+2 + 2^2 + 2^3 + 2^4 + 2^5$$

etc....



However, you are not given the specific coefficients a, b, c, d, e, f that reproduce the curve. Your task is to write a GA (in a program language of your choice) and find the coefficients that reproduce the curve. You will need as input to your program the data file that gives the points. This can be downloaded at:

<http://www.cs.kent.ac.uk/people/staff/dfc/site/datfile.dat>

Each line in the datafile gives for a value of x (first column) the corresponding value $f(x)$.

Submit as your answer:

- 1) The source code of your program on paper (printed). [10 marks]
- 2) A document describing your code & results. This document must contain:

- a. A plot of the data points you downloaded (as seen below) [10 marks]

- b. A description of your GA including a clear explanation of how you encoded the problem, the algorithm you used (i.e. roulette wheel selection, tournament selection, crossover etc...), and all the parameters you used (mutation rate, crossover probability, etc..). [20 marks]
- c. A plot showing how the best, worst and average fitness changes over time. [10 marks]
- d. A formulation of the best solution you found (using mathematical notation). [10 marks + 30 marks for accuracy of results]
- e. A plot containing both the best solution you found and the original datafile that you downloaded. [10 marks]

Practicalities

The deadline to hand in this assessment is shown on the Student Data System. Please hand in the printed part of the assessment by the closing time of the Course Admin Office on that day.

Notes on Plagiarism

Senate has agreed the following definition of plagiarism:

"Plagiarism is the act of repeating the ideas or discoveries of another as one's own. To copy sentences, phrases or even striking expressions without acknowledgement in a manner that may deceive the reader as to the source is plagiarism; to paraphrase in a manner that may deceive the reader is likewise plagiarism. Where such copying or close paraphrase has occurred the mere mention of the source in a bibliography will not be deemed sufficient acknowledgement; in each such instance it must be referred specifically to its source. Verbatim quotations must be directly acknowledged either in inverted commas or by indenting."

The work you submit must be your own, except where its original author is clearly referenced. We reserve the right to run checks on all submitted work in an effort to identify possible plagiarism, and take disciplinary action against anyone found to have committed plagiarism. When you use other peoples' material, you must clearly indicate the source of the material.