



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Engineering, Built Environment and IT
Department of Computer Science

COS 314

Tutorial/Practical 5

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Question

1. Given the following are pairs of fitness cases: (x,y)
 $(-10.0, 100.54), (-9.31, 86.56), (-8.62, 73.58), (-7.93, 61.89), (-7.24, 51.6), (-6.55, 42.64), (-5.86, 34.75), (-5.17, 27.63), (-4.48, 21.04), (-3.79, 14.97), (-3.1, 9.57), (-2.41, 5.14), (-1.72, 1.97), (-1.03, 0.2), (-0.34, -0.22), (0.34, 0.45), (1.03, 1.92), (1.72, 3.95), (2.41, 6.48), (3.1, 9.65), (3.79, 13.76), (4.48, 19.1), (5.17, 25.83), (5.86, 33.93), (6.55, 43.17), (7.24, 53.23), (7.93, 63.88), (8.62, 75.03), (9.31, 86.79), (10.0, 99.46)$
 - (a) Using Genetic Programming develop a program finds the function for these fitness cases such that $f(x) = y$.
Terminal set = $\{x\}$ and Function set = $\{+, -, / (\text{protected}), \sin, \cos\}$.
 - (b) Using Grammatical Evolution develop a program that finds the function for these fitness cases such that $f(x) = y$. Use the following parameters and operators: Uniform crossover, bit flip mutation and fitness proportionate selection.
 - (c) Compare the two algorithms on the following parameters:
 1. Runtime.
 2. Number of evolutions to converge
 3. Tree size of the best individual (GP tree vs GE Phenotype)
 4. Population size.
 5. Computational effort to solve the problem.