21- Genetic Programming: goal, fitness evaluation, function and terminal Sets

The goal is to apply evolutionary ideas to computer programs

- ➔ Make the code evolve to solve the problem
- ➔ We will consider a population of "computer programs", that will be selected, recombined and subject to mutation
- ➔ Until we reach the desired solution
- What can be expected of such programs? -> they should discover a function that produces the right output for a given input

FITNESS:

Let us consider a program p such that: y = P(x) -> x and y can be complex data structures

Let A be a training set: A = {<x1,y1>,<x2,y2>, … , <xk,yk>}

For input xi we know the output yi

Which means the fitness will be computed by: $f(P) = \sum_{i=1}^{k} |y_i - P(x_i)|$

FUNCTION SET AND TERMINAL SET:

The space of programs that we can build is specified by 2 sets:

- F: set of nodes functions {+,*,-,/}, {AND, OR, NOT} -> these are the operators that modify the operands
- T: set of terminal nodes {A,B,C,D} -> these set contains the variables and constants involved in the problem