

XML-based genetic programming framework

Prof. Ivan Tanev

Abstract:

During the course of my lectures at FMI I would like to present the design philosophy, the implementation and various applications of XML-based genetic programming (GP) framework (XGP). The key feature of XGP is the distinct representation of genetic programs as DOM-parse trees featuring corresponding flat XML-text. XGP contributes to the achievement of (i) fast prototyping of GP by using the standard built-in API of DOM-parsers for manipulating the genetic programs, (ii) human-readability and modifiability of the genetic representations (iii) generic support for the representation of grammar of strongly-typed GP using W3C-standardized XML-schema; and (iv) inherent inter-machine migratability of the text-based genetic representation (i.e., the XML text) in the distributed implementations of GP.

The lecture schedule could be as follows (brief program):

Lecture #1: Introduction to Genetic Programming (GP). Challenges in implementing GP. XML-based genetic programming (XGP).

Lecture #2: Applications of XGP. Case study of applying XGP in evolutionary robotics: Evolution, adaptation, and robustness of locomotion of simulated sidewinding snake-like robot (Figure 1).

Lecture #3: Improving the efficiency of XGP for evolution of snake-like robot through the incorporation of some of the recent discoveries in molecular biology. Case studies: (i) biased mutation for evolution of sensorless snake-like robot, and (ii) genetic transposition for incremental evolution of bot with sensors in challenging environment (Figure 2).

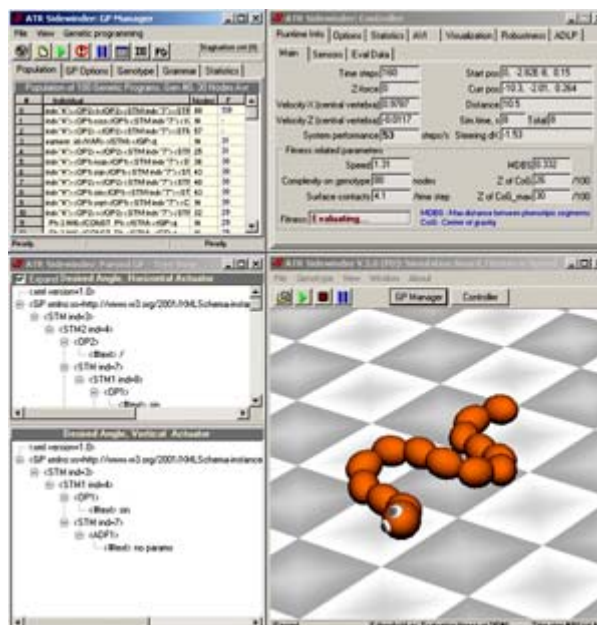


Figure 1



Figure 2