# Java based Distributed Genetic Programming on the Internet

**Fuey Sian Chong**
School of Computer Science,
The University of Birmingham,
Birmingham B15 2TT, UK
F.S.Chong@cs.bham.ac.uk
http://studentweb.cs.bham.ac.uk/~fsc/

**W. B. Langdon**
Centrum voor Wiskunde en Informatica,
Kruislaan 413, NL-1098 SJ Amsterdam
W.B.Langdon@cwi.nl
http://www.cwi.nl/~bill/
Tel: +31 20 592 4093, Fax: +31 20 592 4199

## Abstract

A distributed approach for parallelising Genetic Programming (GP) on the Internet is proposed and its feasibility demonstrated with a distributed GP system termed DGP developed in Java. DGP is run successfully across the world over the Internet on heterogeneous platforms without any central coordination. The run results and the outcome of an experiment to determine DGP's performance are reported together with a description of DGP.

## 1 INTRODUCTION

Parallelising GP on the Internet is an ideal way to realise the increase in computing power required to solve larger and harder problems. DGP allows anyone with access to the Internet to harness the huge number of unused CPU cycles it contains to evolve programs.

## 2 THE DGP SYSTEM

The implementation of DGP is as shown in Figure 1. Machines with different speeds can join and leave the GP run dynamically. DGP works as an applet as well as an offline Java application. Java applications allow users to terminate DGP runs prematurely, save the states of the runs and resume the runs later. They also enable users to run DGP offline and only connect to the server during migrations.

The Web page containing DGP's user interface is at `http://studentweb.cs.bham.ac.uk/~fsc/DGP.html`.

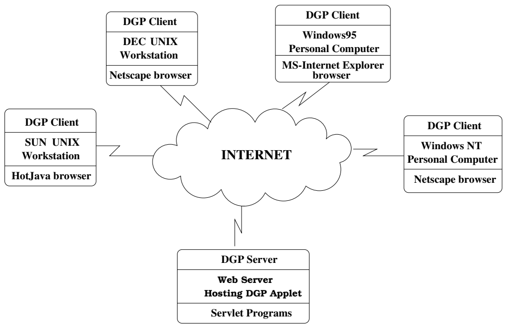


Figure 1: Four workstations of different types work asynchronously over the Internet on a common GP problem using a distributed population, communicating occasionally via Servlet programs.

## 3 WORLD WIDE TESTS

A total of 237 runs of DGP were conducted across 11 countries on the Internet to solve the "Artificial Ant" problem. Results proved the feasibility of DGP, with trouble free operation and without central coordination. A total of 33 correct programs were found out of 102 complete runs.

Experimental results showed that DGP has a higher probability of finding solutions than the distributed approaches studied in our previous work and the conventional single population GP approach.

## 4 CONCLUSION

Experimental results prove the feasibility of DGP and suggest its potential to solve larger and harder problems. DGP is built to support a variety of problem domains. New problems can be supported by implementing problem specific modules to DGP.

Further details can be found in (F. S. Chong, Technical Report CSRP-99-7, University of Birmingham, 1999). The source code for the DGP applet is available via anonymous ftp from site `ftp.mad-scientist.com`, directory `/pub/genetic-programming/code` and file `DGPsrc.tar.gz`.

### Acknowledgements

My gratitude goes to Hansueli Gerber for his stand alone GP source code on which my code is based and all those who have participated in the running of DGP on the Internet.