Chapter 4
Computer Implementation of Genetic Programming

ABSTRACT

This chapter presents the computer implementation of the tree-based genetic programming in C# programming language. Since C# is a common object-oriented programming language, with little modification the source code presented in the chapter can be easily transformed into Java or C++ programming languages. The chapter covers all aspects of the implementation: node, chromosome, population, function set, and terminal set class implementations. The chapter is carefully structured, so at the end of the chapter fully working GP computer program will be implemented which can solve regression and multiclass classification problems. The reader should not worry about specific operating system, or development environment, since all code implementations are based on cross-OS and open source integrated development environment visual studio code which can run on Windows, Mac, or Linux.

INTRODUCTION

The genetic programming is a method which is relatively easy to implement by using classic object-oriented programming languages such C++, Java or C#. That is also the reason why various implementations in many programming languages can be found on the internet. In this chapter the C# implementation of GP will be presented. Since C# is object oriented programming language (like C++ or Java), with little modification due to language syntax, the implementation can be easily transformed into other programming languages.

DOI: 10.4018/978-1-5225-6005-0.ch004

PREPARATION STEPS

In order to start with the GP implementation, the following preparation steps must be completed:

- Operating System selection,
- Installation of .NET Core platform and Visual Studio Code,
- Creating starting project for GP implementation.

Operating Systems Selection

In order to implement GP in the C# programming language the reader should not worry about Operating System, nor license for the Code editor and debugger. Whole chapter can be realized with open source based Operating System like Ubuntu or Fedora, as well as open source and cross operating system platform .NET Core and Visual Studio Code. Besides the Linux based distribution, reader can also use the Windows or MAC operating systems.

Installation of IDE

Source code editor and debugger used in this chapter is Visual Studio Code or short VS Code. VS Code is open source code editor and debugger developed by Microsoft which supports many programming languages e.g. C++, Java, JavaScript, C#, etc. Besides the code editor, VS Code supports many other features like: debugging, embedded GIT source code version control, syntax highlighting, intelligent code completion (IntelliSense), code snippets and code refactoring. The VS Code provides rich set of documentation for installation, code editing and debugging for all supported programming languages. Every supported feature is unique on all operating systems, so the user can start working on the project on Windows, then can switch to Linux or Mac and continue working on it. All information and documentation can be found at http://code.visualstudio.com.

After installation process, VS Code has basic features such as: source code capability, GIT support and support for different theme and colors.