Seeding Methods for Run Transferable Libraries

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ABSTRACT

Run Transferable Libraries (RTL) is an extension for GP where individuals in a population choose functions from an external library of ADF-like functions rather than from a set of standard GP functions.

All previous work done with RTL provided a predefined function set. This work investigates mechanisms by which the library can be seeded with domain relevant functionality.

Categories and Subject Descriptors

I.2 [**Artificial Intelligence**]: Problem Solving, Control Methods, and Search—*Genetic Programming*

General Terms

Algorithms, Theory

Keywords

Module Acquisition, Schema Theory

1. INTRODUCTION

This paper builds on the work presented in [1] on the notion of Transferable Libraries(RTLs). Unlike traditional Evolutionary Algorithms, RTL enabled methods accumulate information from run to run, attempting to improve performance with each new iteration, but more importantly, trying to build a library that can be used to tackle new, related problems.

It was envisaged that an iterative process of mutation and convergence on an initial random function set would be sufficient to generate a domain relevant function set, however, further experimentation indicated that this was not a sustainable strategy. This motivated the investigation of mechanisms which could identify such domain relevant functionality.

2. METHOD DESCRIPTION

The first technical obstacle was the generation of domain relevant functionality. The most accessible way to do this was to harvest the functionality from a GP run. To this end, algorithms were developed which could efficiently identify *schema* in the population. Results from [2] suggest that the actual frequency of occurrence of a schema bears little relevance to its utility within the domain, so the selection of schemas for the library was not modulated by its prevalence throughout the population.

The selected schemas were then expressed as functions by abstracting them. This consisted of choosing an arity for the schema and an associated distribution of parameters amongst the null schema nodes. These were used as the functions in the RTL library.

3. OBSERVATIONS

This method successfully identifies and generates the desired functionality in highly structured domains such as Parity and Polynomial problems.

Applying this method to arbitrary symbolic regression problems did not produce results comparable to the previously mentioned Parity and Polynomial domains, indicating that such domains do not inherently possess a salient functional structure.

4. REFERENCES

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