REST/SOAP Web Service API for G-language System

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1 Introduction

G-language Genome Analysis Environment (G-language GAE) [1,2,3] is a set of Perl libraries for genome sequence analysis that is compatible with BioPerl [4], equipped with several software interfaces (interactive Perl/UNIX shell with persistent data, AJAX Web GUI, Perl API). The software package contains more than 100 original analysis programs especially focusing on bacterial genome analysis, including those for the identification of binding sites with information theory, analysis of nucleotide composition bias, analysis of the distribution of characteristic oligonucleotides, analysis of codons and prediction of expression levels, and visualization of genomic information. First version of G-language GAE was released in 2001, and the latest release is currently 1.8.9 (16th August, 2009), and it is freely available under GNU General Public License. Taking advantage of the BioHackathon 2009, we have recently developed REST/SOAP web service APIs for this software system, in order to provide higher interoperability with other programming languages and bioinformatics software tools.

2 Method and Results

Web service interface is provided using two protocols: Representational State Transfer (REST) provided at http://rest.g-language.org/ and Simple Object Access Protocol (SOAP) provided at http://soap.g-language.org/. REST is more suited for simple analysis and for heuristic usage, whereas SOAP is more suited for programmatic access. Both services are implemented in Perl with the latest G-language GAE, and are freely accessible.

2.1 REST Services

REST interface provides RESTful URL-based access to all functions of G-language GAE, which is highly interoperable to be accessed from other online resources. Here all analysis resource can be accessed through HTTP GET/POST request using unique URI. For example, graphical result of the GC skew analysis of Escherichia coli K12 genome is given by http://rest.g-language.org/NC_000913/gcskew. Example usage and syntax of this service is depicted in Figure 1.

2.2 SOAP Services

SOAP interface provides language-independent access to more than 100 analysis programs. The WSDL file contains descriptions for all available programs in a single file, and can be readily loaded in Taverna 2 workbench to integrate with other services to construct workflows. Example workflows are available at the myExperiment website [5].
Figure 1: Syntax for G-language REST Service. Base URL is http://rest.g-language.org/, or http://useG.jp/.

3 Discussions

The web service API is already utilized in several software tools, including a lightweight version of G-language System available at CPAN that functions as a wrapper around the REST services, with minimal number of external modules for easy installation, and with minimal computational resource requirement. A web service for the generation of interactive and zoomable Chaos Game Representation images is also available utilizing the REST service [6].

References


