Environmental Modelling & Software

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\begin{align*}
 y_k &= y_{k-1} + d_1 \phi_{k-1} \beta_k y_k \\
 \phi_0 x_k &= d_1 \beta_k x_k \\
 \phi_k &= \phi_{k-1} + d_1 a_{k-1} y_k \\
 y_k &= \phi_{k-1} + d_1 T_k \\
 \phi_0 x_k &= \phi_{k-1} + d_1 a_k y_k \\
 \phi_k &= \phi_{k-1} + d_1 a_k T_k
\end{align*}
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Software, Data and Modelling News

Visualisation of hydrological observations in the water data transfer format

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Abstract

The Bureau of Meteorology (the Bureau) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) have developed a Water Data Transfer Format (WDTF) to support the water industry to share and deliver water data to the Bureau as required under the Water Regulations 2008. The data in WDTF is stored into database through a data ingestion process. Until the data ingestion program is completed, there is no standard way to view data of WDTF. The Visualisation Tool is intended to serve the purpose of viewing and inspecting WDTF data in the interim for quality control. This tool also allows the user to explore WDTF (and in the future WaterML) data, including plotting and comparing both time series data and ratings and gauging data.

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Software availability

Name of software: WDTF Visualisation Tool
Developers: Geoffrey Squire and Andrew Pratt
Contact address: WIRADA and CSIRO Water for a Healthy Country Flagship, CSIRO, Canberra, ACT 2600, Australia
Email: waterdata@bom.gov.au
Year first available: 2010
Operating system: Windows and Linux/Unix
Programming language: Java 1.6

1. Overview

The Water Data Transfer Format (WDTF) is a data transfer format for a wide variety of hydrological data, such as flows, groundwater, water storages, meteorology, water use, urban water and water quality (Ranatunga et al., 2010). The WDTF is XML based, and its data is stored into a database named AWRIS (Australian Water Resources Information System) through a data ingestion process. The process of data ingestion is intended to provide a function for viewing WDTF data graphically and textually. However, until the data ingestion program is completed, there is no standard way to view data of WDTF, other than inspecting WDTF data with a generic text editor. The WDTF Visualisation Tool is intended to serve the purpose of viewing and inspecting WDTF data in the interim. The tool is capable of rendering data of both (a) time series and (b) rating and gauging. Rating tables (derivation of volumetric flow from water level) and capacity tables (surface area and storage volume derivation of storages) are required to convert gauging measurements into volumes of water. The rendered data can then be input to any system needing such data for post-processing purposes. For instance, it can be used as a feed to a water resources management system.

The WDTF Visualisation Tool has been developed and tested using Sun’s JDK 1.6.0. It is compatible with any Java6 JDK or JRE (e.g. OpenJDK 1.6.x). The user’s access to the operation of the tool is based on a GUI (Graphic User Interface). It depends on following listed libraries. Appropriate versions are included in the lib directory, each with its license details. More information, different versions, and their sources are available from their associated websites.

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2. Prerequisite of data validity

Each WDTF document (data) intended for viewing must be valid according to WDTF standard’s structure and semantics. One way of validating the data is to use the online WDTF Validation Service. More information about this service, such as its coverage and the architecture, can be found at the Bureau’s web site (BoM, 2010a).

3. Implementation of the WDTF Visualisation Tool

As illustrated in Fig. 1, functionally, the use of the Visualisation Tool begins with the opening of data source(s) and the selection of site(s). The user can specify single or multiple data source files.

To render the data, it is required to further select Property and Feature(s) if it is time series data, or select the Complex Property and Conversion for ratings and gauging data. Property and features are an instance of ‘observedProperty’ and ‘featureOfInterest’ elements, respectively according to the WDTF definition (BoM, 2010b). The Fig. 2 showed an example of a chart with rendered time series data with dual properties.

Specific to time series data’s rendering are the abilities to inspect overall metadata, to examine the time–value pair of a particular data point, and to shift positions of rendered charts. Capturing a rendered image and raw data, printing, and zooming in/out rendered chart(s) are functions available to the user regardless of the data type chosen.

Through the Rating and gauging data, the user can inspect the rendered charts for rating and gauging data. Two selections are required in order to determine which data set is to be rendered: Complex Property and Conversion. In WDTF terminology, the Complex Property data is represented in XPath syntax, which stands for XML Path Language, a query language for selecting nodes from an XML document. Conversion is required because ratings and gaugings tables are associated with a specific time span in which the rating should apply (BoM, 2010b).

For reporting purposes, the image of rendered charts can be copied into the computer system buffer area called the “clipboard” for later retrieval for documentation. In addition, the rendered charts’ corresponding non-graphical, raw time series data can also be copied into the clipboard in Comma-Separated Value (CSV) format. More information about using the Visualisation Tool can be found elsewhere (BoM, 2011).

4. Summary

The Visualisation Tool allows the user to explore WDTF (and in the future WaterML) data, including plotting and comparing time series and ratings/gaugings. It currently supports WDTF version 0.3 and 1.0, and loading WDTF data from files including zipped collections of data files.
Fig. 2. Rendered time series chart with dual properties.

References

