New Features in the Spectrum Services for the Virtual Observatory

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Abstract.   We present the new version of Spectrum Services for the Virtual Observatory. The two year long development period led to a reconsidered user interface, more available datasets, and several scientific functions. Currently available datasets include observed spectrum catalogs (SDSS DR1-DR4, 2dF), as well as simulated or theoretical catalogs (such as Charlot 100k spectrum library, BaSeL stellar library).

Newly available scientific functions include generation of composite spectra, dereddening and calculation of synthetic magnitudes convolving with band pass curves of optical instrument filters to generate simulated photometric catalogs on-the-fly. The most important services are the continuum and spectral line fitting functions which are available for the researchers through the web user interface and through the SOAP web services programmatically. When fitting continuum, different template sets can be chosen including Bruzual-Charlot '03 templates or the SDSS 450k eigenspectra).

MySpectrum is a cross-platform version of the spectrum web service for setting up your own spectrum repository. It integrates into the main service allowing easy access for the VO community to your data.

URL: http://voservices.net/spectrum

1.   New user interface

We introduce a redesigned, easy-to-use web interface. Wizard-like forms help setting the numerous parameters of the scientific functions. These parameters are grouped by functionality for easy navigation. "Next" and "Back" buttons can be used to navigate between property pages. A "Finish" button is made for running spectrum processing with default parameters.

The web user interface is mainly intended for testing the functionality of the services. For batch processing and higher performance, all funtionality is available via XML Web Services for software clients.

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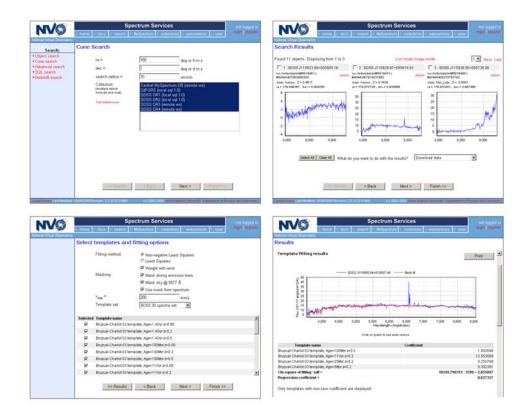[2]Dept. of Physics & Astronomy, Johns Hopkins University, Baltimore, MD 21218, USA

Figure 1.   Wizard pages for executing a query and setting continuum
fit parameters. Users can navigate between pages by the "Back" and
"Next" buttons.

2.   "MySpectrum"

MySpectrum is a simplified version of the Spectrum Services without the sci-
entific functions. It is a platform independent spectrum repository that pro-
vides the same query interface as the Spectrum Services for seamless integration.
MySpectrum currently runs on Windows using the .net framework and MSSQL
or MySQL database servers, or on any Unix systems using the Mono framework
and MySQL database server. Support for additional database systems can be
easily added in the future. We added hierarchical triangular mesh (HTM) sup-
port to the MySpectrum package, so the spatial indexing is also available on
MySQL.

3.   Remote collections and parallel queries

Spectrum Services now support integration of remote data sources using the
standard web service interface. Users of the service can even register their own
data sources and publish their set of spectra easily on the common web interface.
It is the way to publish spectra of any local MySpectrum database on the central
web site. These datasets can be queried using the same web service proxy via

the central web service in parallel, or one-by-one accessing them at their own URLs, which may highly increase performance when retrieving large amount of data.

4. New data model

We introduce an implementation of the new data model designed by the IVOA data model working group. This data model provides a convenient way to describe spectral energy distributions on wavelength or frequency scale, even time series and 2d spectra. The data model defines a hierarchical structure to describe spectrum header data. Using UCDs and standardized unit descriptions the model supports heuristic physical quantity recognition and conversion. The data model standard proposal defines three serialization methods: VOTable for VO compatibility, XML to use with standard web services and FITS for old programs and compact data storage. Currently only XML and VOTable are supported, later via the Simple Spectrum Access (SSA) interface.

For more information about the data model, please visit the Spectrum Services web site at http://voservices.net/spectrum.

5. Dereddening

We use Schlegel's dust map and a combined galactic extinction curve of Cardelli et. al and O'Donnell for dereddening galaxy spectra on-the-fly.

6. Continuum and line fitting

Spectrum services provide the non-negative and standard least squares fitting methods for continuum fitting. You can choose from different sets of theoretical templates, and different masking methods are available to mask strong emission lines, the night sky line and use mask values from the spectra. Emission line fitting is done in the same step by subtracting continuum and not background fitting.

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