AURA Signal Data Explorer

The AURA based Signal Data Explorer (SDE) allows a user to rapidly search by content and browse small to very large amounts of time series data in a similar way as documents and the internet are searched using conventional search engines.

FEATURES

Principal features of the technology are:

◉ **Search signals based on content.**

◉ **Browsing of time series data.**

◉ **Searches for examples that are similar as well as identical.**

◉ **System Scales from small data sets to Terra bytes of data.**

◉ **Data can be stored locally or remotely.**

◉ **System accessed as a web service.**

◉ **Flexible searching that can be adapted for specific applications.**

◉ **Data is loaded very quickly using a data specific conversion system.**

For more information, please contact Cybula at the address below.

Head Office: Cybula Ltd.,
Fimber, East Yorkshire,
YO25 9LY, UNITED KINGDOM
Voice & Fax: +44 (0)1377 236 382
E-mail: enquiries@cybula.com

Introduction

SDE allows a user solve the 'needle in a haystack' problem - how to find that important event in a large, unstructured data set. The user specifies the signal event to be searched by supplying a short example of that event (query by content). The user is able to specify this using manually created examples, historical sample inputs, or examples imported from other systems. The user is then able to select the datasets for the search (remote or local). The search returns a number of examples that can then be browsed using a powerful viewer that is simple to operate.

SDE is designed as a general-purpose search engine for time signal data. As such it is able to return potential hits from large data sets, for a user to browse and find the exact example of interest. This removes the need to manually search all the data. Cybula is able to tune the system to find more specific classes of events in the data more accurately if required.
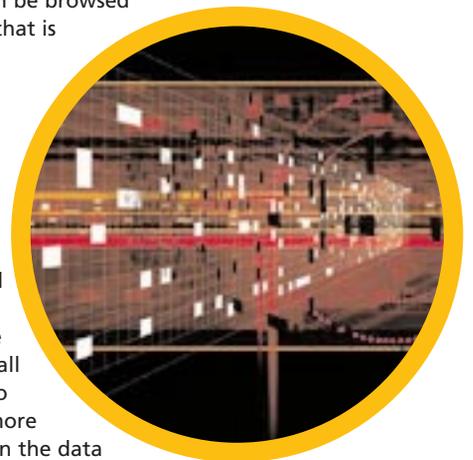
One of the major features of the system is its ability to search small and very large datasets very quickly. For example 10Gb of raw ZMOD data takes less than 1 second on a standard PC. Furthermore, storage of data in the system is also very rapid. To enable scalable search across distributed data SDE leverages Grid technology, permitting secure, rapid delivery of information to the viewer.

SDE consists of two main components a browser and a search engine. These two components may be installed on separate computer systems or together on the same system, allowing distributed datasets to be searched. The search engine is based on the AURA storage system, common to all of Cybula's search products, a scalable search engine for incomplete and noisy data.

One application of SDE has been for engine vibration data, allowing a user browse and search frequency-power spectra from aircraft engines. In this application the data is represented in industry standard ZMOD format.

The system is equally applicable to other signal data, such as those from speed, pressure and audio sensors. Cybula is able to offer other data adapters to read other formats of data.

The system is implemented in C++ and as web services. It is available on a wide variety of platforms, including Sun Solaris, Linux and Windows. For the most demanding of applications it may be hosted on our PRESENCE II PCI standard hardware and Cortex II parallel multi processor servers. These hardware solutions offer exceptional high performance search.

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The Image below shows a typical screen shot of the system in operation. The large window shows the time series (ZMOD) plot. The window below this shows a sample of a signal selected for searching.
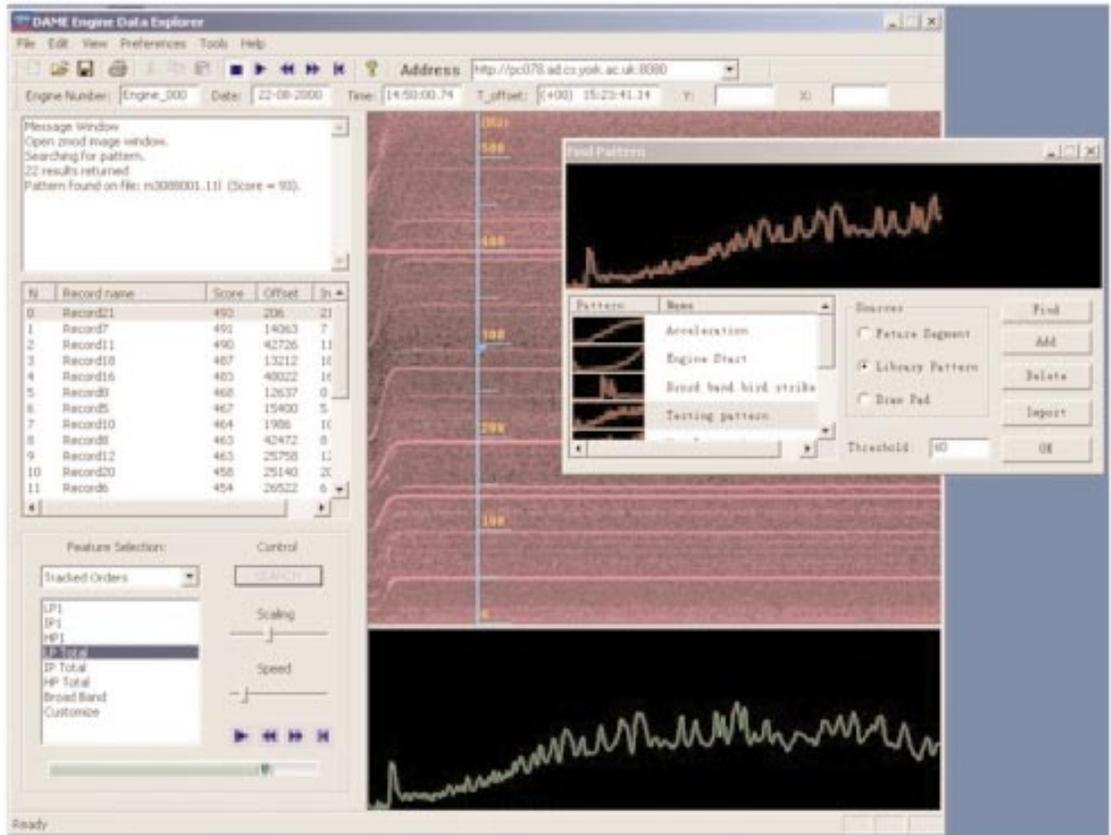
Application examples

Engine vibration data (ZMOD)
The system can be used to search for events, such as a bird strike, in vibration and performance data collected from engine data. This allows an engineer to select data of interest and browse results.

Structural data
Data from structures, such as environmental "shake and bake" tests where vibration, temperature, RF, EMC etc can use data samples and historical data to search and investigate if known events have taken place.

Medical Data
A great deal of medical data is expressed and stored in a time series format which requires search and analysis. SDE allows a user find events in ECG, EEG flow and pressure data etc quickly.

There are many applications for the signal data explorer. Its ability to scale to large datasets with very short search times make it applicable to the most demanding of tasks. The tool can be adapted to take most signal data, please contact Cybula for details and a demonstration of this product and associated services.

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