Data Management for Analytics

Data Curation:
Time Series Pattern Search

Time Series Pattern Search (TPS) models a time series in a compact way and then enables search over these models.

MARKET NEED

The market need for this technology is for applications which perform analysis and data mining of time series. These applications are ubiquitous in many different different domains:

- Body Area Network (BAN) data for medical applications.
- Patient monitoring e.g. real time analysis of ECG data,
- Telemetry of aircraft flights,
- Fluctuations of stock market.

These applications use methodologies such as indexing, classification, clustering and approximation of time series. TPS is software tool that is relevant to all of these applications.

TECHNOLOGY SOLUTION

TPS is a tool that can be used by developers and data analysts to extract events from time series data. For example, TPS can be used to detect fraudulent activity in financial transactional data by leveraging it to detect particular patterns/events in associated log file metrics.

Figure 1 gives a logical overview of the TPS architecture used in HDFS monitoring. In this case, the system analyses HDFS log data to watch for events such as namenode trashing under small file access load. TPS first reduces the dimensionality of a time series. It then extracts entities such as peaks, valleys and other patterns from the time series. These extracted patterns are placed into a pattern database.

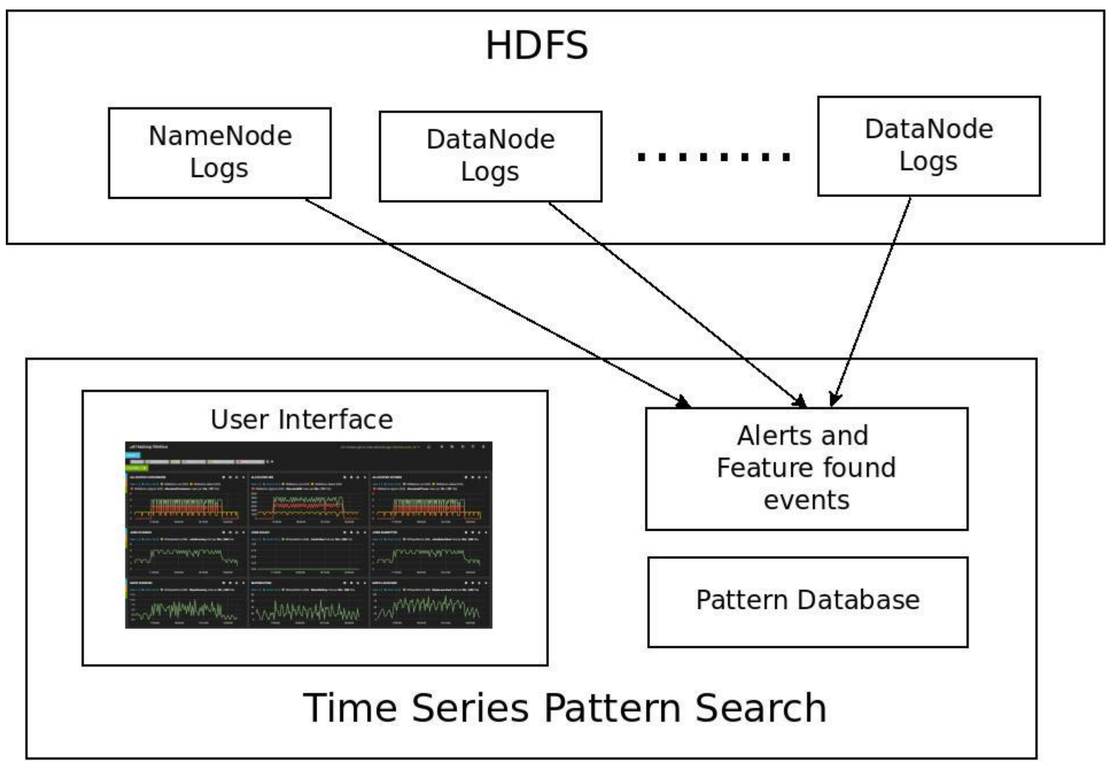

Figure 1: TPS architecture for Monitoring HDFS events

Figure 2 shows a view of the pattern database which TPS has extracted from DSL time series data. TPS enables the user to query over the pattern database using a combination of spatial filters. For example, a user can find a pattern that consists of two large peaks followed by one small peak. TPS allows the user to search for patterns that are approximately similar to a search pattern or to combine search patterns across multiple time series. These user defined higher level patterns can then become signals or events that the user can monitor.

APPLICABILITY

This work is not restricted to particular market sectors. Any organization in which time series data is analysed will benefit from using TPS to extract value from such data.

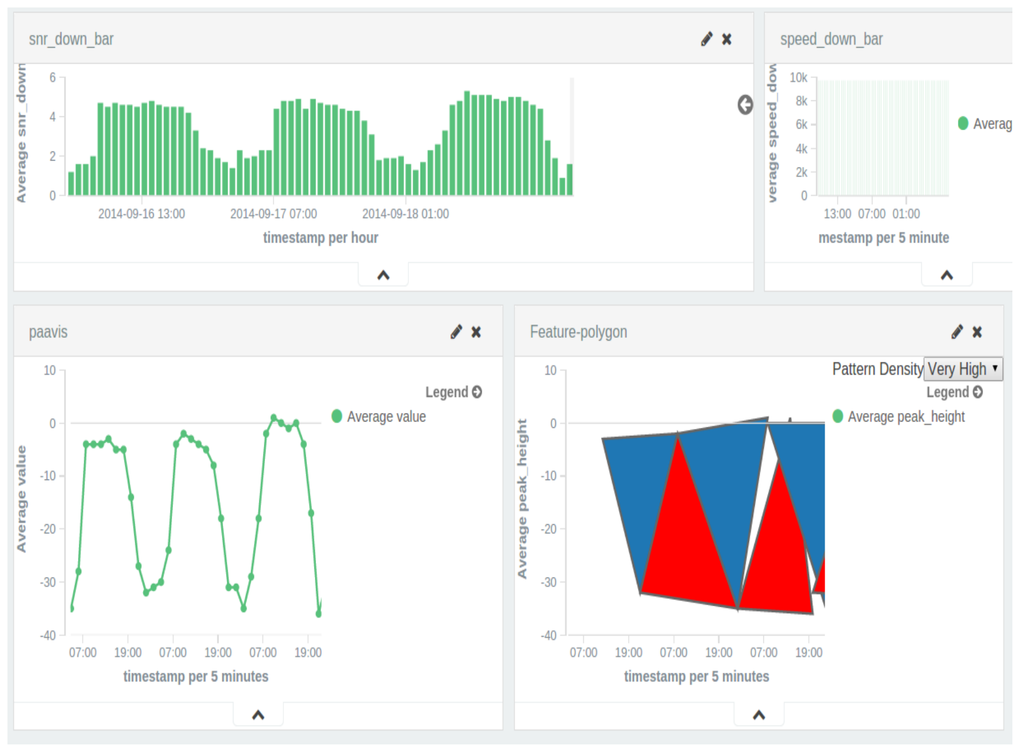

Figure 2: TPS in action

RESEARCH TEAM

The research team at UCC consists of Barry O'Sullivan, Derek Bridge, Helmut Simonis, and Paul Davern.