

# Interactive Exploration of Time Series Data

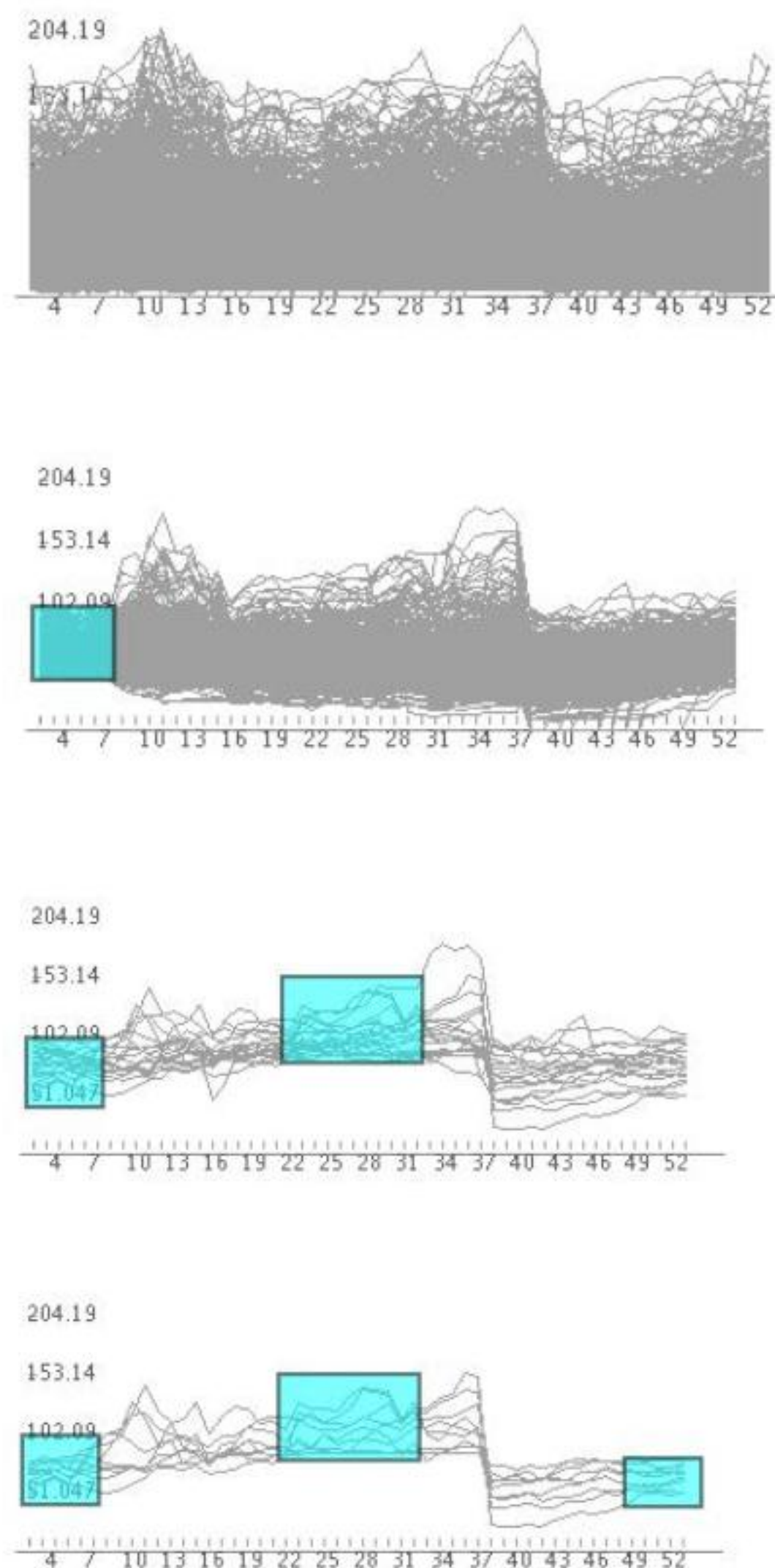
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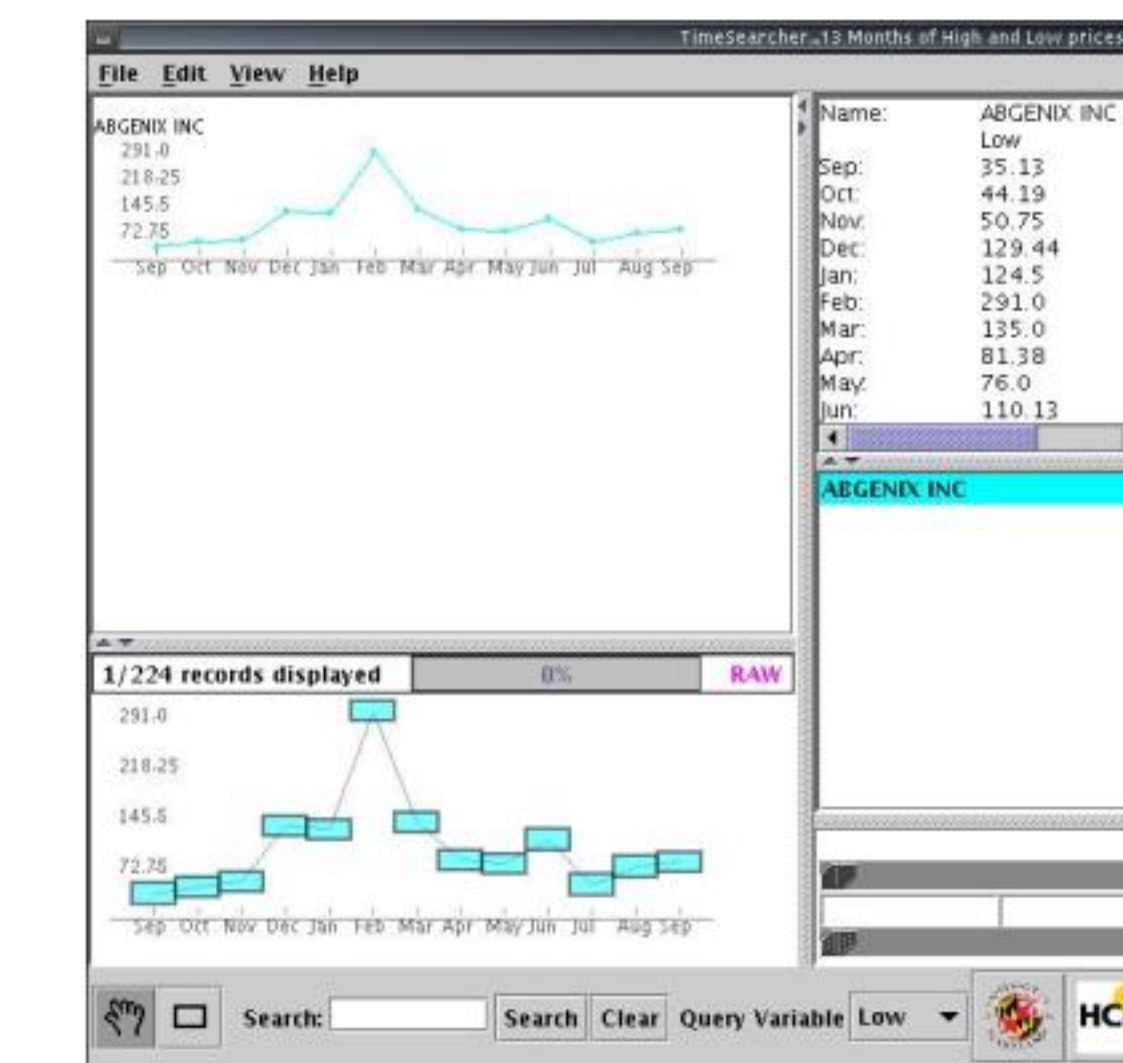


## Timeboxes: Interactive Temporal Queries



## TimeSearcher

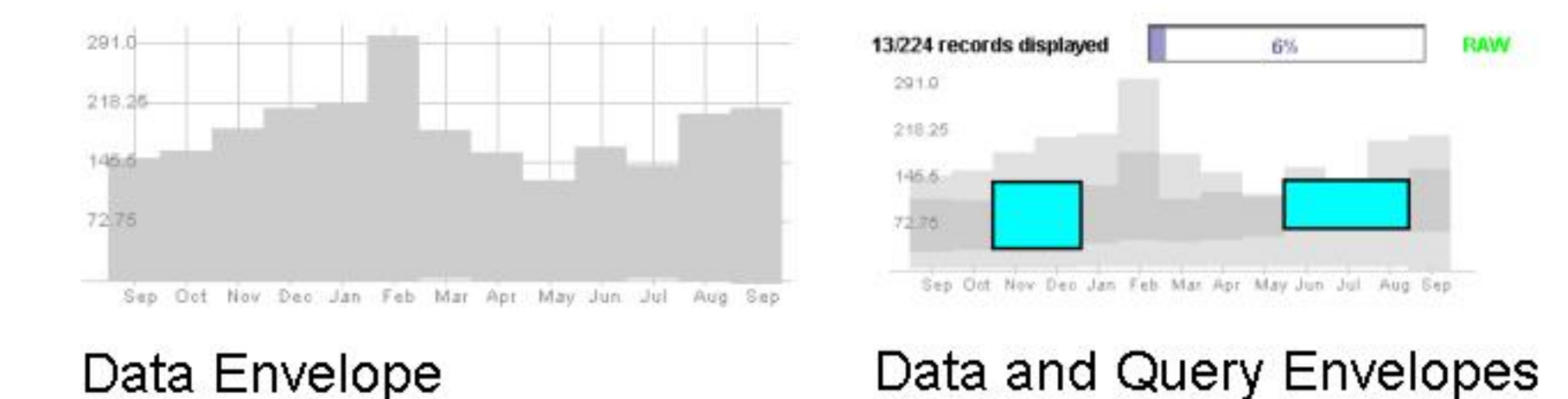
## Drag-and-Drop: Query-by-example



- Find items similar to chosen item
- Refine query by moving & scaling Timeboxes

## Overview Envelopes

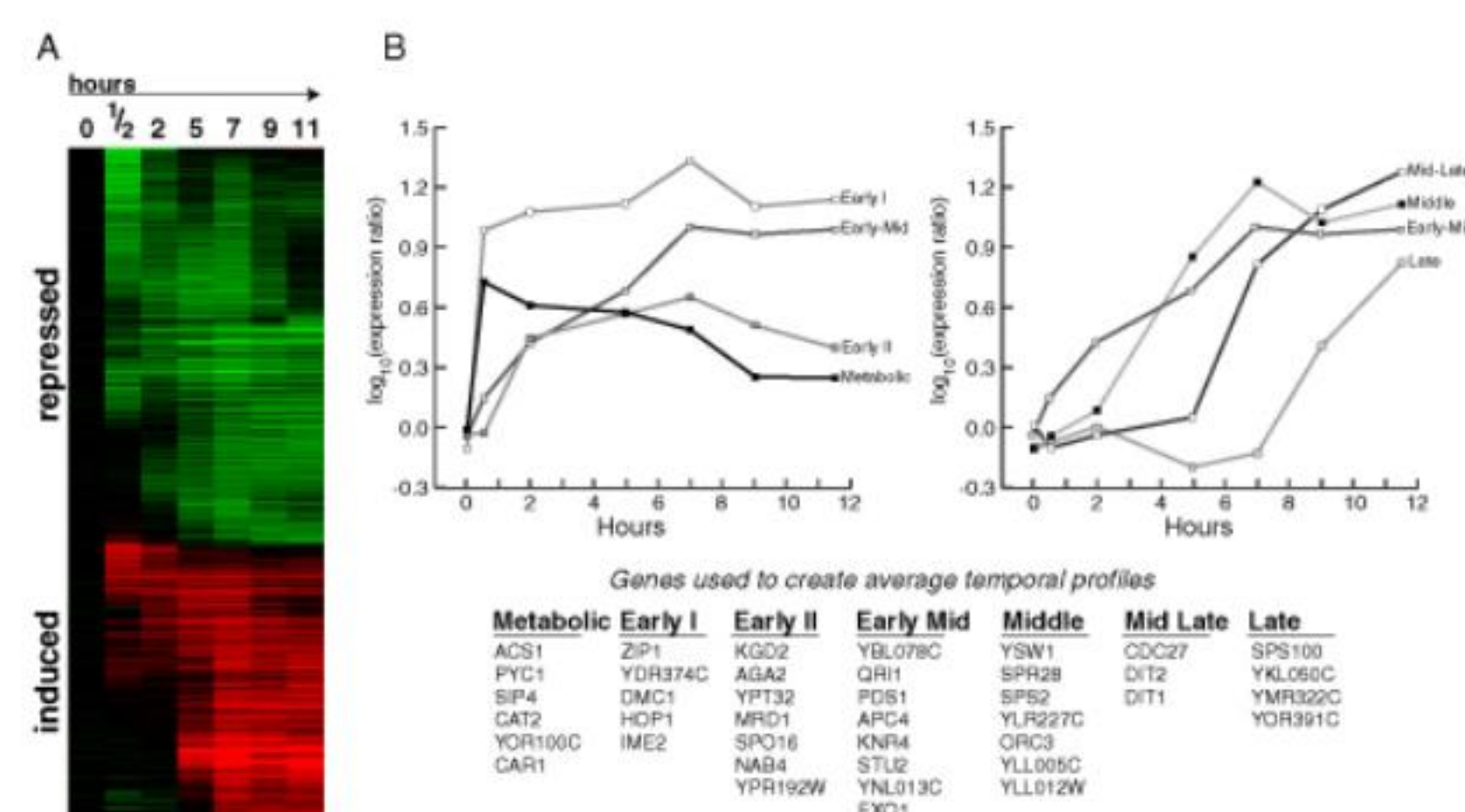
- How to provide overview of entire data set?
- One possibility: envelopes
- Show minimum and maximum values at each time point
- Add inner envelope for result set after query



<http://www.cs.umd.edu/hcil/timesearcher>

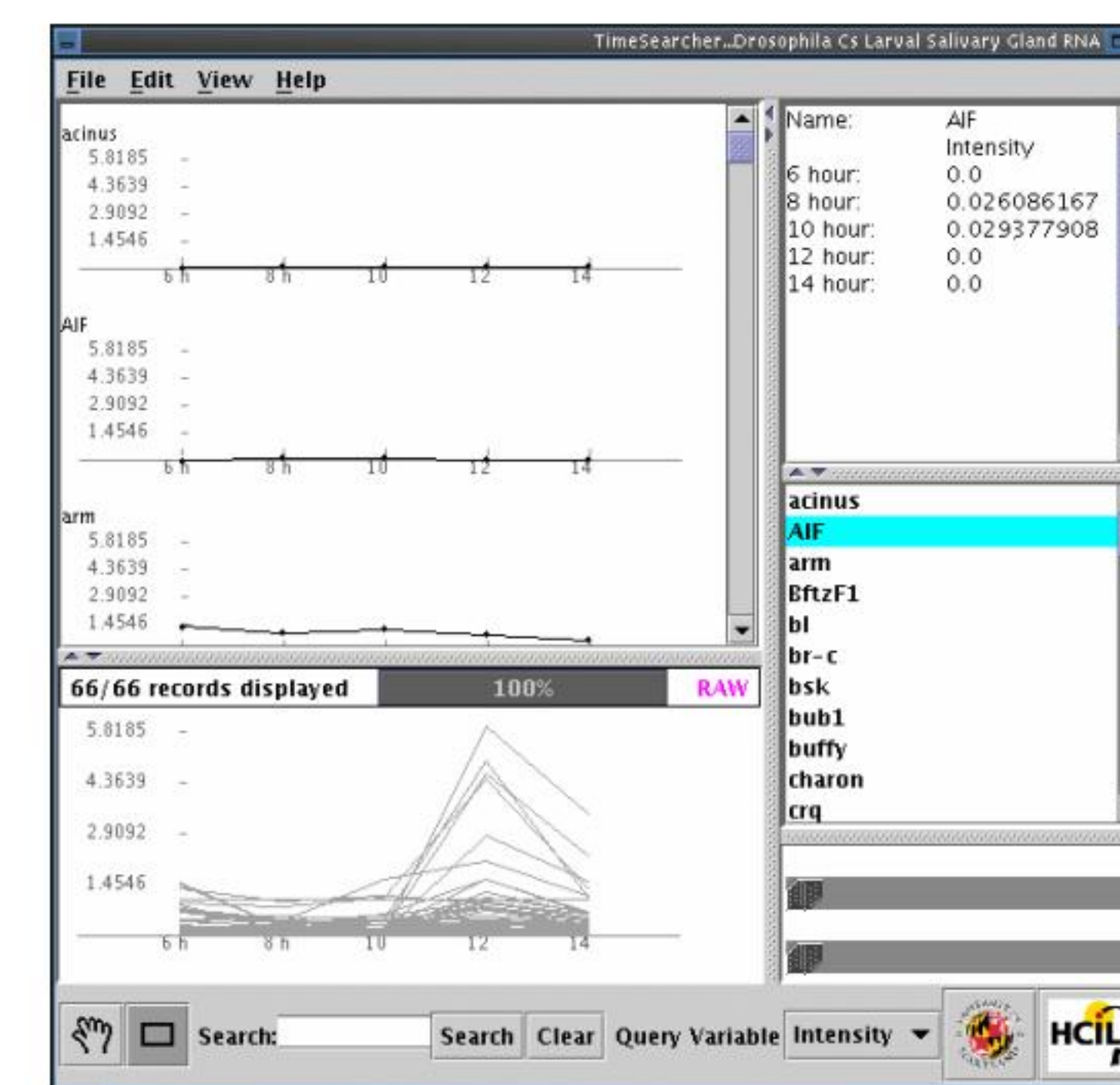
## Application Example: Microarray Gene-Expression Data

- Microarray experiments generate gene expression profiles
- Goal: find patterns of interest
- Information visualization techniques for interactive exploration

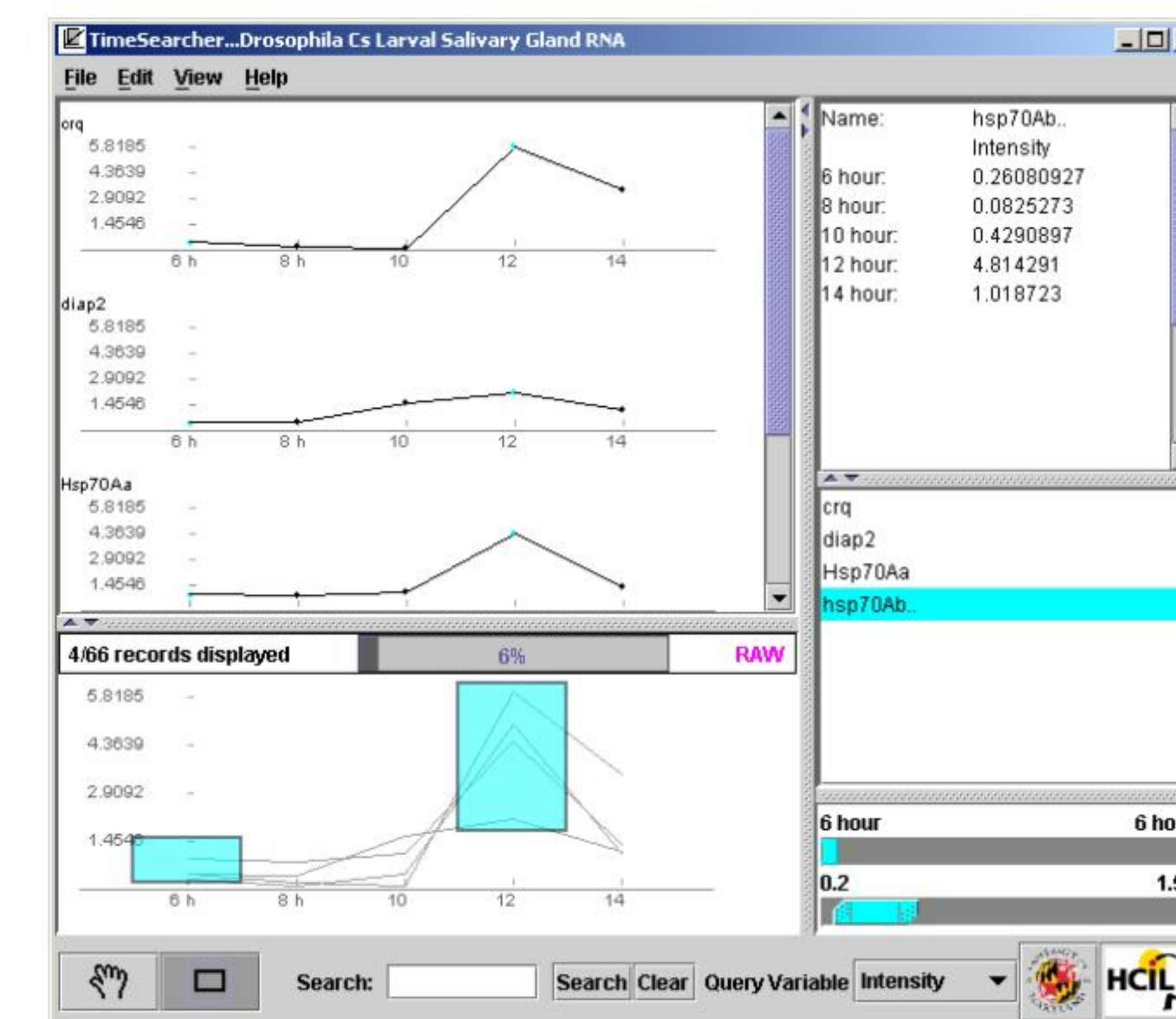


Gene expression profiles with time series.

Chu, et al. The transcriptional program of sporulation in budding yeast, *Science* 1998 Oct 23; 282(5389): 699-705. (<http://mgm.stanford.edu/sporulation/>)



Data set: Gene expression levels from *Drosophila Melanogaster*  
Data collected by Baehrecke Lab, University of Maryland Biotechnology Institute



Timebox query showing *Drosophila Melanogaster* genes with increased expression levels at 12 hour observation