

|Numenta Anomaly Benchmark|

## Numenta Anomaly Benchmark

### The First Temporal Benchmark Designed to Evaluate Real-time Anomaly Detectors

The growth of the Internet of Things has created an abundance of streaming data. Finding anomalies in this data can provide valuable insights into opportunities or failures. Yet it's difficult to achieve, due to the need to process data in real time, continuously learn and make predictions. How do we evaluate and compare various real-time anomaly detection techniques?

The Numenta Anomaly Benchmark (NAB) provides a standard, open source framework for evaluating real-time anomaly detection algorithms on streaming data. Through a controlled, repeatable environment of open-source tools, NAB rewards detectors that find anomalies as soon as possible, trigger no false alarms, and automatically adapt to any changing statistics.

NAB comprises two main components: a scoring system designed for streaming data and a dataset with labeled, real-world time-series data.

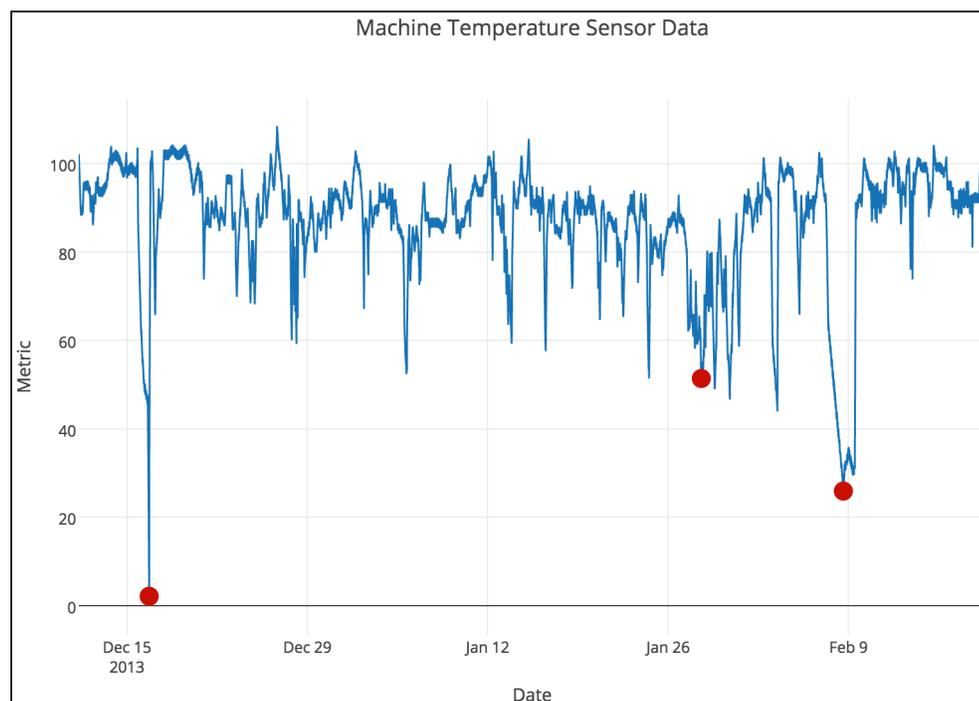


Fig. 1: Temperature sensor data with three labeled anomalies

### TIME-SERIES DATA

Contains real-world, time-series data with labeled anomalies. Includes variety of data metrics and common challenges.

### SCORING MECHANISM

Evaluates real-time performance and rewards earlier detection within defined anomaly windows while penalizing false results.

### OPEN SOURCE CODE LIBRARY

Provides a modular, open codebase, built through collaboration. Designed to test algorithms in any language, adjust application profiles and test custom labeled data files.

## Try NAB!

- Evaluate your algorithms
- Report your results
- Develop new anomaly detection algorithms

<https://github.com/numenta/NAB>

## ABOUT THE COMPANY

Numenta's mission is to lead the new era of machine intelligence. The biologically inspired technology was first described in Numenta co-founder and thought-leading technologist Jeff Hawkins' book *On Intelligence* and is based on principles discovered in studying how the brain processes information.

For more information on NAB, see A. Lavin and S. Ahmad, "Evaluating Real-time Anomaly Detection Algorithms – the Numenta Anomaly Benchmark," in 14th International Conference on Machine Learning and Applications (IEEE ICMLA'15), 2015. <http://arxiv.org/abs/1510.03336>

## Key Components

### Real Time-Series Data

- 58 labeled data files
- 365,551 data points
- Multiple streaming data anomalies
- Diverse data sources:
  - IT Metrics
  - Industrial machine sensors
  - Social media chatter

### Algorithms

- [Hierarchical Temporal Memory](#) – Numenta
- Etsy Skyline
- Twitter

### Scoring Mechanism

- Rewards algorithms that:
  - Detect all anomalies present
  - Detect anomalies as soon as possible
  - Trigger few false positive
  - Work with real-time data
  - Are fully automated across all datasets
- Defines anomaly windows to measure early detection
- Uses application profiles to gauge performance for different scenarios

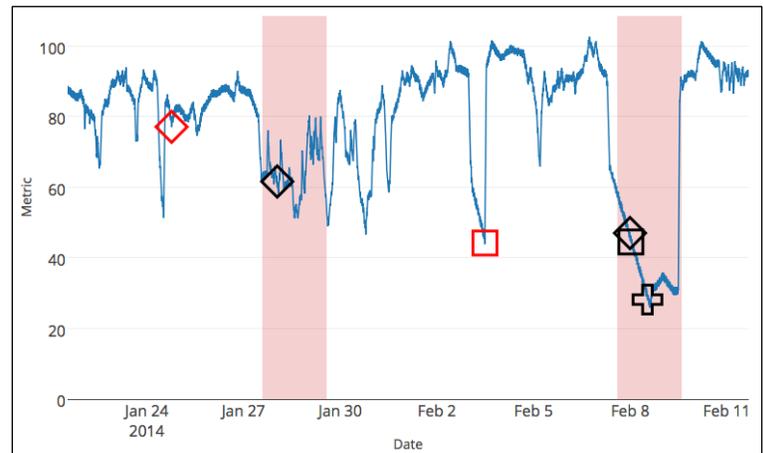


Fig. 2: Anomaly detection by 3 algorithms on machine temperature data

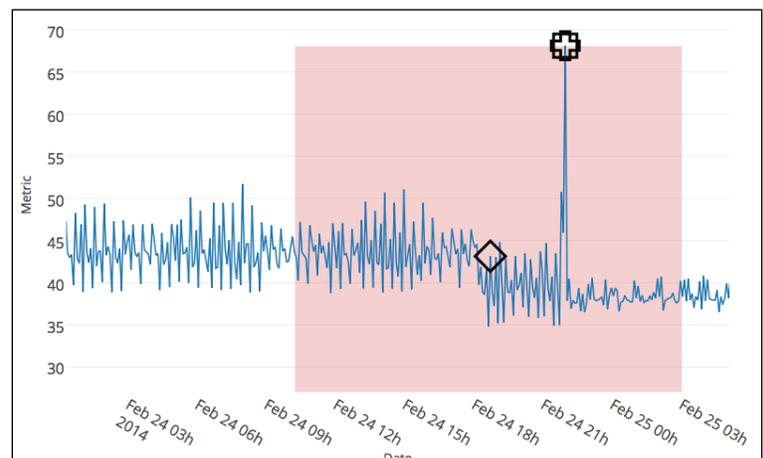


Fig. 3: Zoom-in of anomaly window showing early detection of temporal change preceding large shift