

# Making sense of data streams

## Complex Event Processing for Controls Applications

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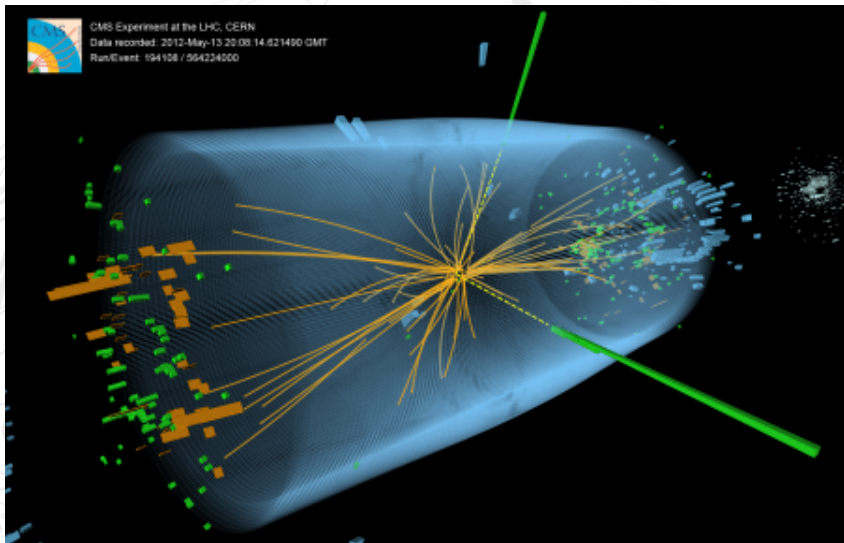
August 19, 2014



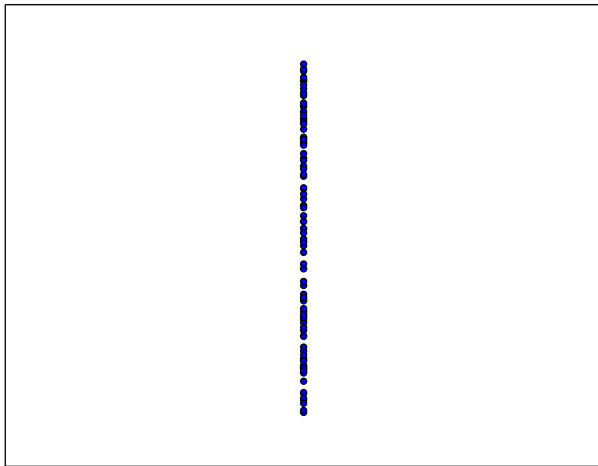
**CERN**openlab

**SIEMENS**

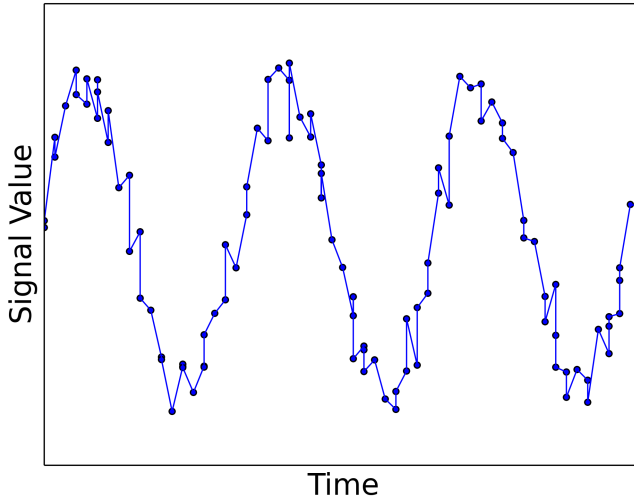
# Dynamic vs. Static



Signal Value



# Data Points in time



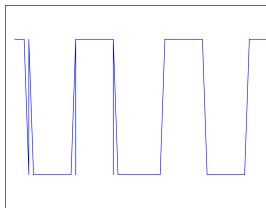
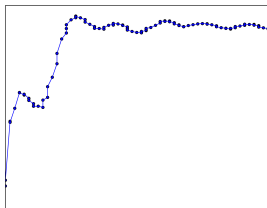
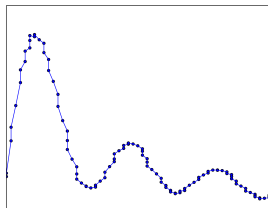
## Time Windowing

- Length;
- Sliding Time Window;
- Time Batch.

## Measures

- Average;
- Standard Deviation;
- $k$ -Lag;
- etc.

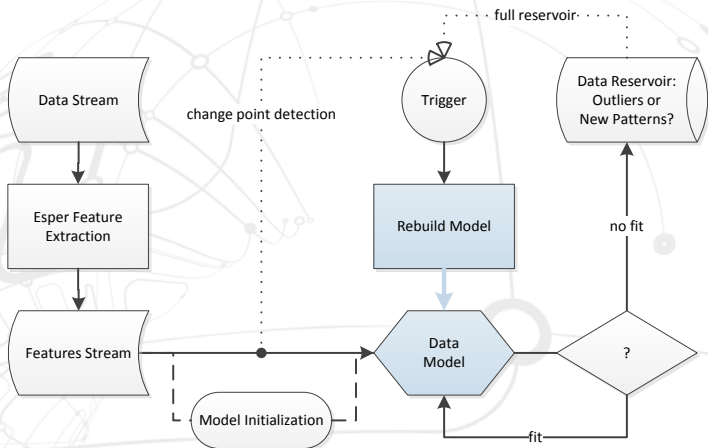
avg | std | 1-lag  $\rightarrow$  in time



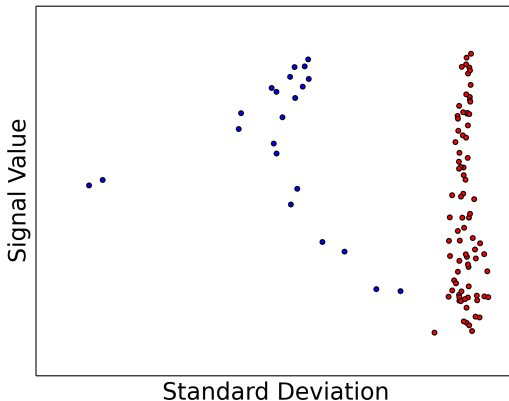
# Feature Extracting Module

```
select
  avg(current) as F1,
  stddev(current) as F2,
  featureExtractors.FeatureExtractor.posNeg
    ((current - prev(3, current)) ) as F3,
  current as F4,
  featureExtractors.FeatureExtractor.threshold
    (current) as F5,
  5 as FN,
  timer as TS
from SinTick.win:time(60 sec);
```

# Algorithm model







## Legend

- RED Signal standard behavior,
- BLUE Signal abnormal behavior—action needed.

