

# DeviationSequenceAnomalyDetection operator

This operator searches for anomalies in a sequence in comparison to the learned sequences. To do this, the operator uses the deviation information created by the [DeviationSequenceLearn operator](#). For each tuple of a sequence, the value is compared to the learned distribution (mean and standard deviation). The data input port is 0, the input port with learn data is 1.

## Parameters

- **interval** Defines, how many standard deviations are allowed for a tuple to be different from the mean. 3.0 is the default value. Choose a smaller value to get more anomalies
- **tupleCountLearnAttribute** The attribute name on the learn port that gives the group count (the counter that gives each tuple in the sequence a number)
- **meanLearnAttribute** The attribute name on the learn port that has the mean
- **standardDeviationLearnAttribute** The attribute name on the learn port that has the standard deviation
- **valueDataAttribute** Name of the attribute which should be analysed
- **GROUP\_BY** If you use a deviationSequenceLearn operator, use 'group' as grouping attribute.
- **fastGrouping** Use hash code instead of tuple compare to create group. Potentially unsafe!

## Example

The DeviationSequenceAnomalyDetection operator uses the learned data from the previous [DeviationSequenceLearn operator](#).

```
#PARSER PQL
#RUNQUERY
///
  Values above 50 will be 'true' (which means that the current sequence
  starts / runs) and smaller values to 'false' (means: sequence ended)
stateInfo = MAP({
  expressions = ['temp', ['temp > 50', 'state']]
  },
  System.manual
)

/// The elements within one sequence will be counted (starts from 1 with each new sequence)
sequence = MAP({
  expressions = ['temp', 'counter(state)']
  },
  stateInfo
)

///
  The tuple which marks the end of the sequence (and itself is not part
  of the sequence) has the counter_state_ 0 and will be filtered out
onlySequence = SELECT({PREDICATE = 'counter_state_ > 0'}, sequence)

/// Learn how a "normal" sequence is. The first 15 sequences will be learned and used as the definition of
"normal"
sequenceLearn = DEVIATIONSEQUENCELEARN({
  group_by = ['counter_state_'],
  parameterAttribute = 'temp',
  sequencesToLearn = 15
  },
  onlySequence
)

///
  Check, if the current tuple of this sequence differs from the normal
  tuples of the sequence at the specific point of the sequence
sequenceAnalysis = DEVIATIONSEQUENCEANOMALYDETECTION({
  interval = 4.0,
  standardDeviationLearnAttribute = 'standardDeviation',
  group_by = ['group'],
  meanLearnAttribute = 'mean',
  valueDataAttribute = 'temp'
  },
  0:sequenceLearn,
  1:sequenceLearn
)
```