

{RIVIERADEV}



Rediscover the known Universe with NASA dataset

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lover



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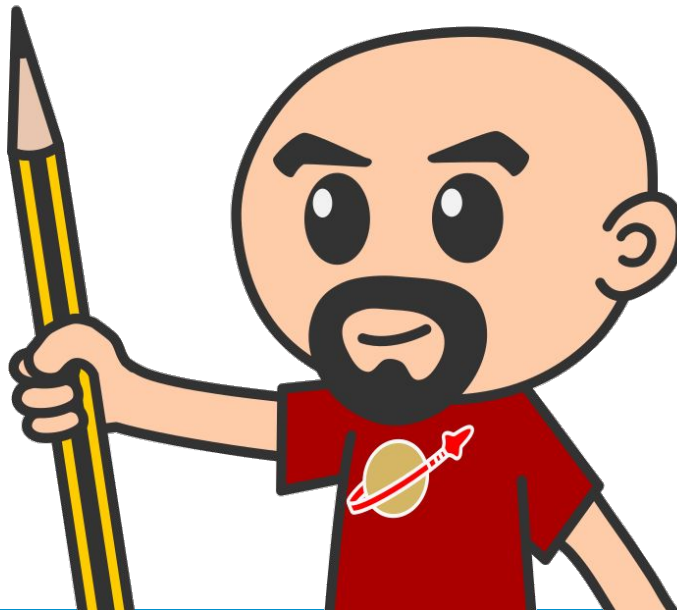
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dreamer and all-around geek

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Team DevRel



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HelloExoWorld

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- What are Time Series?
- What are Warp10 and OVH Metrics?
- What is an exoplanet?
- How can I found an exoplanet?



The result



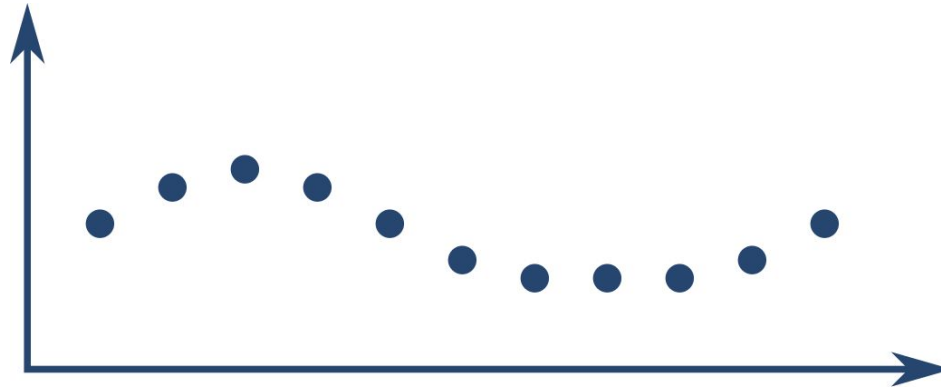
Time Series

What are they?



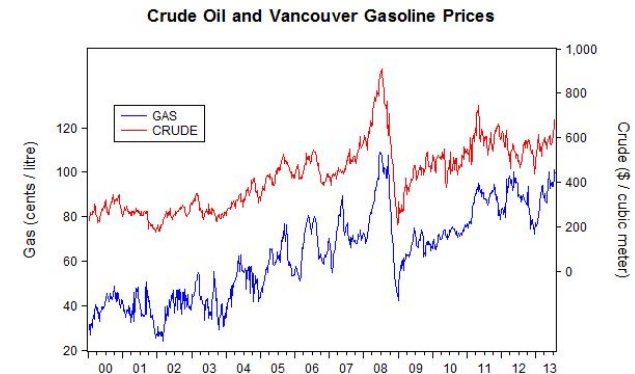
Definition of Time Series:

An ordered sequence of values of a variable at equally spaced (or not) time intervals.



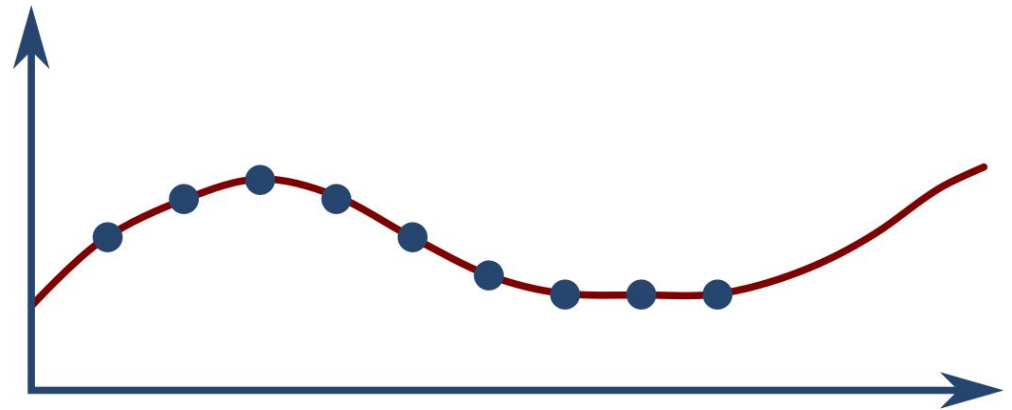
Time Series

- Stock Market Analysis
- Economic Forecasting
- Budgetary Analysis
- Process and Quality Control
- Workload Projections
- Census Analysis
- ...



Applications:

- Understanding the data
- Fit a model
 - Monitoring
 - Forecasting

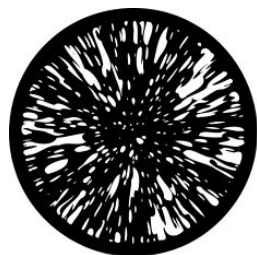


Time Series Databases

Many options



Time Series Databases



WARP 10

OVH Metrics

What is it?



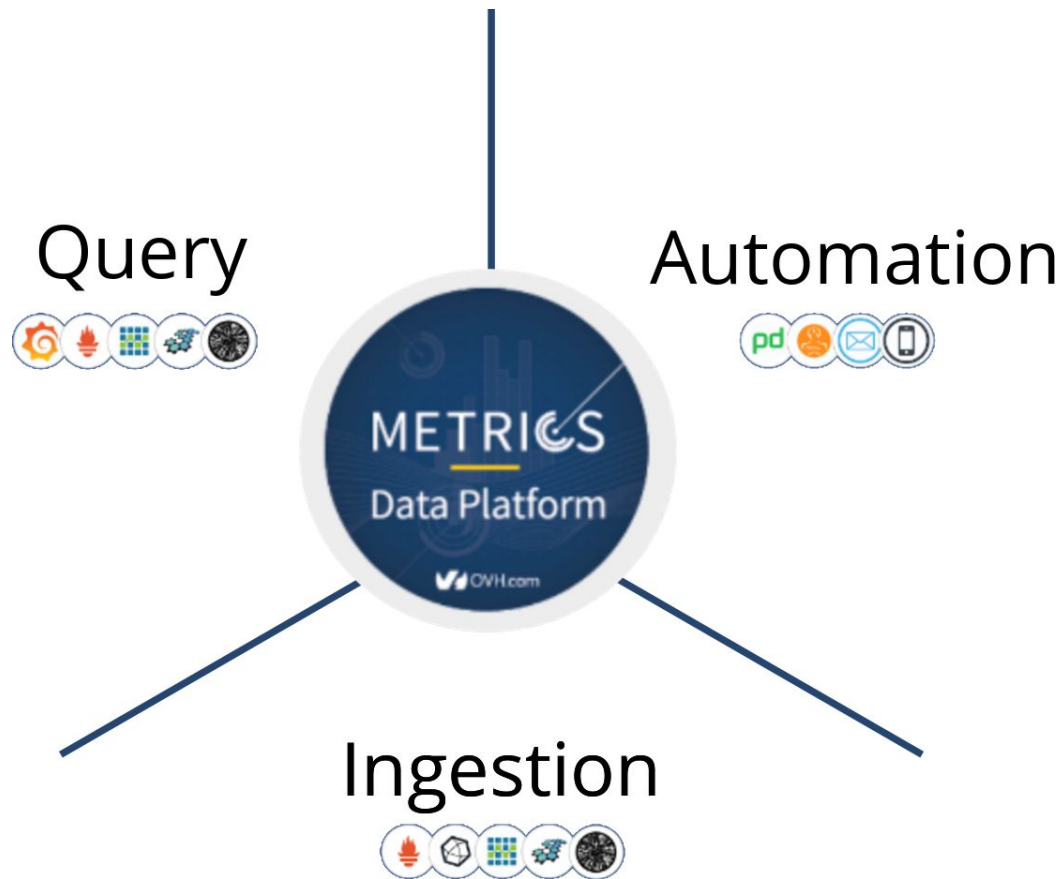
What's OVH Metrics

Managed Cloud Platform for Time Series



Metrics Data Platform

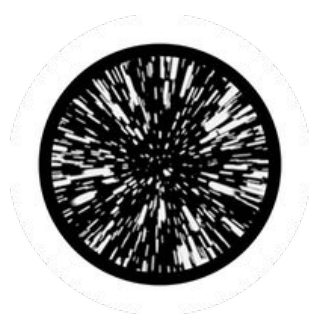
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Metrics Data Platform

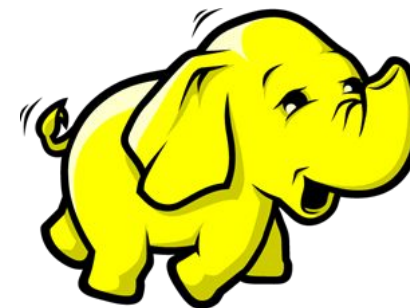
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The logo for Riviera Dev, featuring the text "{RIVIERA DEV}" in a bold, sans-serif font. The word "RIVIERA" is in dark grey, and "DEV" is in blue. The curly braces are yellow.

Some Metrics's metrics:

- 1.5M datapoints/s, 24h/7
- Peaks at ~10M datapoints/s
- 500M unique series
- Deleted (varying) up to 8M datapoints/s
- 2 Trillion deletes capacity per week



Exoplanets

What are they?



Exoplanet?

An exoplanet is a planet **outside** our solar system that orbits a star.



How many?



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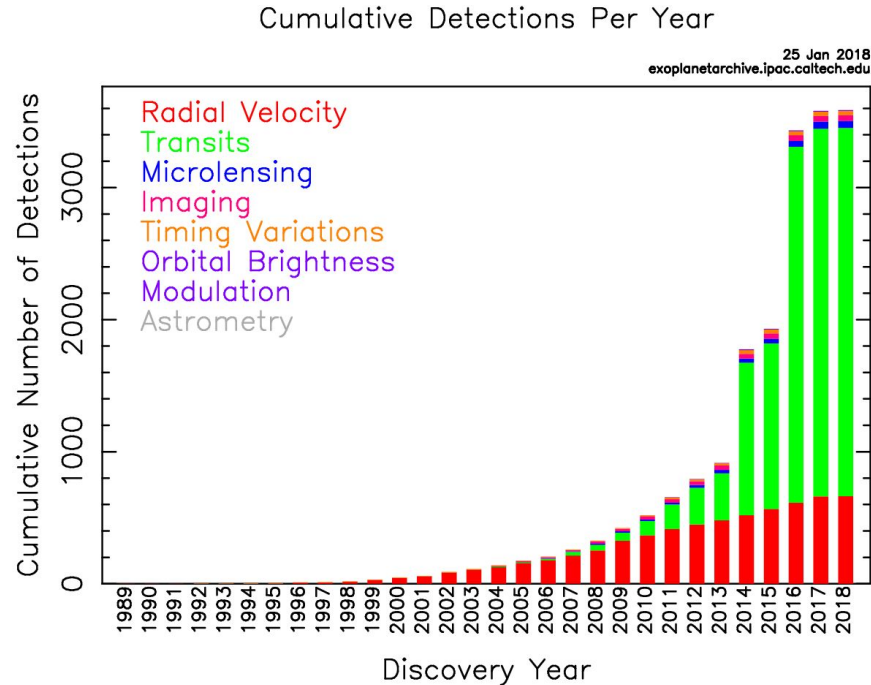
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3,725 Confirmed Planets 04/26/2018 →	613 Multi-Planet Systems 04/26/2018 →	4,496 Kepler Candidates 08/31/2017 →	View more Planet and Candidate statistics →
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<https://exoplanetarchive.ipac.caltech.edu/index.html>



Detection method



<https://exoplanetarchive.ipac.caltech.edu/exoplanetplots/>



Transit



Credits: NASA's Goddard Space Flight Center



Example



Pleiades By NASA, ESA, AURA/Caltech, Palomar Observatory. Via Wikimedia Commons



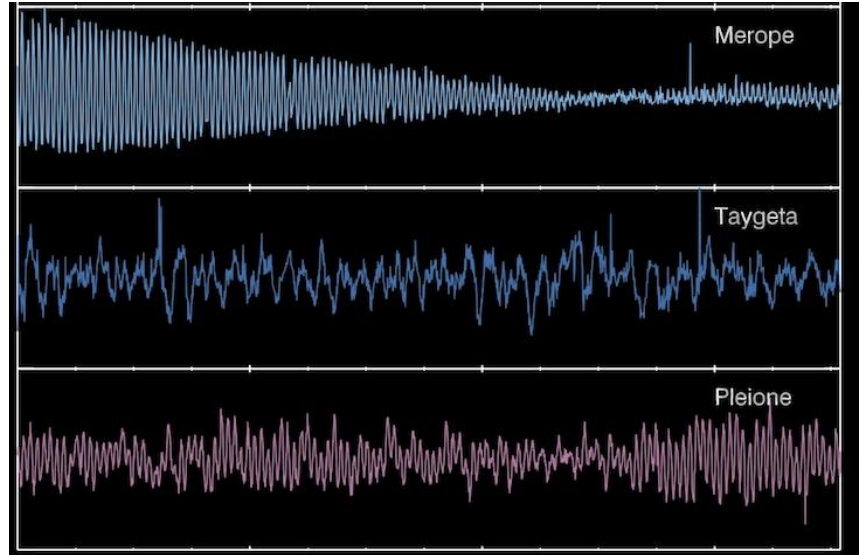
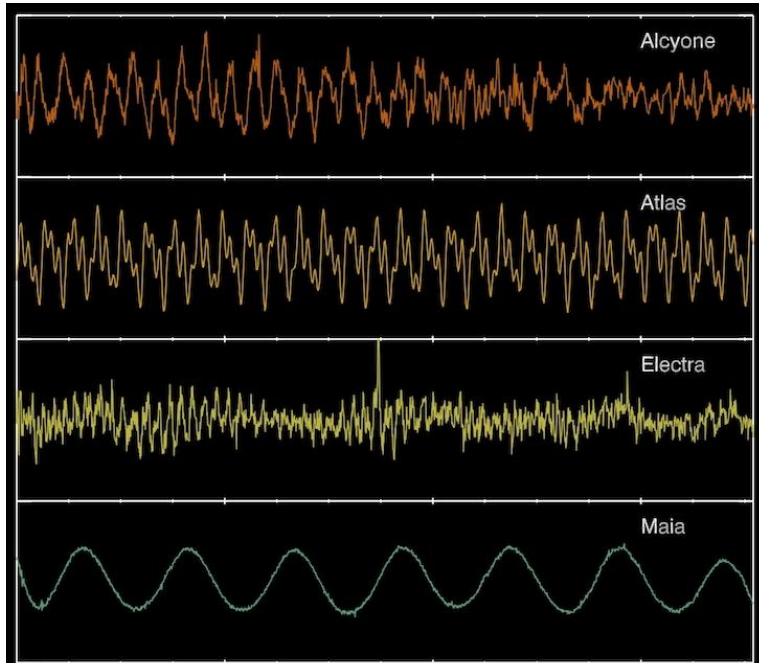
Example



Pleiades By NASA, ESA, AURA/Caltech, Palomar Observatory. Via Wikimedia Commons

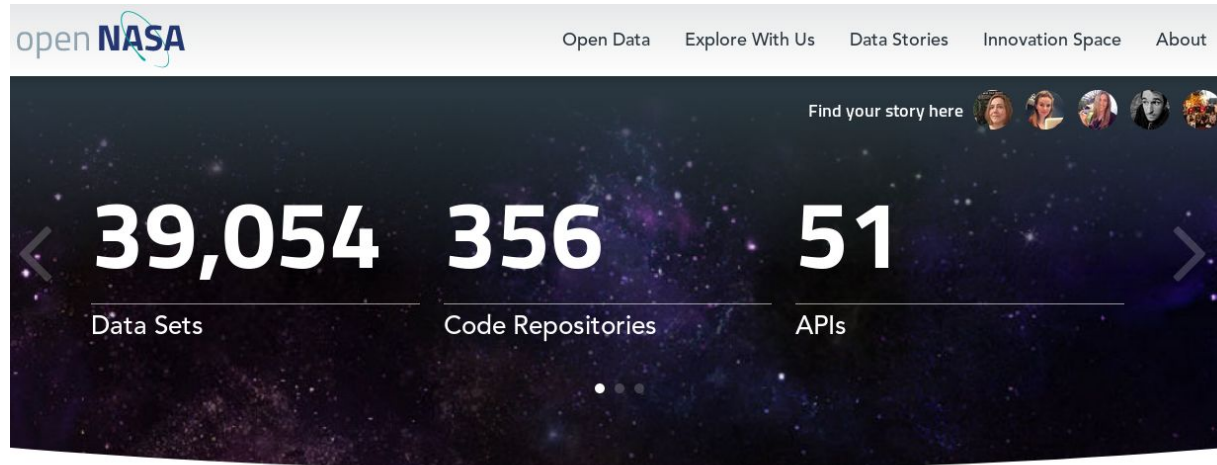


Not that easy



Credit: Aarhus University / T. White





What describes you best?



Citizen Scientist



Developer



Citizen Activist



Govvie



Curious



Kepler satellite

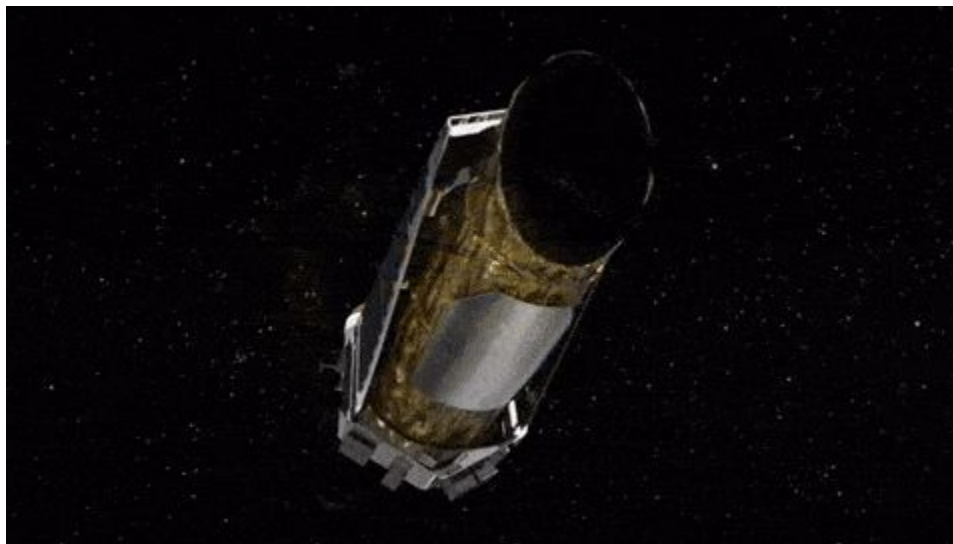
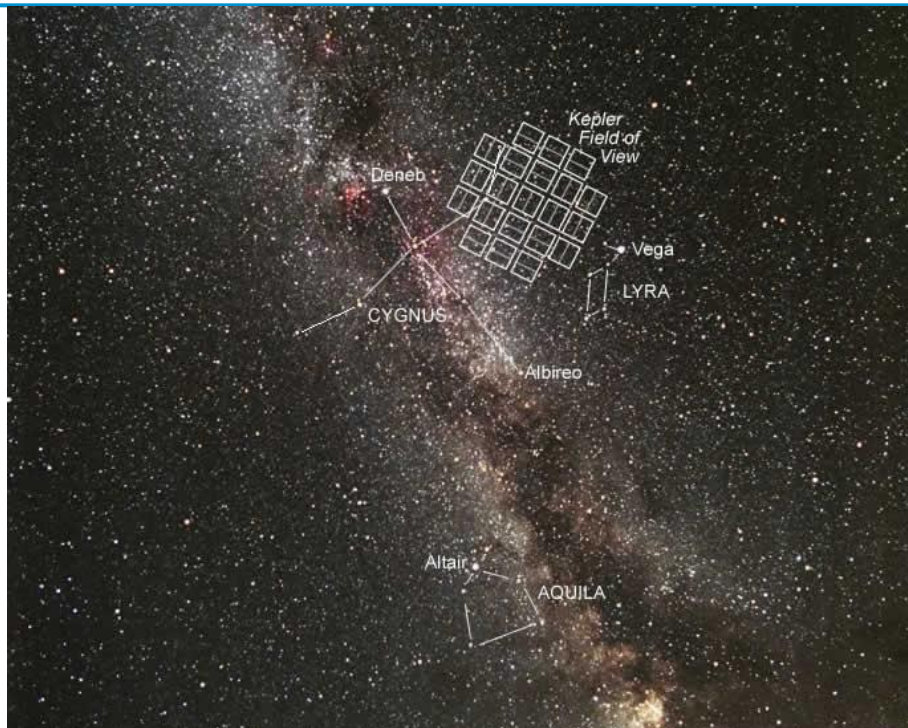


Image credit: NASA

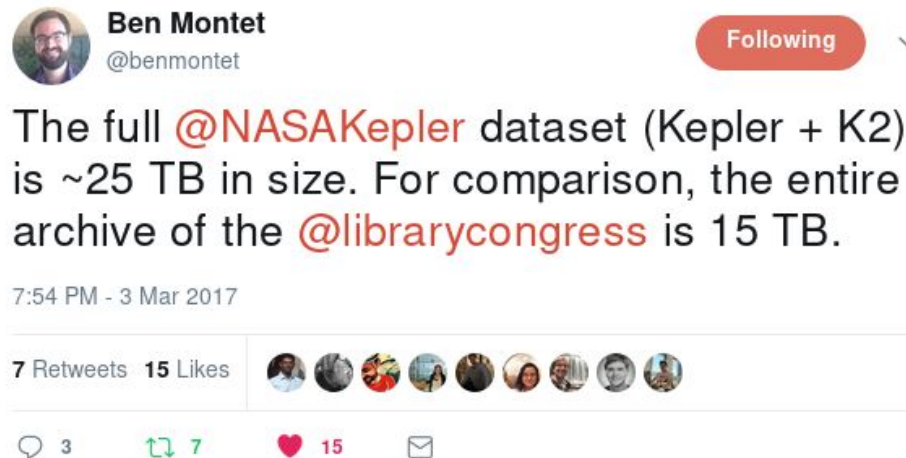


Kepler satellite



By Carter Roberts [Public domain], via Wikimedia Commons





40,726,580 Light Curves

What we have done:

- Downloaded and parsed 40M of FITS files
- Pushed it to a Warp10 instance
- Select a cool subset for you

What you have to do:

- Find some exoplanets!

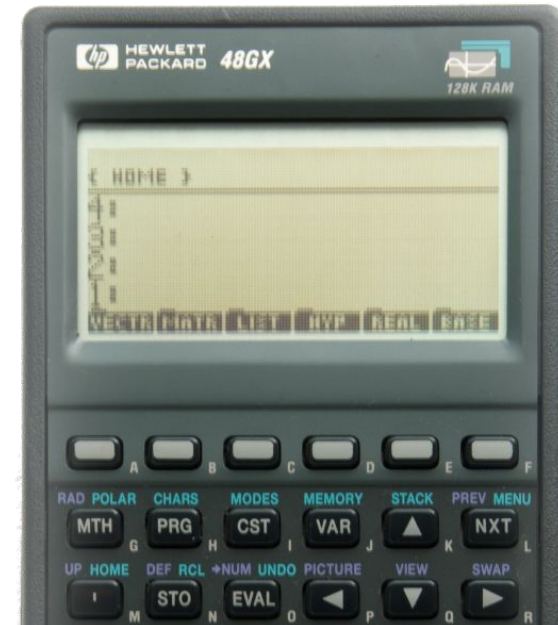
Let's get started!

1. Connect to <https://bit.ly/2H7Z5b3>
- OR
2. Connect to WIFI HEW-5G (or HEW)
3. Password is helloexoworld
4. Click on cancel on user password window
5. Open chrome/chromium on 192.168.1.2
6. Enjoy!



Reverse Polish Notation

Input	2	3	add	11	mul	1	add
Stack		3		11		1	
	2	2	5	5	55	55	56



Variables

'hello, world!'

'exo' STORE

\$exo

// Push Hello World String on the Stack

// Store it in a variable called exo

// Then push back exo variable on the stack



What are the available series?

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```
[
  $readToken           // Application authentication
  '~.*'                // selector for classname
  {}                   // Selector for labels
]
FIND
```

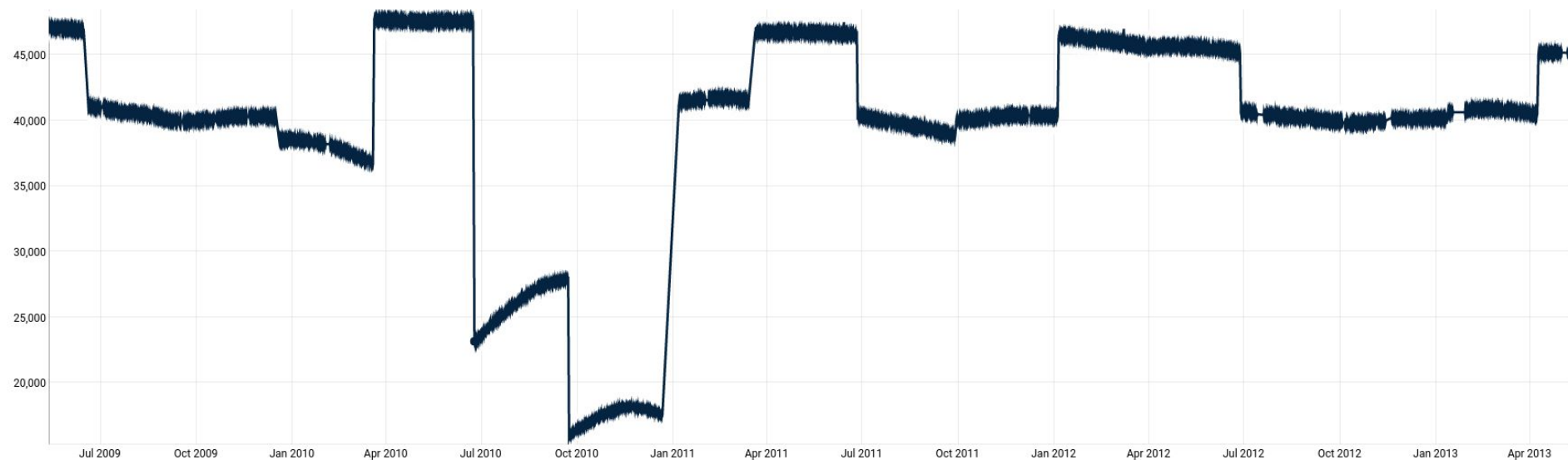


Get raw data

```
[  
  $readToken           // Application authentication  
  'sap.flux'           // selector for classname  
  { 'KEPLERID' '6541920' } // Selector for labels  
  '2009-05-02T00:56:10.000000Z' // Start date  
  '2013-05-11T12:02:06.000000Z' // End date  
]  
FETCH
```



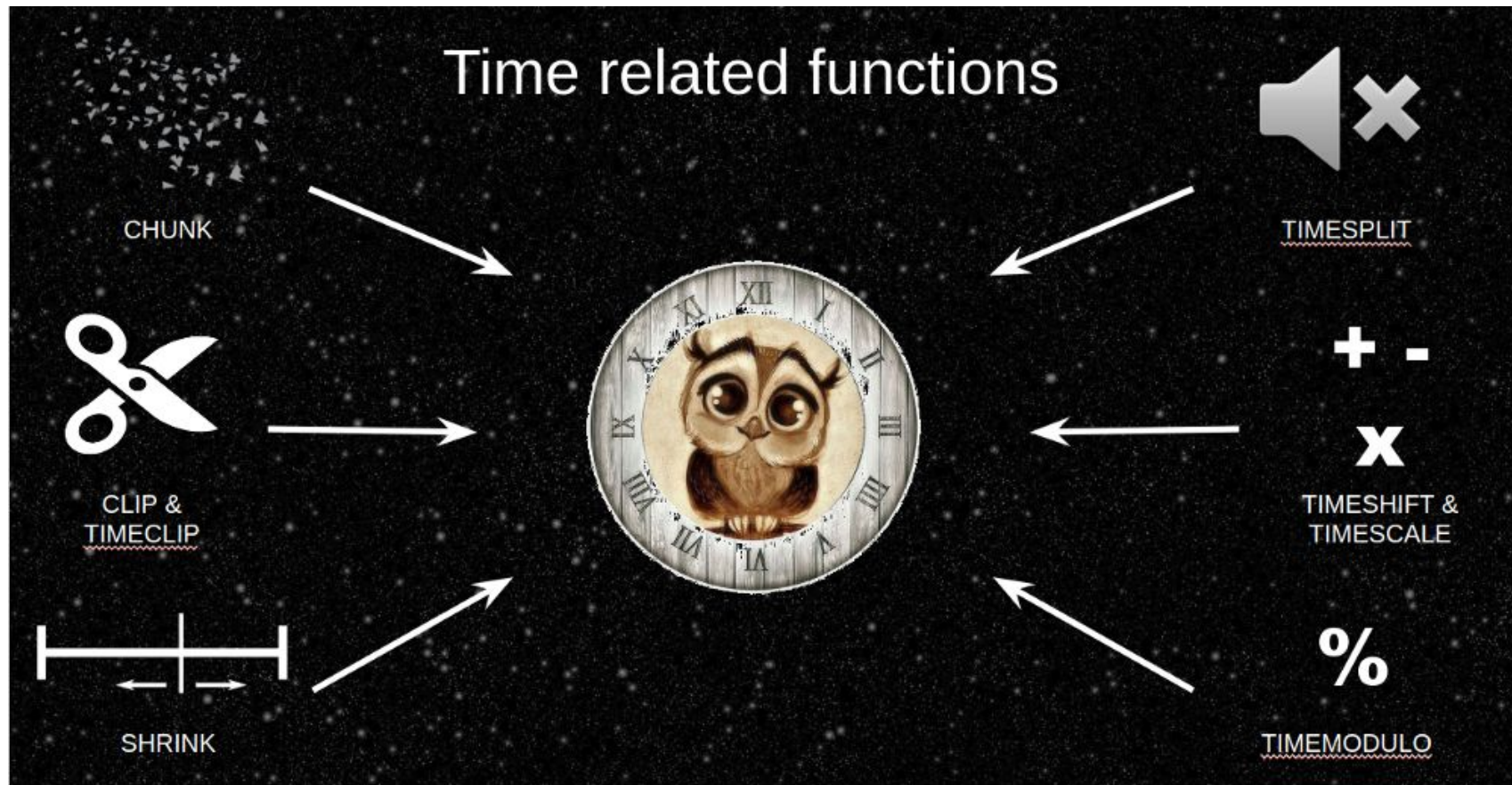
Kepler-11: Raw data



Time manipulation



Time related functions



How to split a Time series

\$gts

6 h

100

'record'

TIMESPLIT

// Singleton (or list of) GTS

// Minimum of time without data-points

// Minimum of data-points required

// New labels to subdivide the result

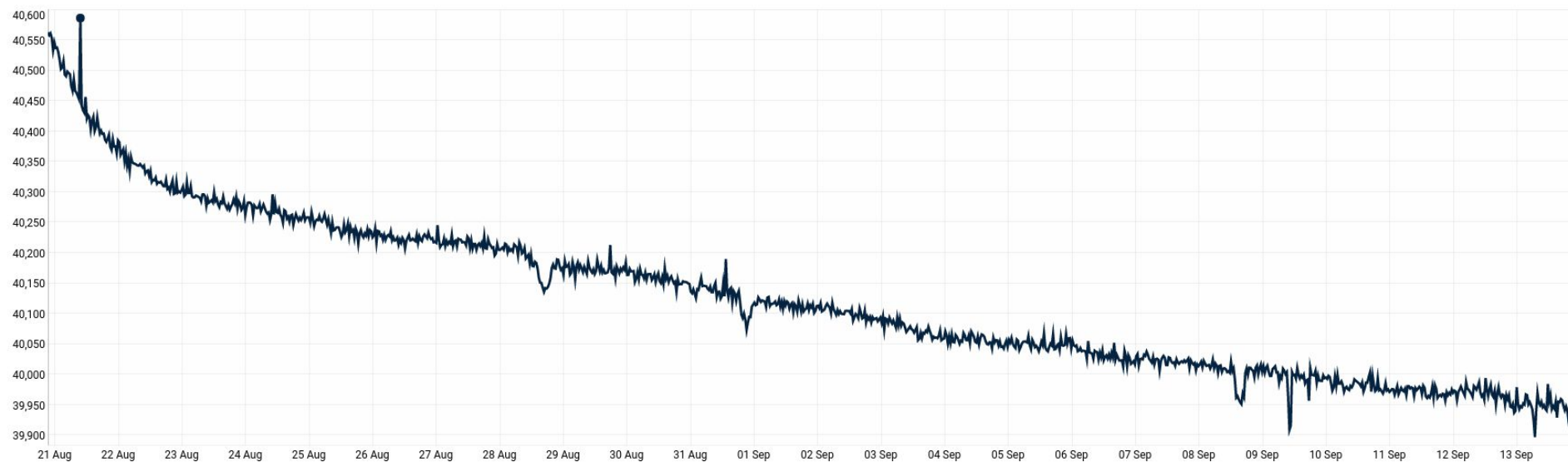


FILTERING

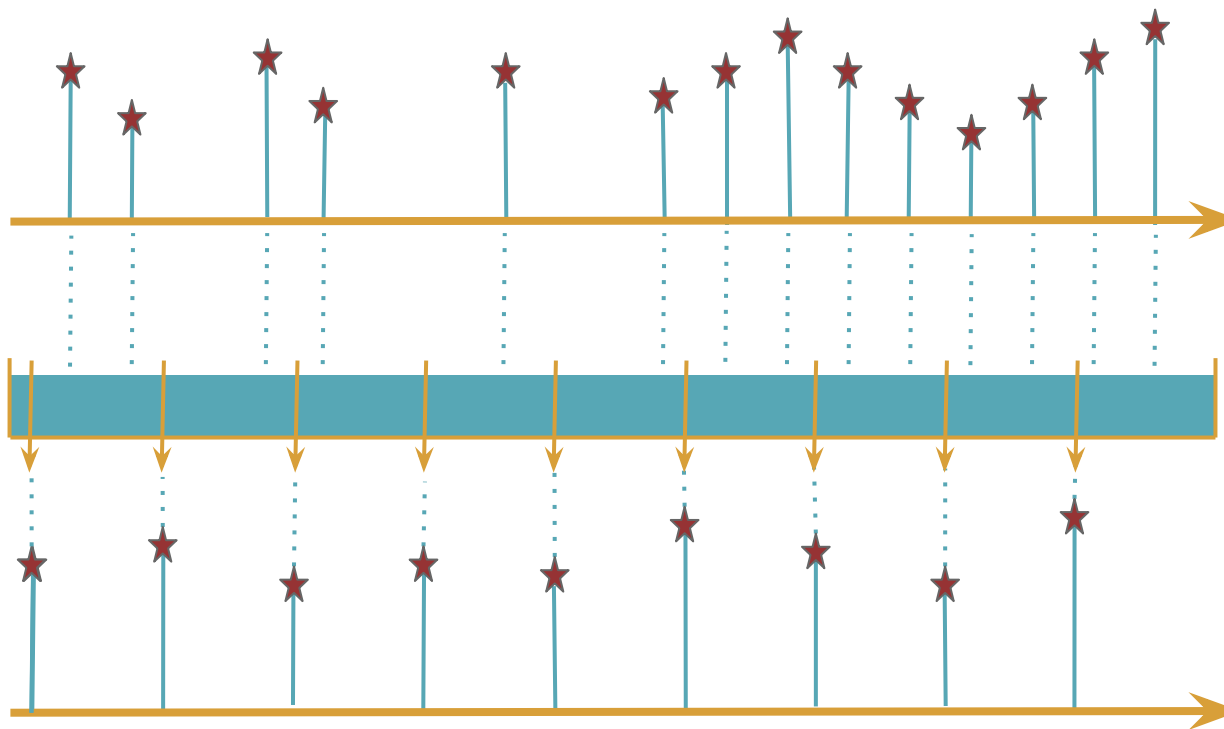
```
[  
    $gts                // Singleton (or list of) GTS  
    []                  // Equivalence classes  
    { 'record' '5' }    // Labels to select  
    filter.bylabels     // Type of filter  
]  
FILTER
```



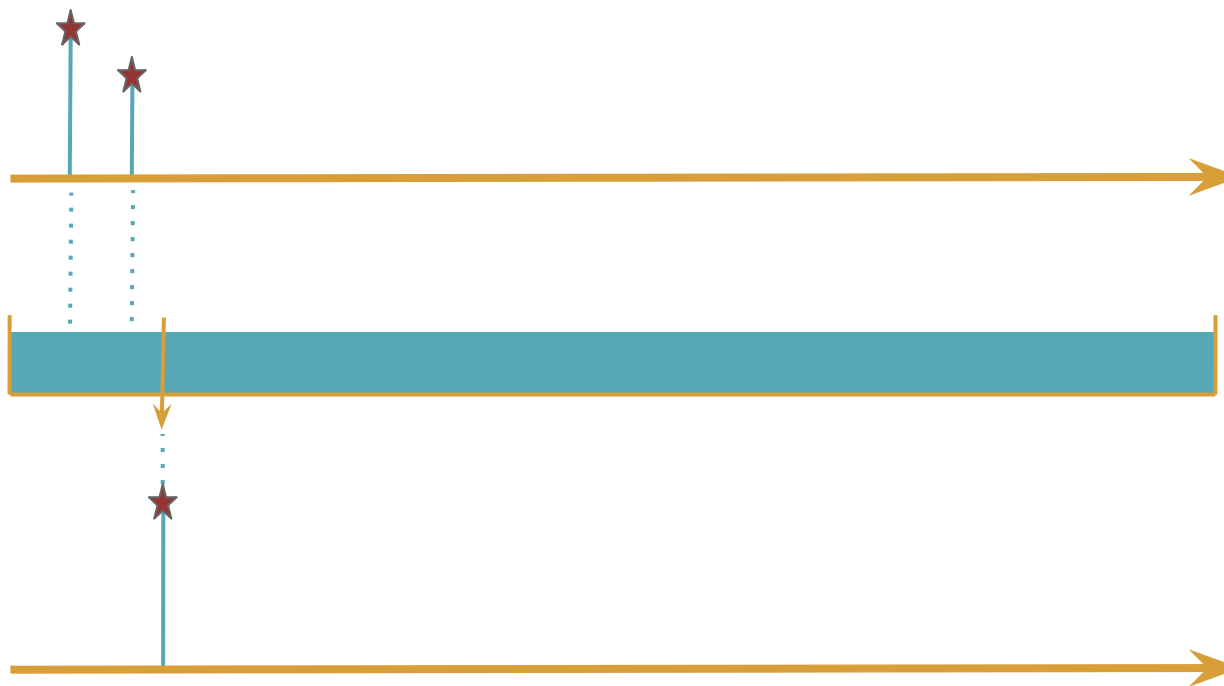
Reference record: 5



Downsampling

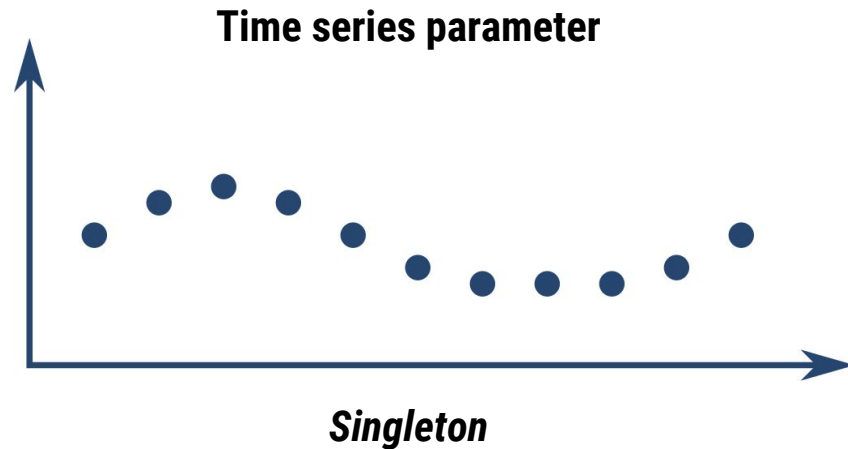


Bucketize



Syntax

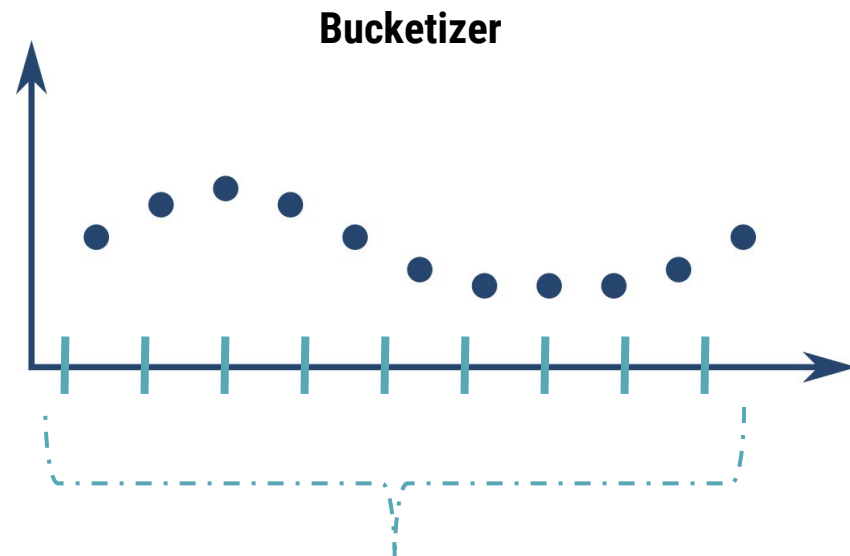
```
[  
  $gts  
  bucketizer.min  
  0  
  2 h  
  0  
]  
BUCKETIZE
```



Syntax

```
[  
  $gts  
  bucketizer.min  
  0  
  2 h  
  0  
]
```

BUCKETIZE

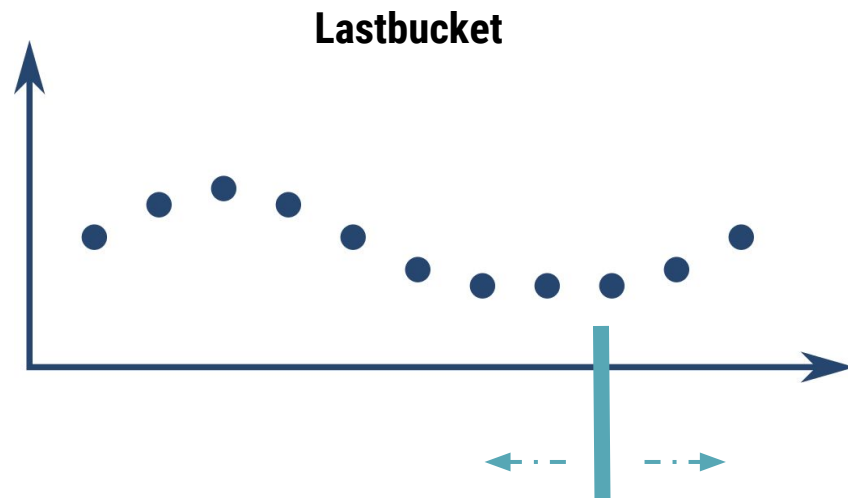


*Type of operator to apply on each **bucket**
last, max, mean, and, count ...*



Syntax

```
[  
  $gts  
  bucketizer.min  
  0  
  2 h  
  0  
]  
BUCKETIZE
```



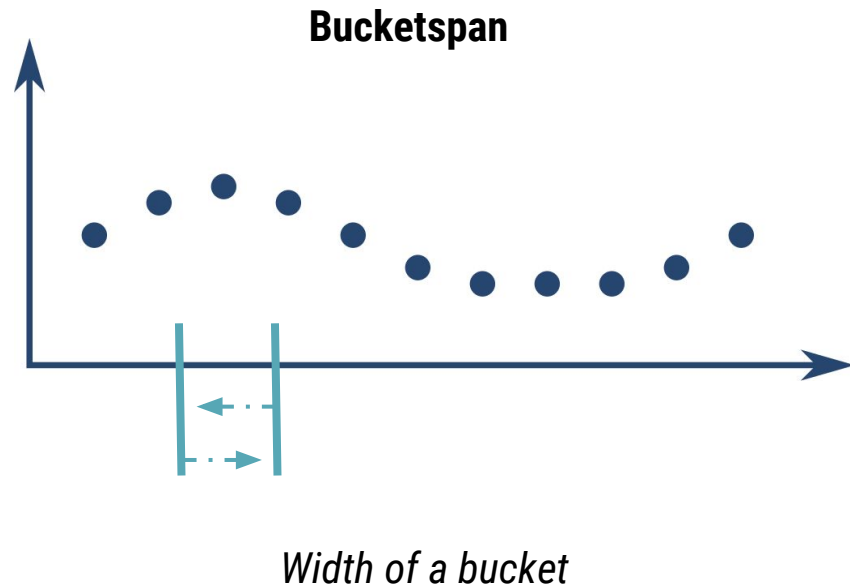
End timestamp of the more recent bucket



Syntax

```
[  
  $gts  
  bucketizer.min  
  0  
  2 h  
  0  
]
```

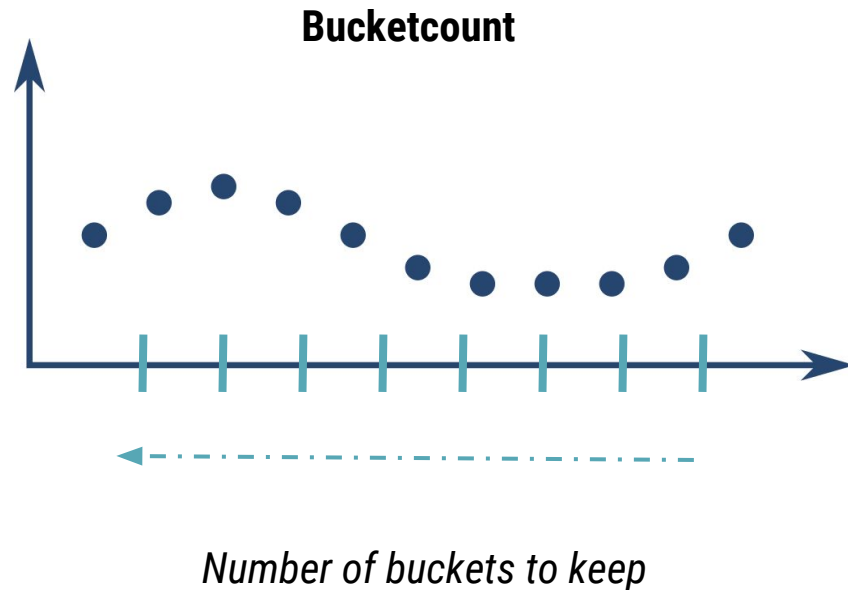
BUCKETIZE



Syntax

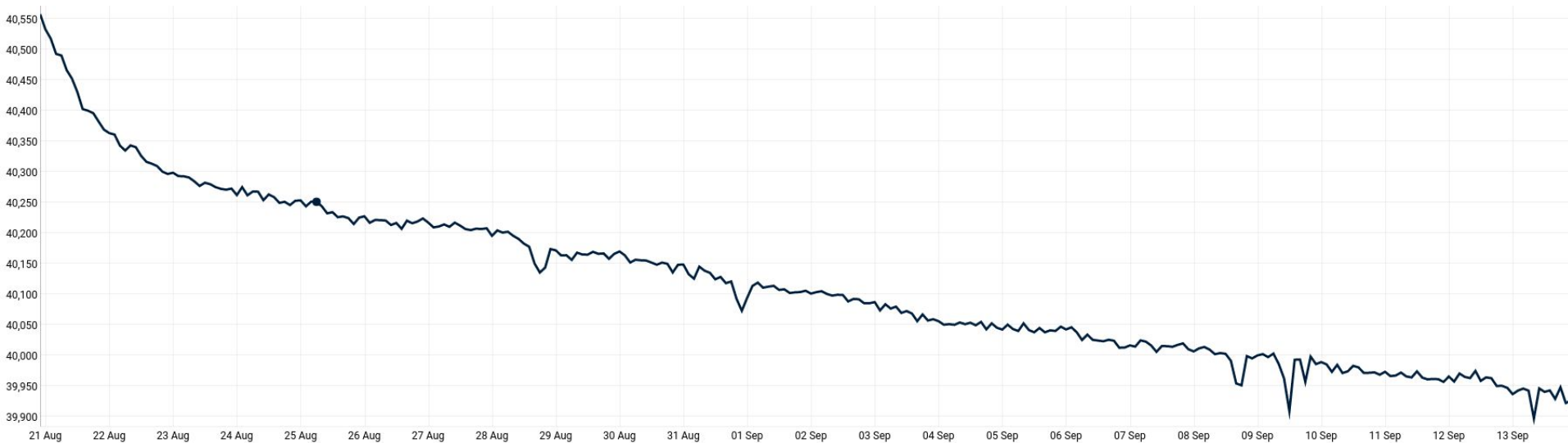
```
[  
  $gts  
  bucketizer.min  
  0  
  2 h  
  0  
]
```

BUCKETIZE



Actuel

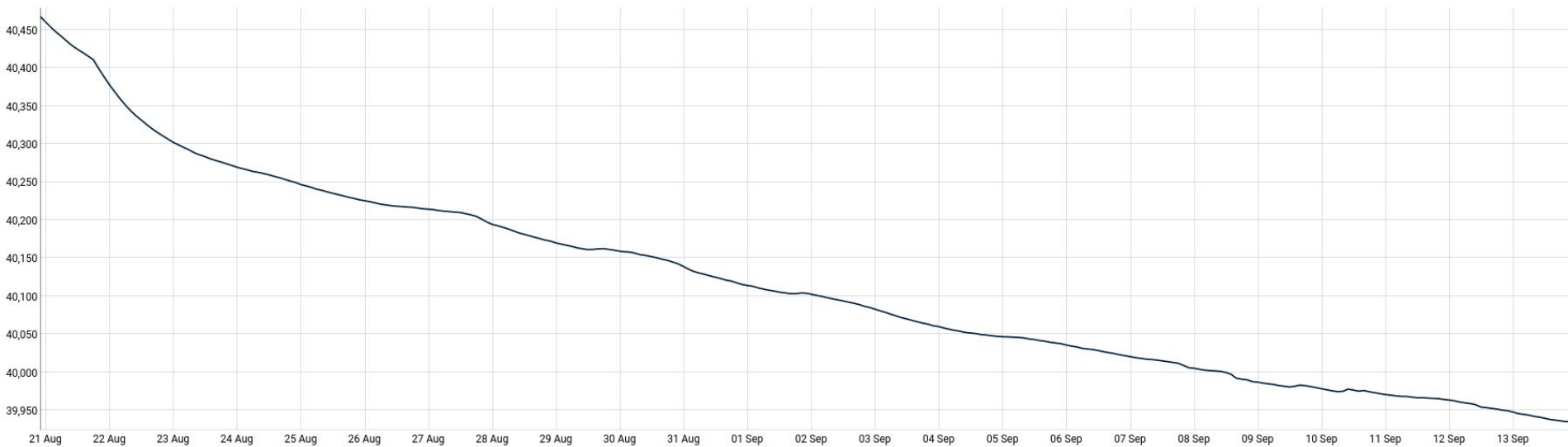
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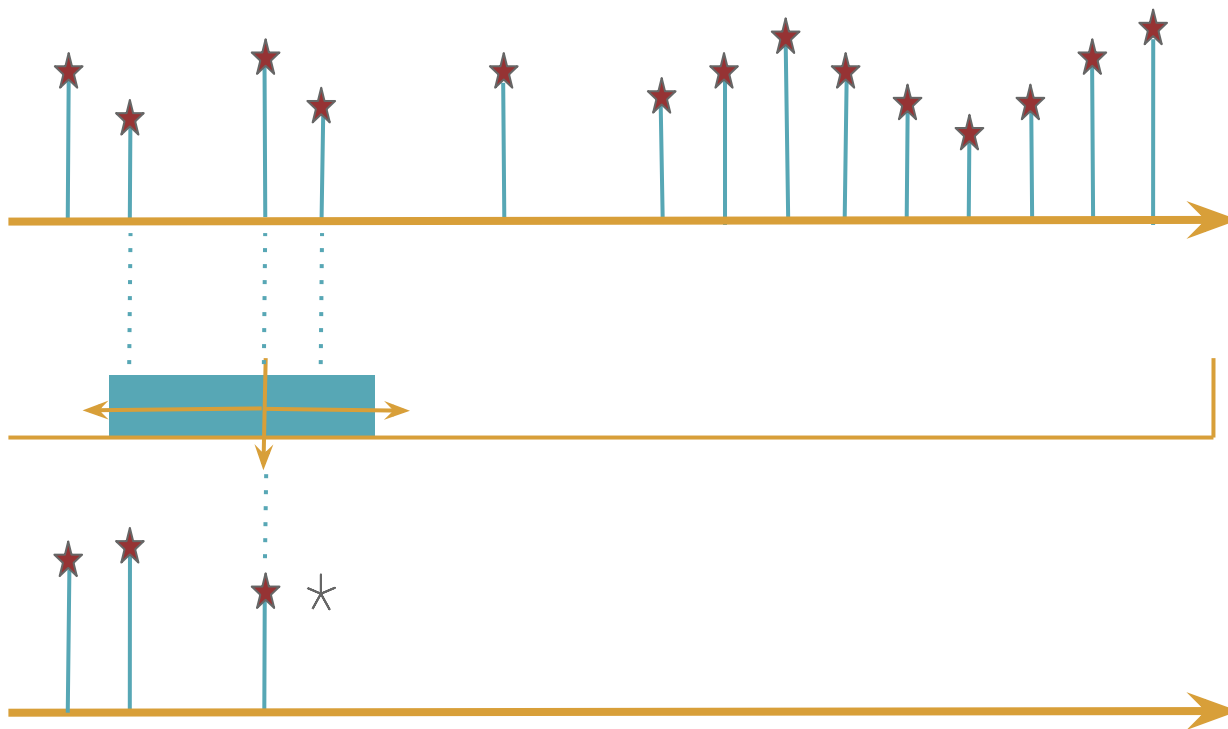
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Trend



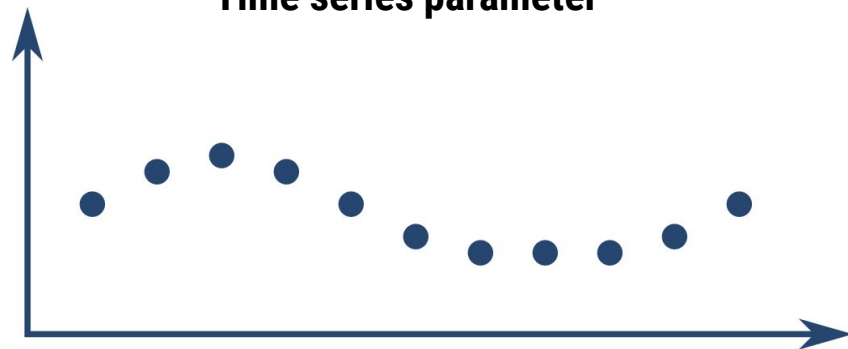
Mapper



```
[  
  $gts  
  mapper.mean  
  2  
  2  
  0  
]  
MAP
```

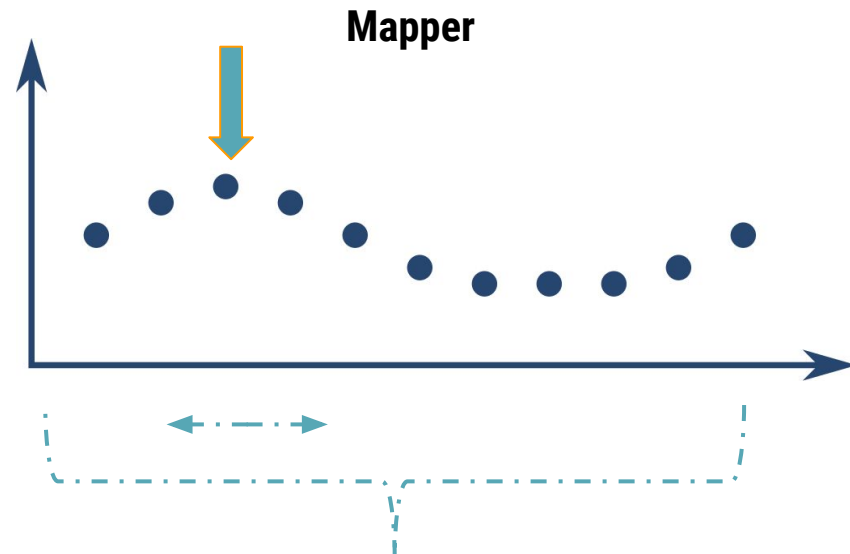


Time series parameter



Syntax

```
[  
  $gts  
  mapper.mean  
  2  
  2  
  0  
]  
MAP
```

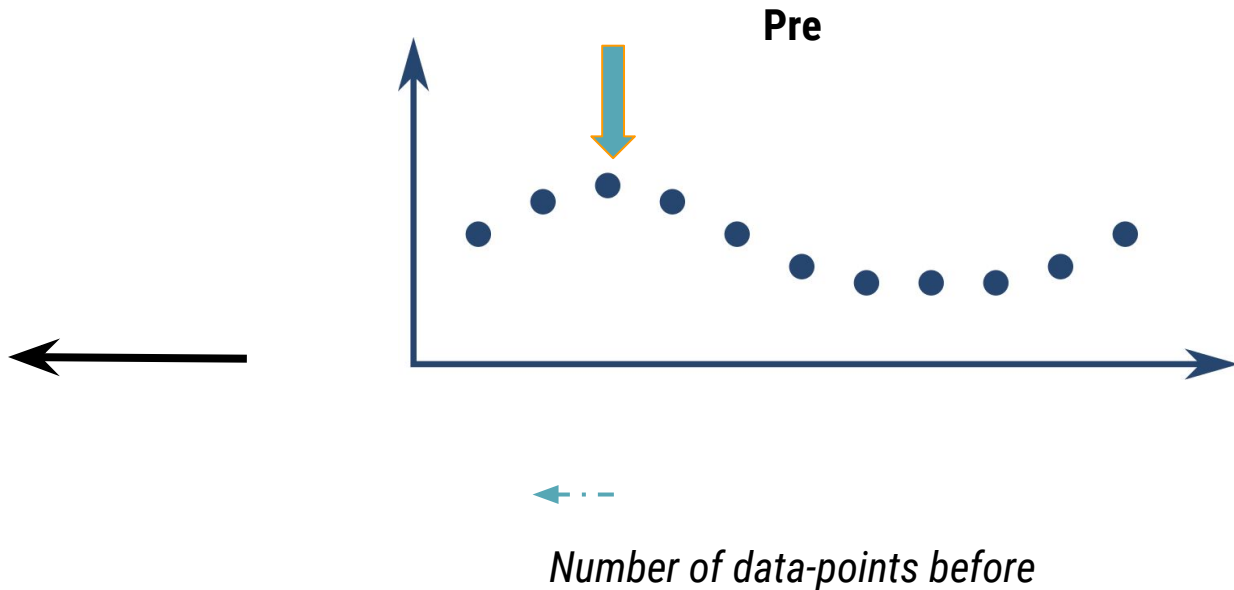


Type of operator to apply on each *window*
add, gt, rate, and, count...

Syntax

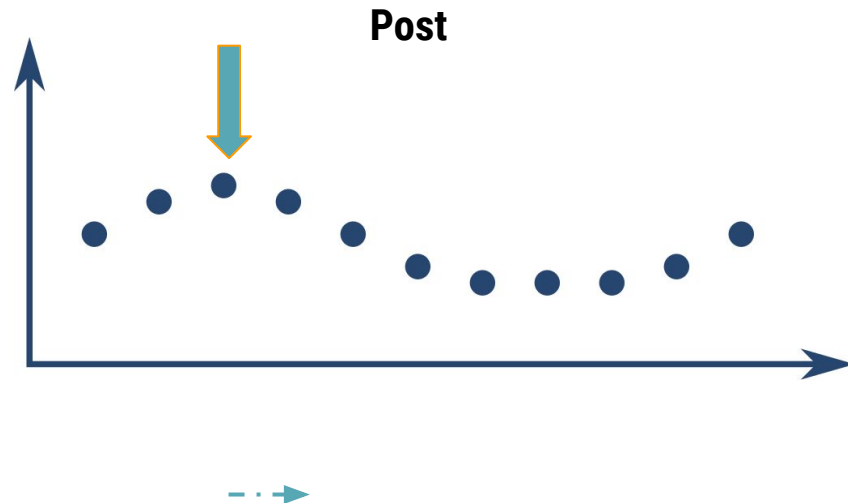
```
[  
  $gts  
  mapper.mean  
  2  
  2  
  0  
]
```

MAP



Syntax

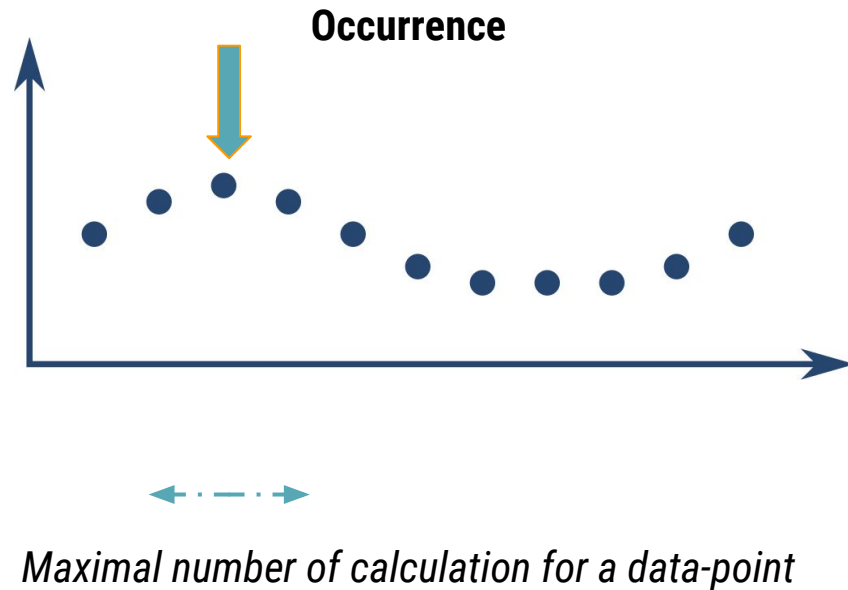
```
[  
  $gts  
  mapper.mean  
  2  
  2  
  0  
]  
MAP
```



Syntax

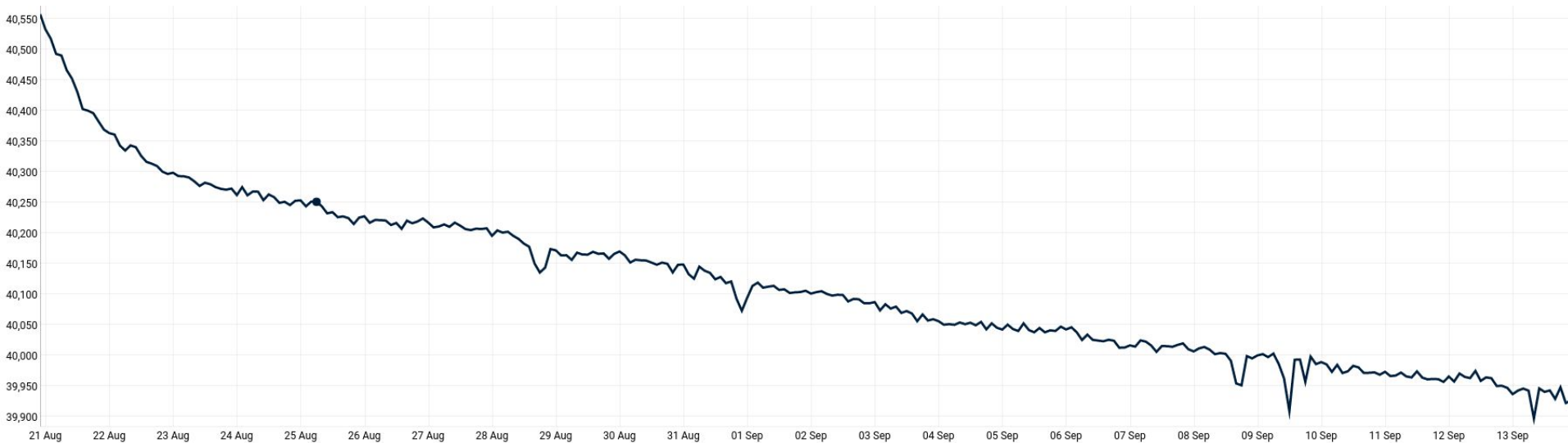
```
[  
  $gts  
  mapper.mean  
  2  
  2  
  0  
]
```

MAP



Actual

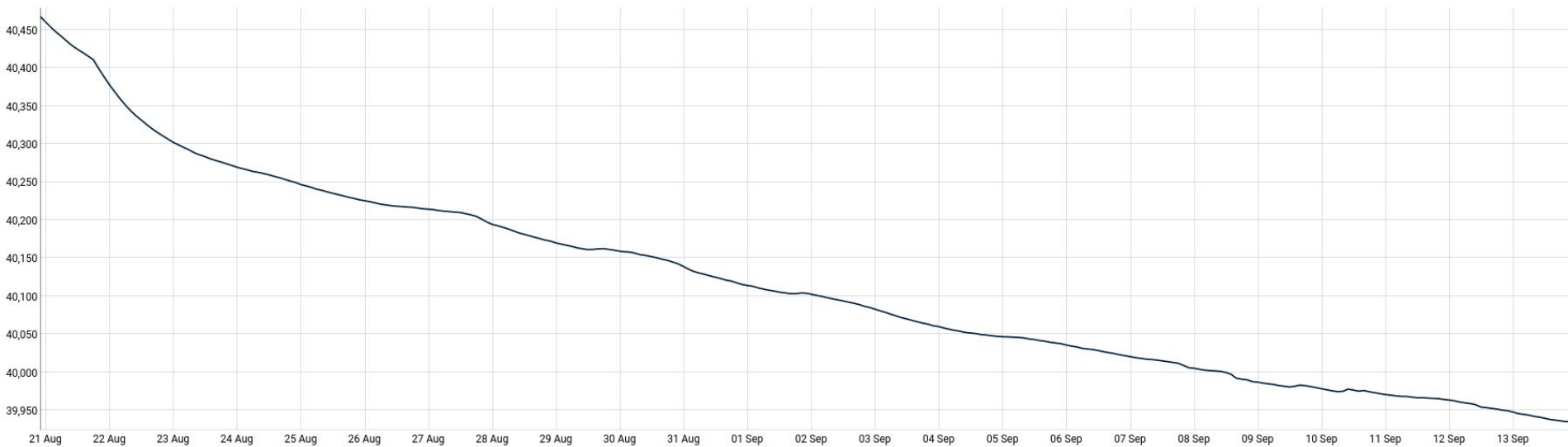
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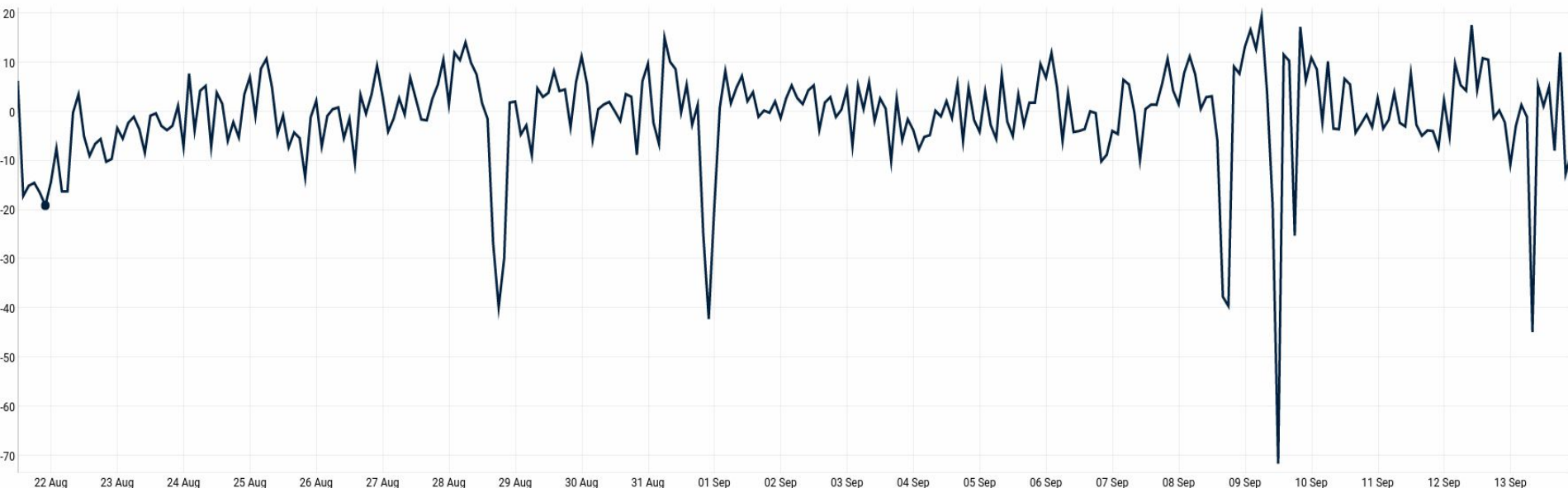
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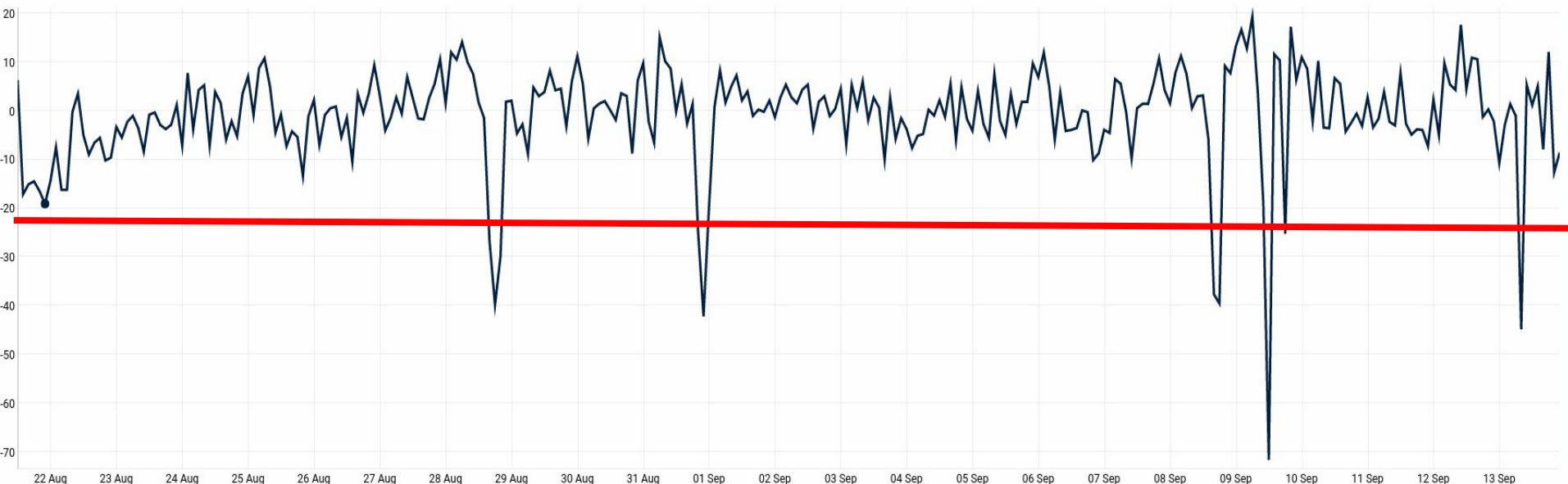
Trend



Actual - trend



Actual - trend



Time to level-up!



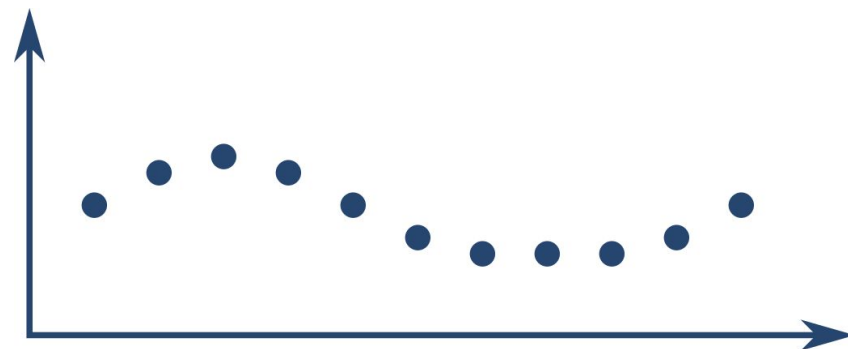
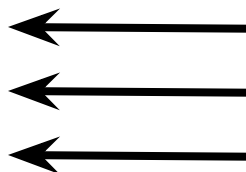
Time series operation

```
[  
    $gts0                // First series pull  
    ...                  // ...  
    $gtsN                // N series pull  
    [ 'record' ]         // Key labels list  
    op.add               // Type of operator  
]  
APPLY
```



Syntax

```
[  
  $gts0  
  ...  
  $gtsN  
  [ 'record' ]  
  op.add  
]  
APPLY
```

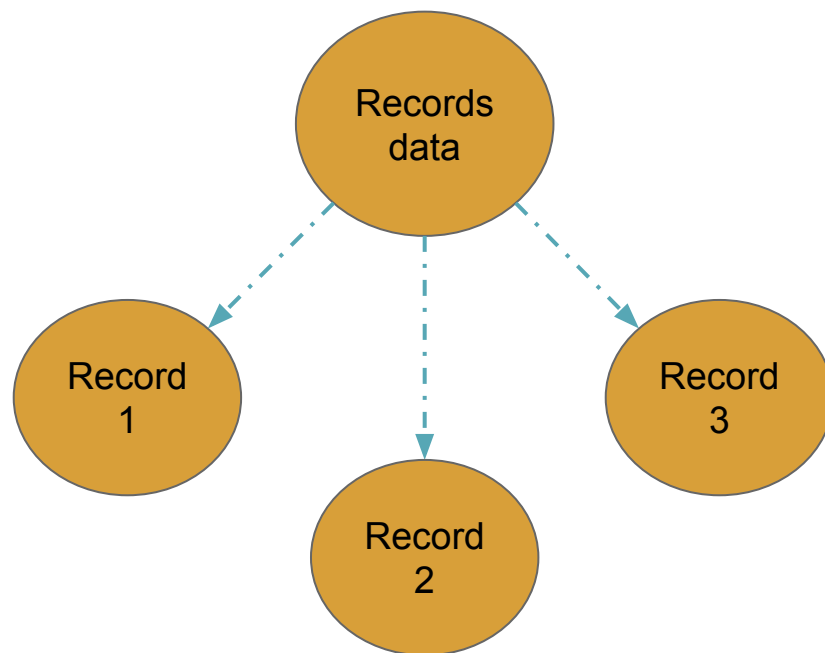


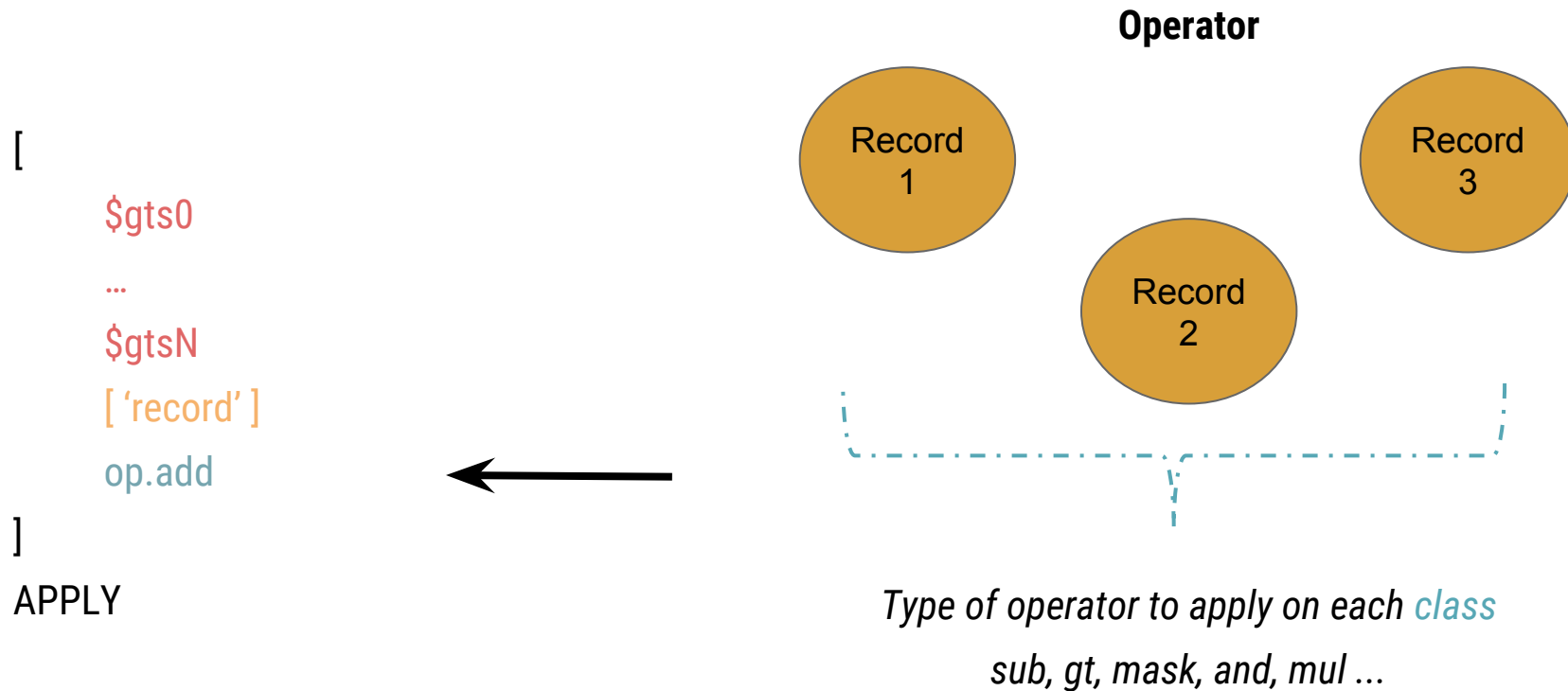
Singleton



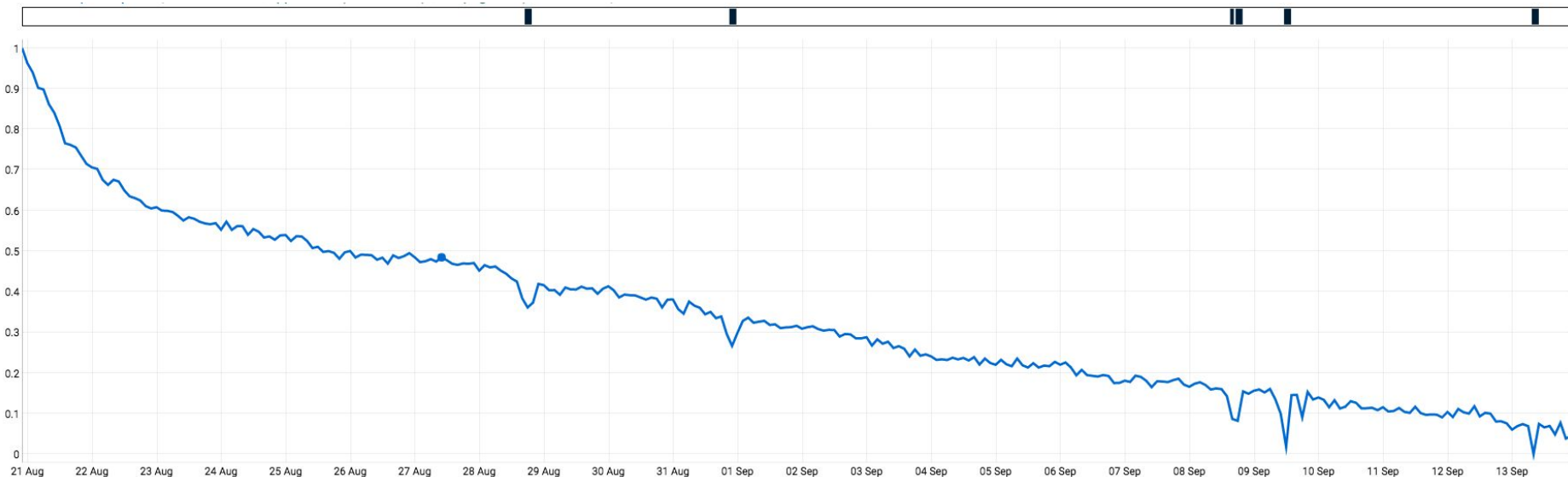
Equivalence class

```
[  
    $gts0  
    ...  
    $gtsN  
    ['record']  
    op.add  
]  
APPLY
```

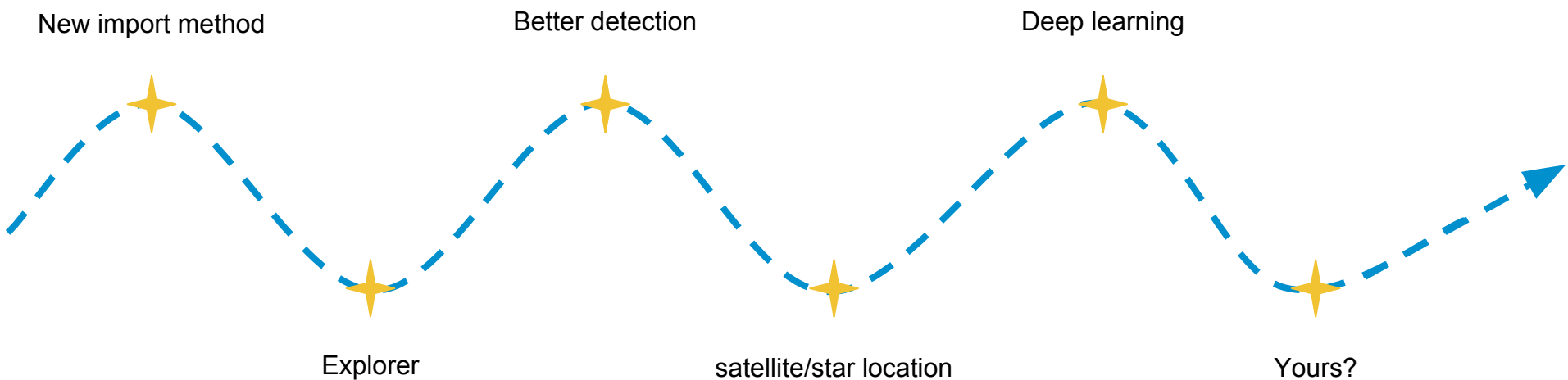




Final result



Only the beginning



One more thing...

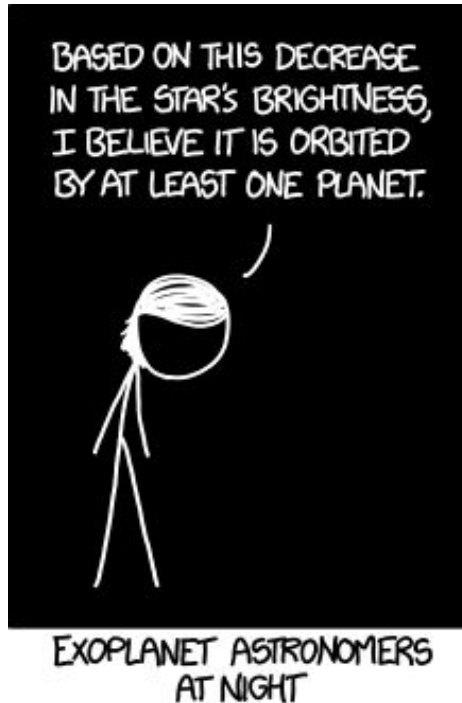
Want to continue?

Ping @OVHMetrics on Twitter

To add the dataset into your Metrics account



The end!



<https://xkcd.com/1371/>

Join us!

<https://helloexo.world>

