The Rayon Visualization Toolkit

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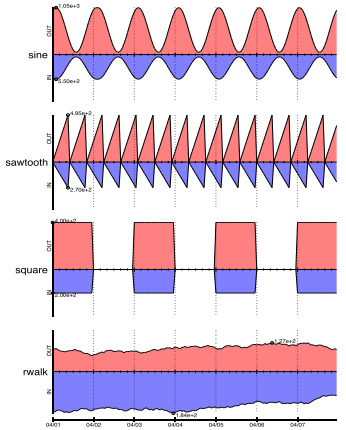
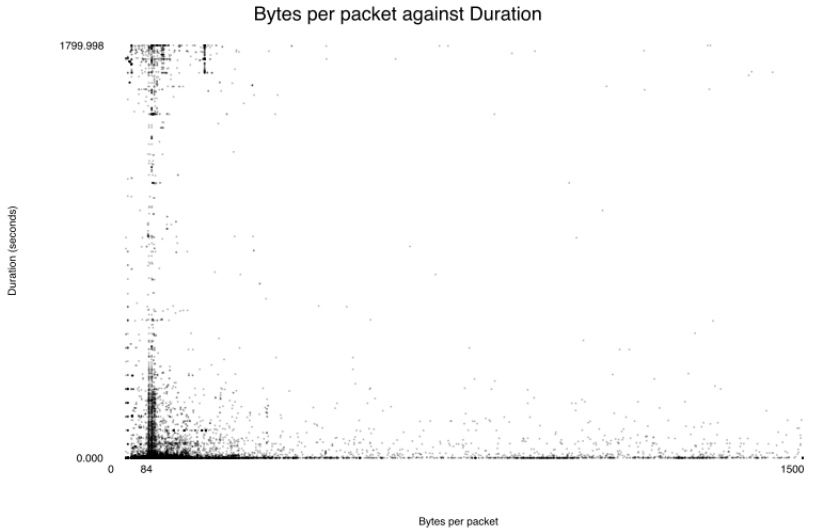
Motivation

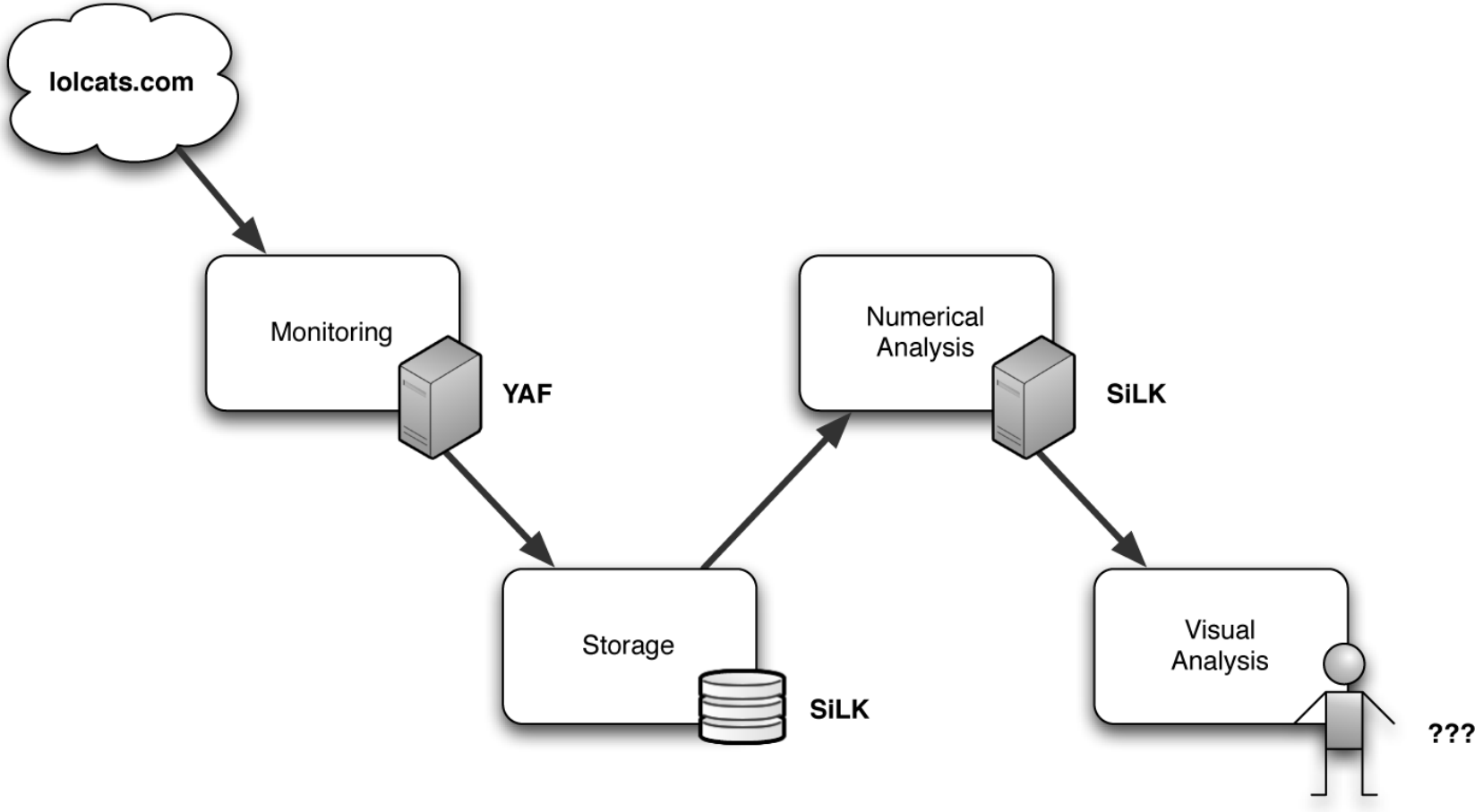
Improve transition/uptake of NetSA analytics

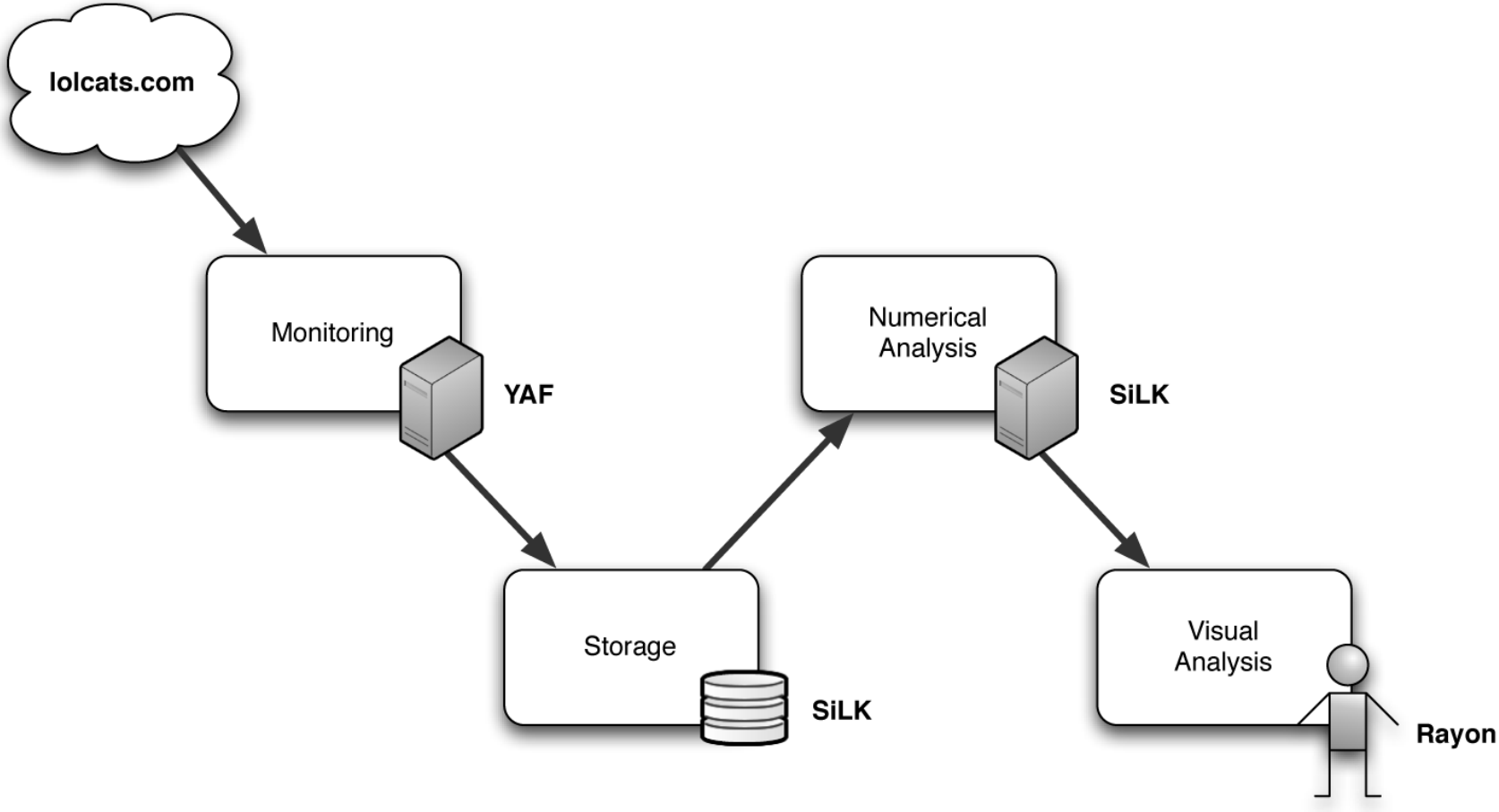
Provide basic visualization that people in SOCs can use easily

- Live where they live






lolcats.com
Monitoring
YAF
Numerical Analysis
SiLK
Storage
SiLK
Visual Analysis
???


lolcats.com
Monitoring
YAF
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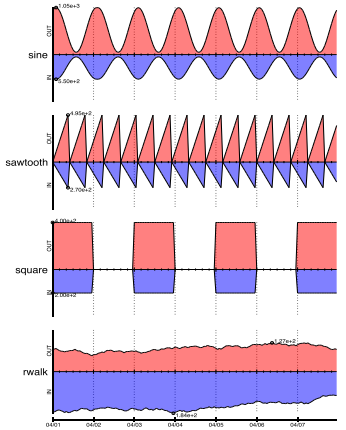
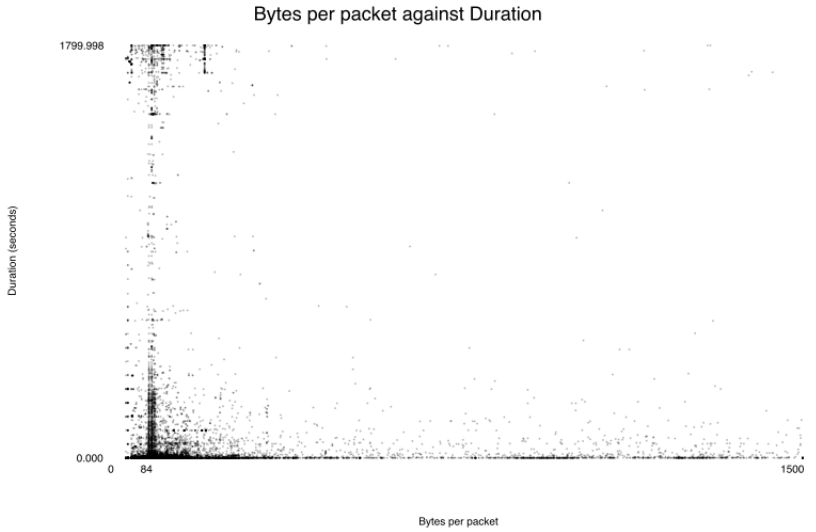
SiLK
Storage
SiLK
Visual Analysis
Rayon

Motivation

Visualize SiLK data

- Live where SiLK lives (Unix, command-line)
- Live in iSiLK





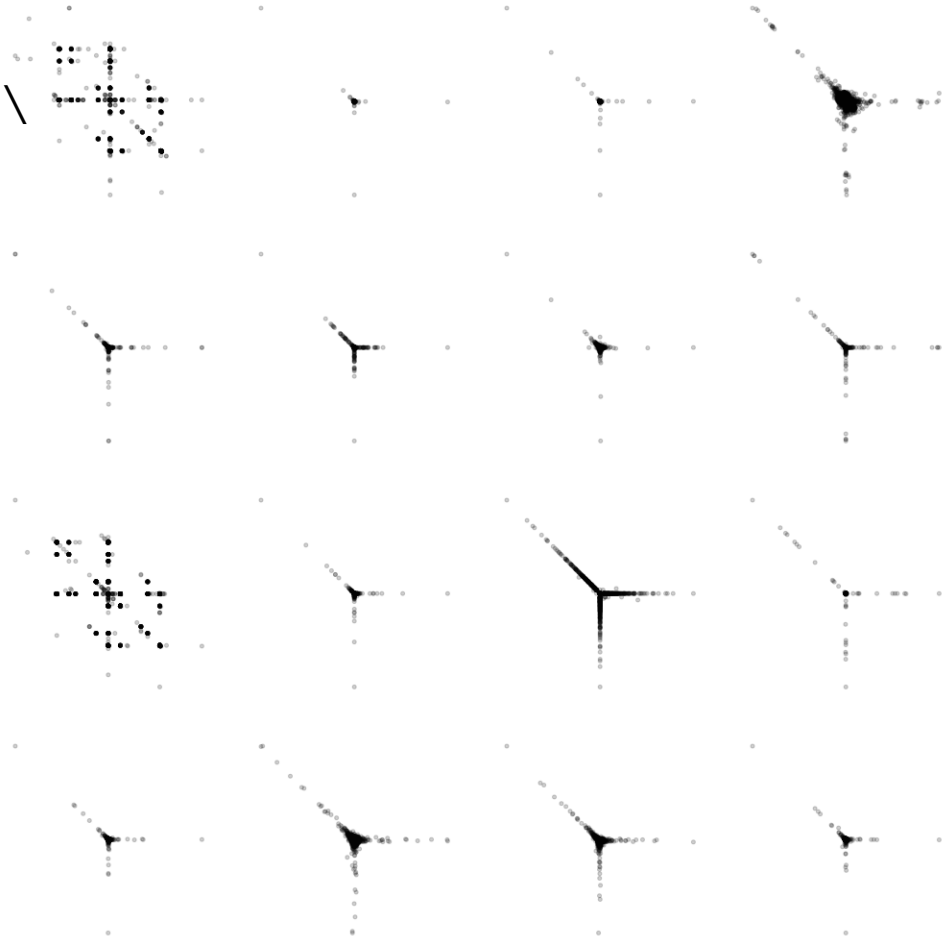
Rayon Fun Facts™

- Can render visualizations to:
  - PDF, SVG, PNG (via Cairo)
  - GUI (via wxPython)
- Requirements:
  - Python >2.4, < 3.0
  - One or both of
    - Cairo and PyCairo (1.4.x and 1.8.x tested)
    - wxWidgets and wxPython (2.8.x tested)

ryscatterplot

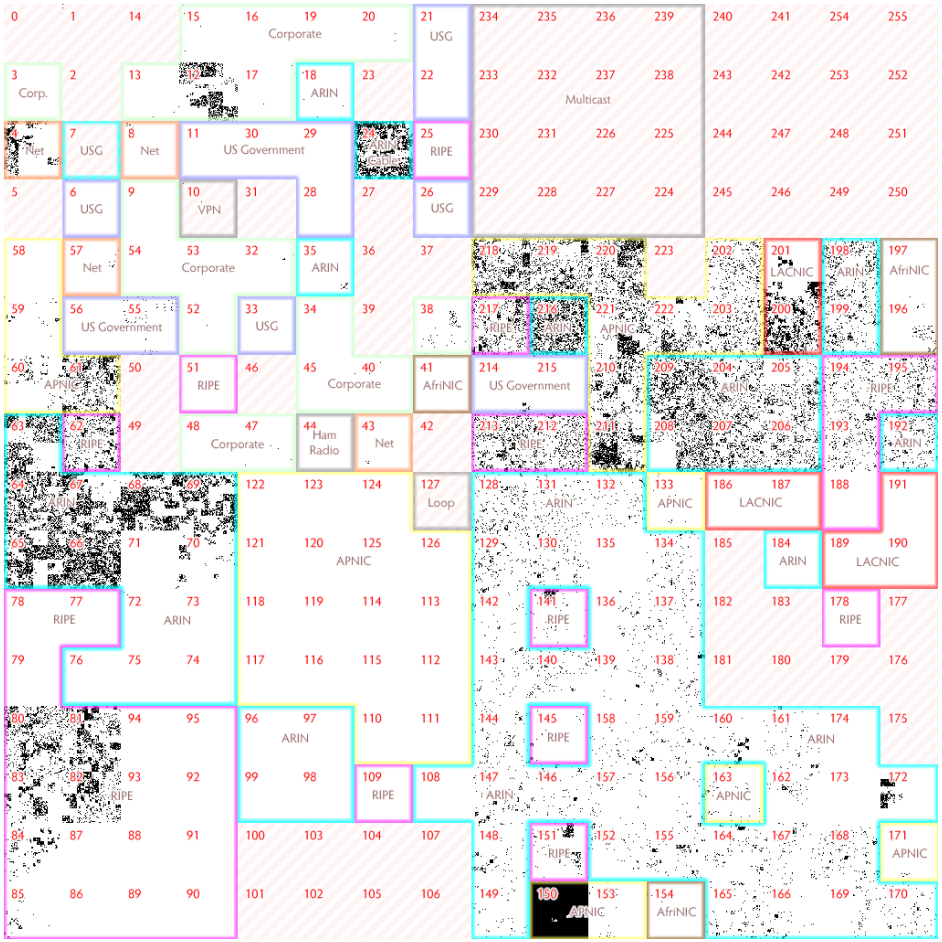
```
ryscatterplot --input-path=foo.txt \
  --output-path=foo.svg \
  --x-input=1 --y-input=2 \
  --grid --grid-key-input=0
```

```
## key   | x      | y
1.2.3.4 | 0.0    | 0.0
1.2.3.4 | 0.0    | 200.0
…
5.6.7.8 | 144.0 | 0.0
```



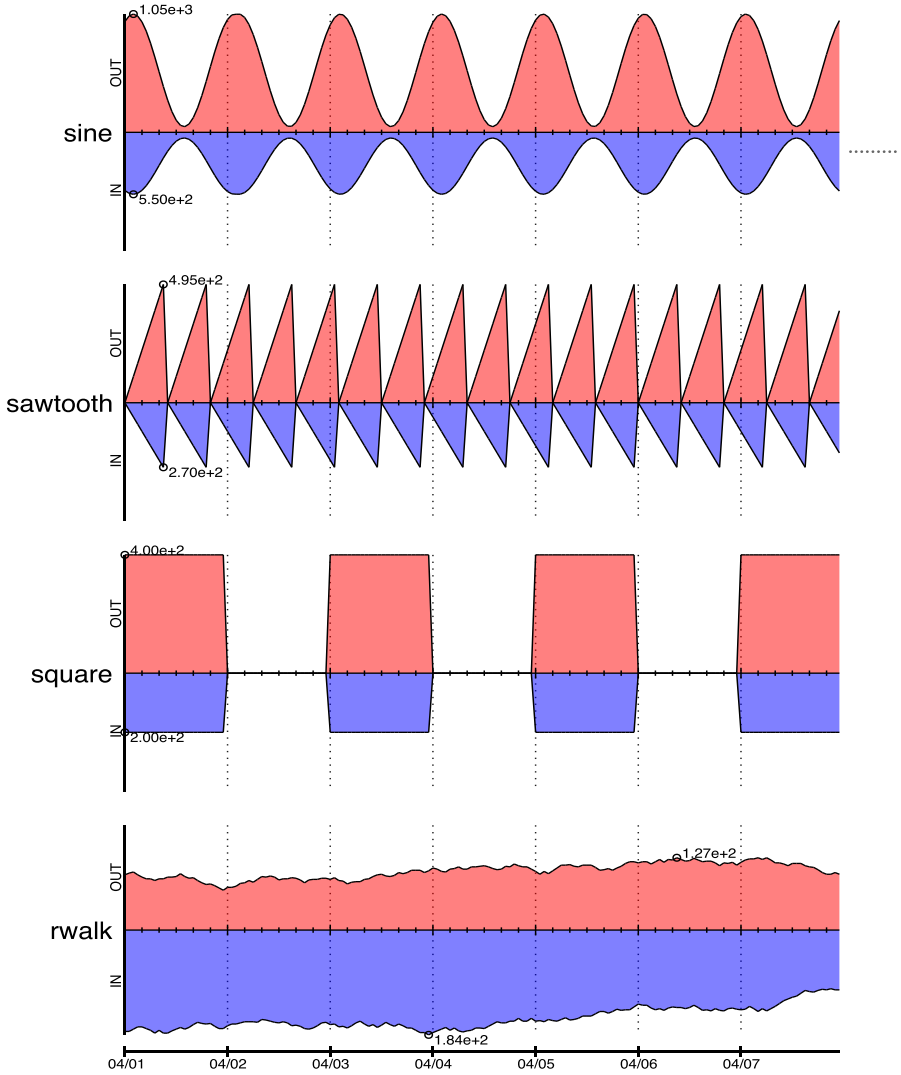
ryhilbert

```
rwsetcat foo.set | \
ryhilbert --input-path - --output-path foo.png \
  --binary-plot
```



rystripplot

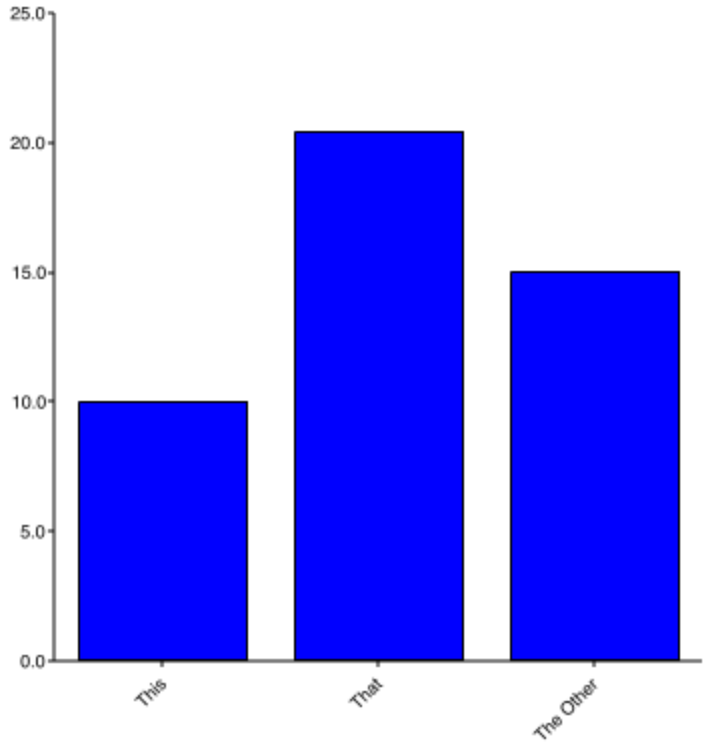
```
rystripplot      \
  --in foo.txt   \
  --out bar.png
```




```
## date|sine_in|sine_out|sawtooth_in|sawtooth_out|square_in|square_out|rwalk_in|rwalk_out
2000-04-01 00:00:00+00:00|982.74|516.37|0.00|0.00|400.00|200.00|97.00|178.00
2000-04-01 01:00:00+00:00|1033.26|541.63|55.00|30.00|400.00|200.00|100.00|178.00
2000-04-01 02:00:00+00:00|1049.99|550.00|110.00|60.00|400.00|200.00|102.00|174.00
2000-04-01 03:00:00+00:00|1031.77|540.88|165.00|90.00|400.00|200.00|97.00|170.00
```

rycategories

```
rycategories \
 --in foo.txt \
 --out bar.png
```



Phases of Visualization

Invention Envisioning a new visualization *technique*
Implementation Realizing that *technique* into a *tool*
Production Applying the *tool* to *data*, producing a *visualization*
Consumption Using a *visualization* to gain *insight*

Invention

Envisioning a new visualization *technique*

Implementation

Realizing that *technique* into a *tool*

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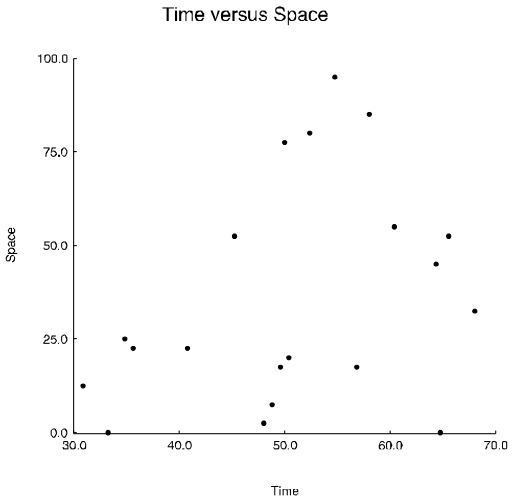
Applying the *tool* to *data*, producing a *visualization*

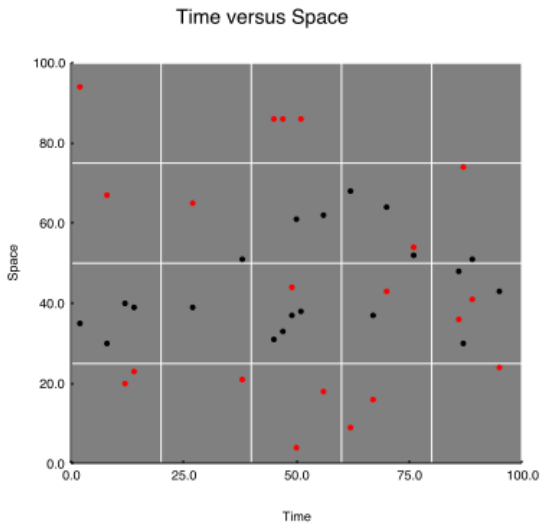
Consumption

Using a *visualization* to gain *insight*

Code Sample

```
from rayon import toolbox

tools = toolbox.Toolbox.for_file()

# Read in data
indata = toolbox.new_dataset_from_filename(
    "sample_in.txt")

# Define the chart
chart = tools.new_chart("square")
plt = tools.new_plot("scatter")
plt.set_data(x=indata.column(0),
             y=indata.column(1))
chart.add_plot(plt)
c.set_chart_background("white")

# Decorate chart - http://tools.netsa.cert.org
# for more
omitted_for_space()

# Draw the chart
page = tools.new_page_from_filename(
    outfile, width=400, height=400)
page.write(chart)
```





Importing and Manipulating Data

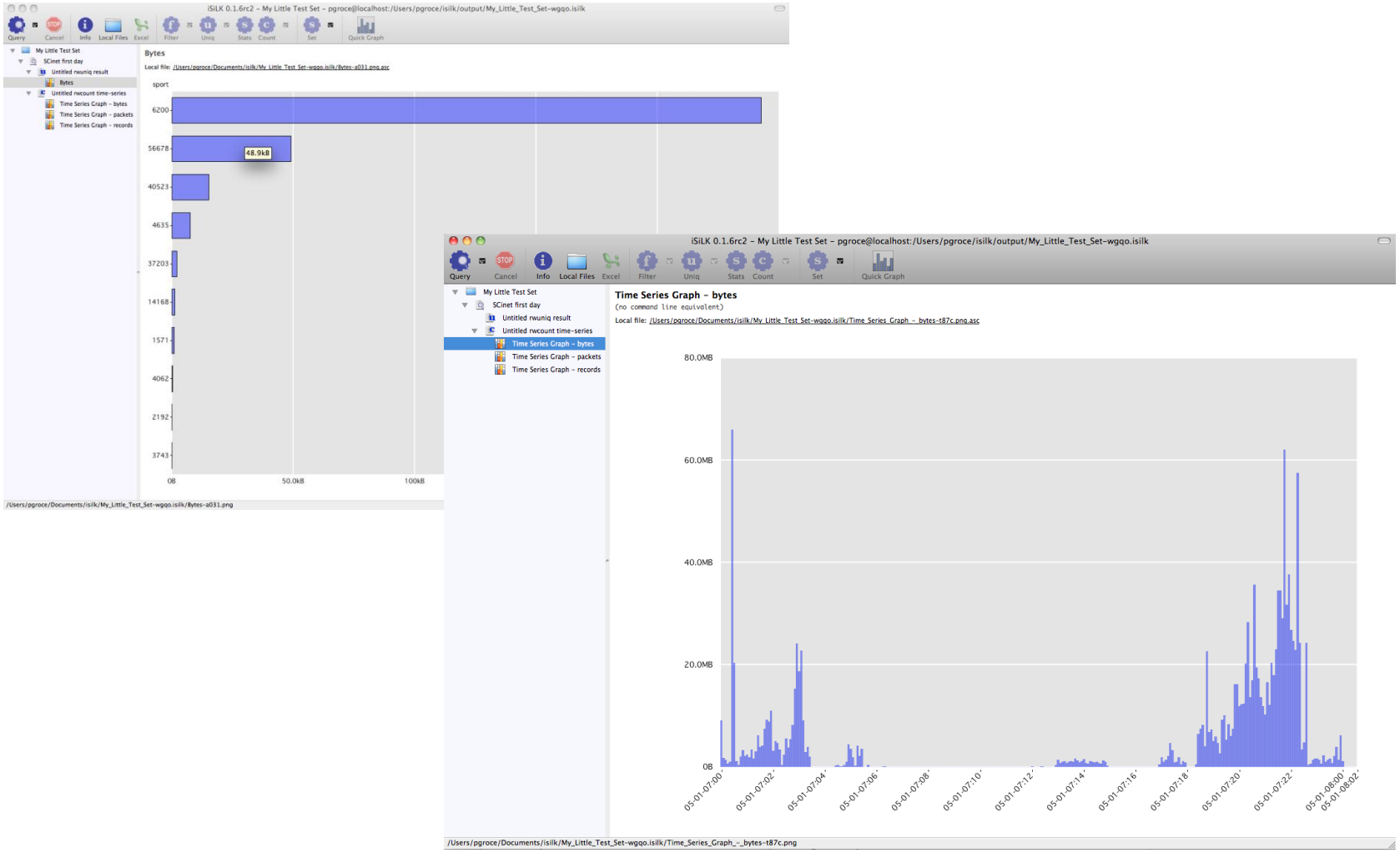
```
## Typemap: str,int,str,int
## proto|port|network|count
TCP|8080|A|1009
UDP|8080|A|1001388
TCP|25|A|4396
TCP|53|B|230
UDP|25|A|4
...
```

```
from rayon.data import *
d = Dataset.from_file('foo.txt')
C = d.get_column('proto')
c2 = Column([1,2,1,2,3,…])
d.add_column(c2,
    name="stuff")

d2 = d.map(lambda r:
    [r.proto, r.count+stuff])

d.to_file('bar.txt')
D2.to_file('baz.txt')
```

Extending Rayon

```
import math
from rayon.plots import *
from rayon.markers import *

class PolarScatterPlot(plots.Plot):
    axes = ('r', 'theta')
    def draw_(self, ctx, width, height):
        marker = markers.Dot()
        for r, theta in self.get_scaled_points():
            x = r * math.cos(theta)
            y = r * math.sin(theta)
            marker.draw(ctx,
                        x * width,
                        height - (y * height))
```

Rayon and iSiLK



Rayon Status

Current Version: 1.0.1

- Released 2010.11.10
- http://tools.netsa.cert.org/rayon

Questions?