Kernel analytics

Bokeh for data visualization

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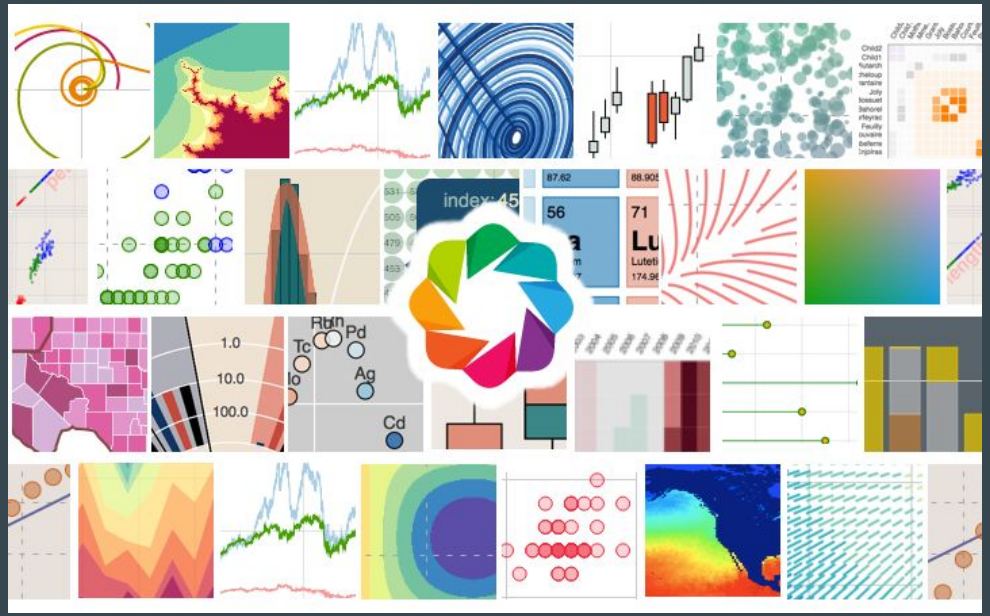
Today's meetup

- Data visualization introduction
- Bokeh core concepts
  - Overview Bokeh
  - Navigating Bokeh's interfaces
  - Sharing your work



Workshop materials

- Notebooks:
  - BokehforDataViz.ipynb
- Dependencies:
  - bokeh=0.12.0
  - pandas=0.18
  - ipython-notebook=4.0.4
  - ipywidgets=4.1.1

Data Viz history and theory

~~“Information is power”~~

“Knowledge is power”

“We are infoxicated” - Alfons Cornella

Data Viz history and theory

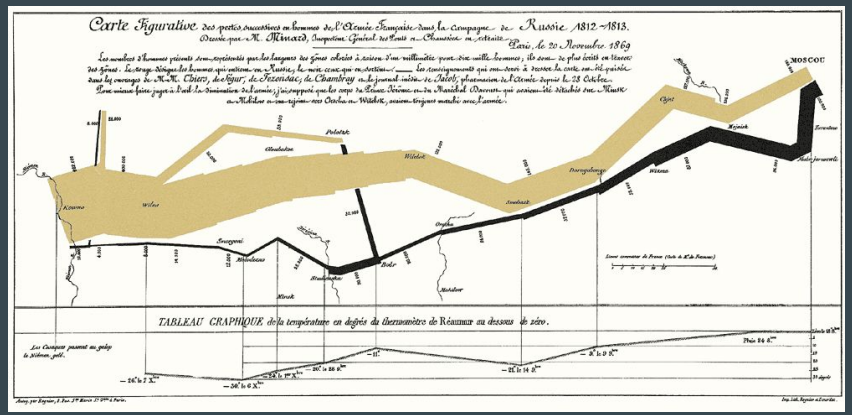
2 main objectives of data viz:

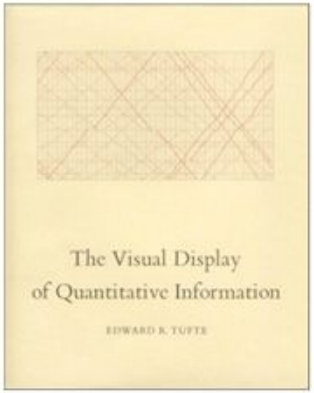
- explore amounts of data
- communicate data effectively

The goal of any good visualization has to focus the recipient of the information on what really is relevant and important: it leads to ***insight***

Data visualization history

- Cartography
- Edward Tufte - The Visual Display of Quantitative Information
- Data visualization minimalism - Data-Ink Ratio



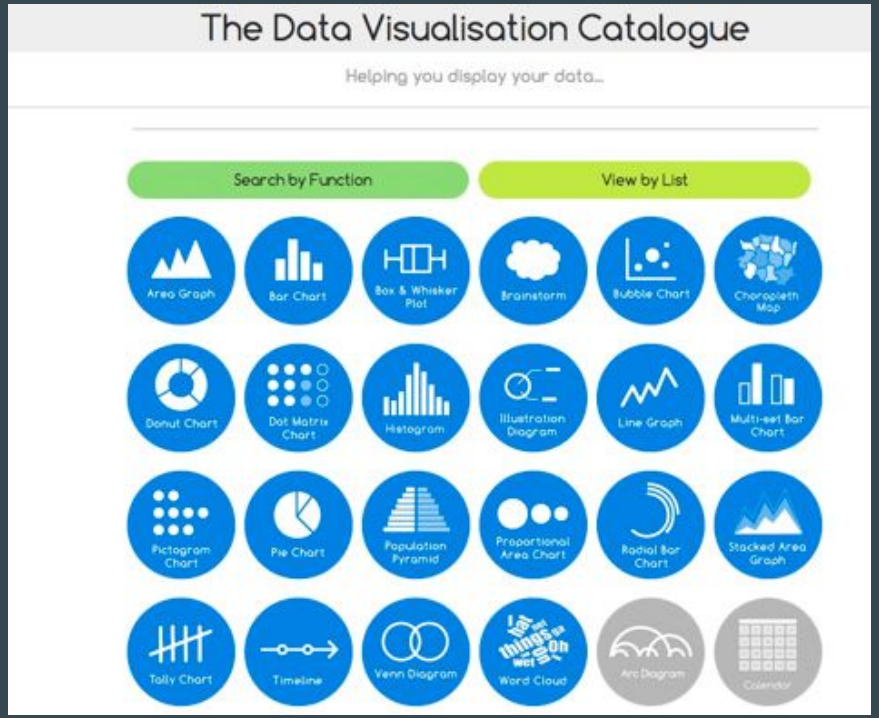


“Above all else show the data”

Tufte, 1983

Data visualization categories

- Trends
- Patterns
- Anomalies
- Connections
- Correlations
- Comparison
- Hierarchy
- Locations
- Processes

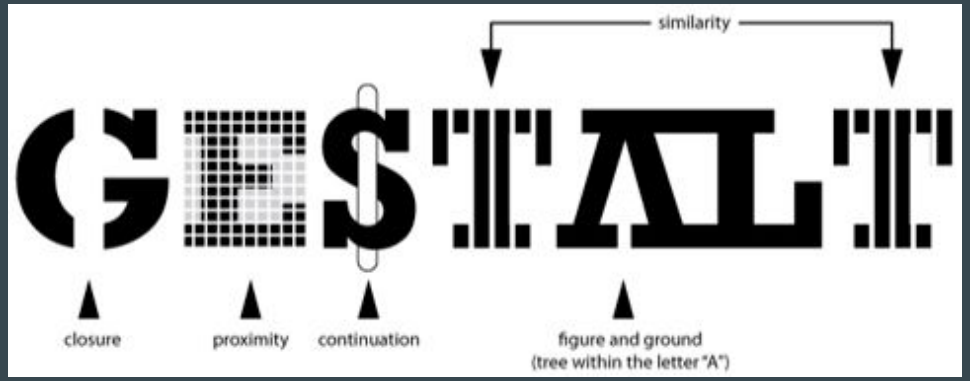


http://www.datavizcatalogue.com/

Visualization components

GESTALT LAWS

- ➔ Similarity
- ➔ Continuation
- ➔ Closure
- ➔ Proximity
- ➔ Figure and ground

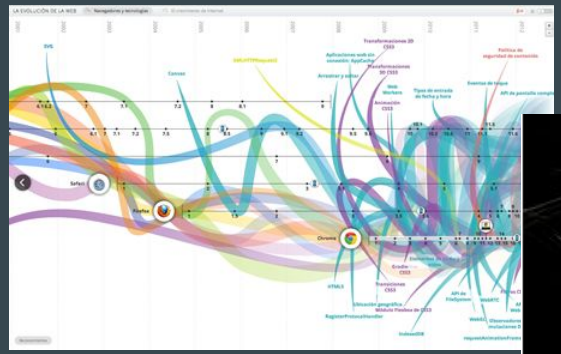


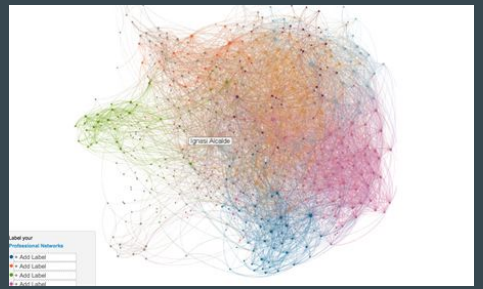
YouTube

- Line
- Form
- Direction
- Size
- Texture
- Color
- Balance
- Proximity
- Alignment
- Repetition
- Contrast
- Space

Data viz is for everybody

http://evolutionofweb.appspot.com/





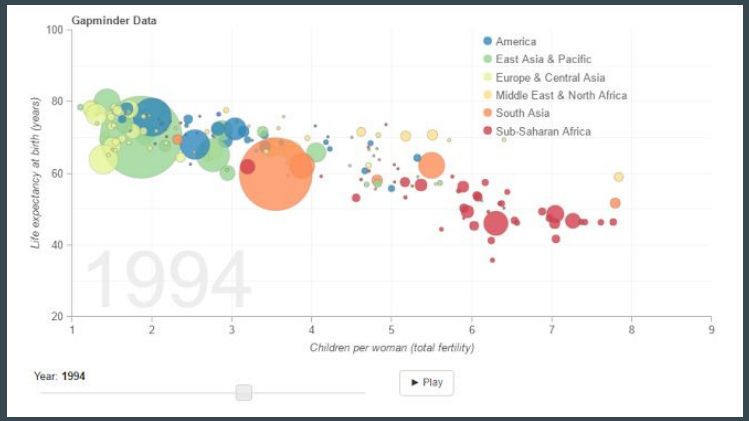
http://2010.tnsdigitallife.com/

Data visualization tools

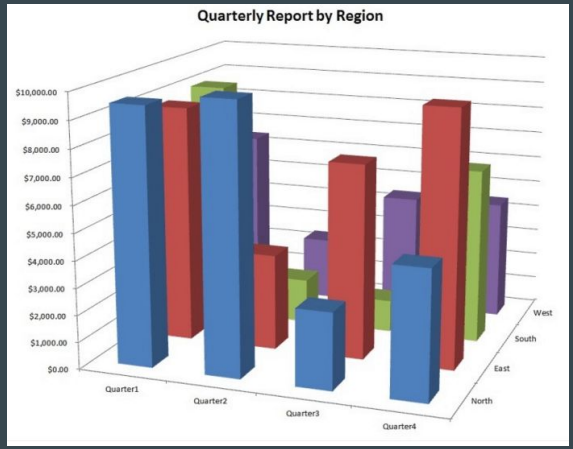
• Excel • PowerBI • Libreoffice • Tableau • QlikSense/View • ...	• ggplot • Matplotlib • Seaborn • Plotly • Bokeh	• D3 • custom solutions: javascript + HTML5 • javascript libraries (highcharts)

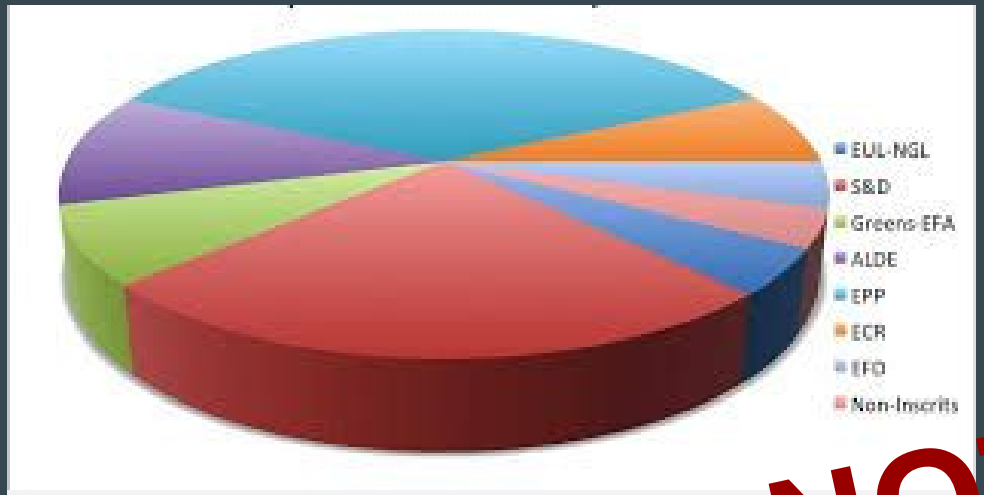

Style
Alone is merely
an elegant
look


NewTest


Gapminder Data
America
East Asia & Pacific
Europe & Central Asia
Middle East & North Africa
South Asia
Sub-Saharan Africa
Life expectancy at birth (years)
Children per woman (total fertility)
1994
Year: 1994
► Play

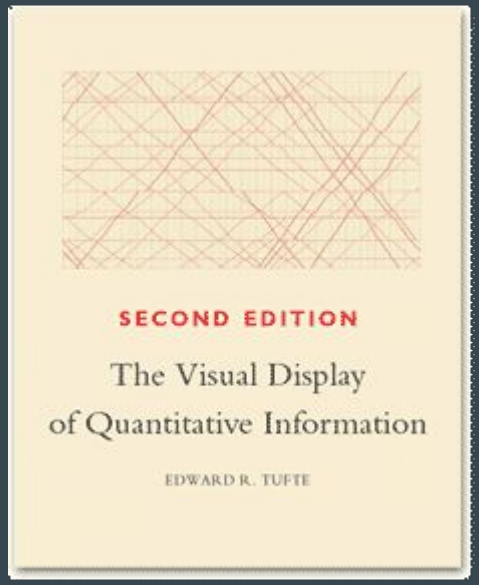
GAPMINDER

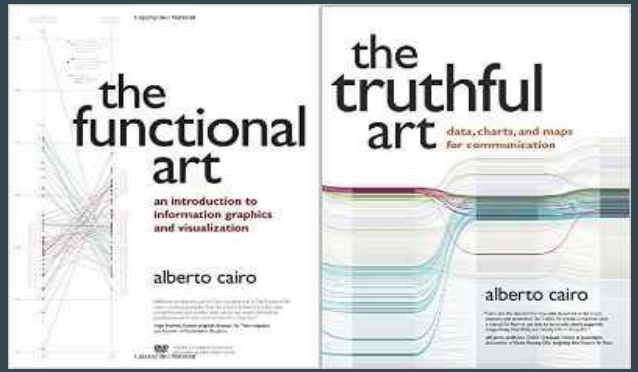

Quarterly Report by Region
$10,000.00
$9,000.00
$8,000.00
$7,000.00
$6,000.00
$5,000.00
$4,000.00
$3,000.00
$2,000.00
$1,000.00
$0.00
Quarter1
Quarter2
Quarter3
Quarter4
West
South
East
North

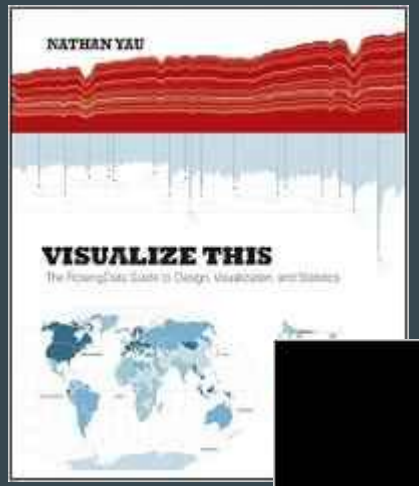


Please do NOT do this !!!

Some good books



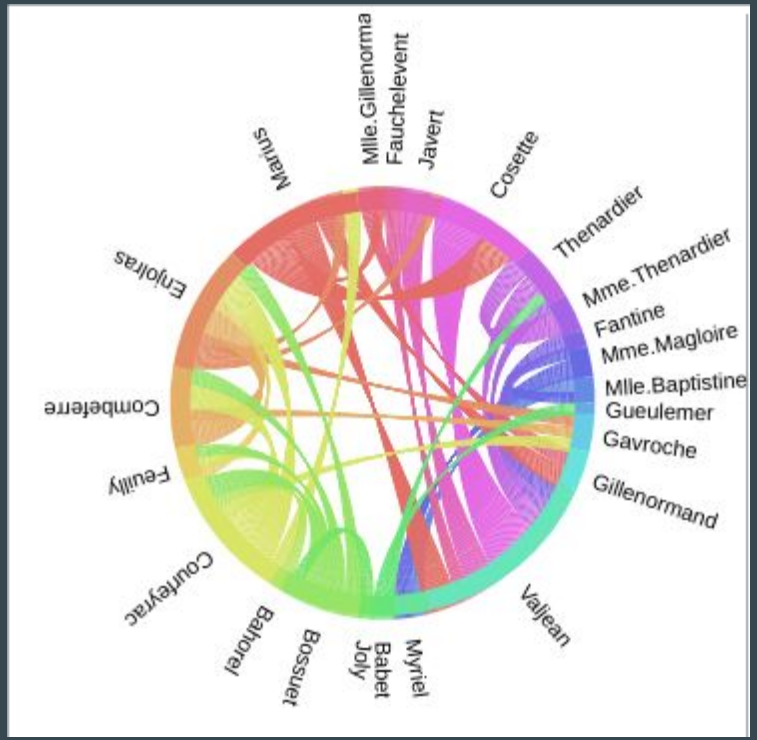




What is Bokeh?

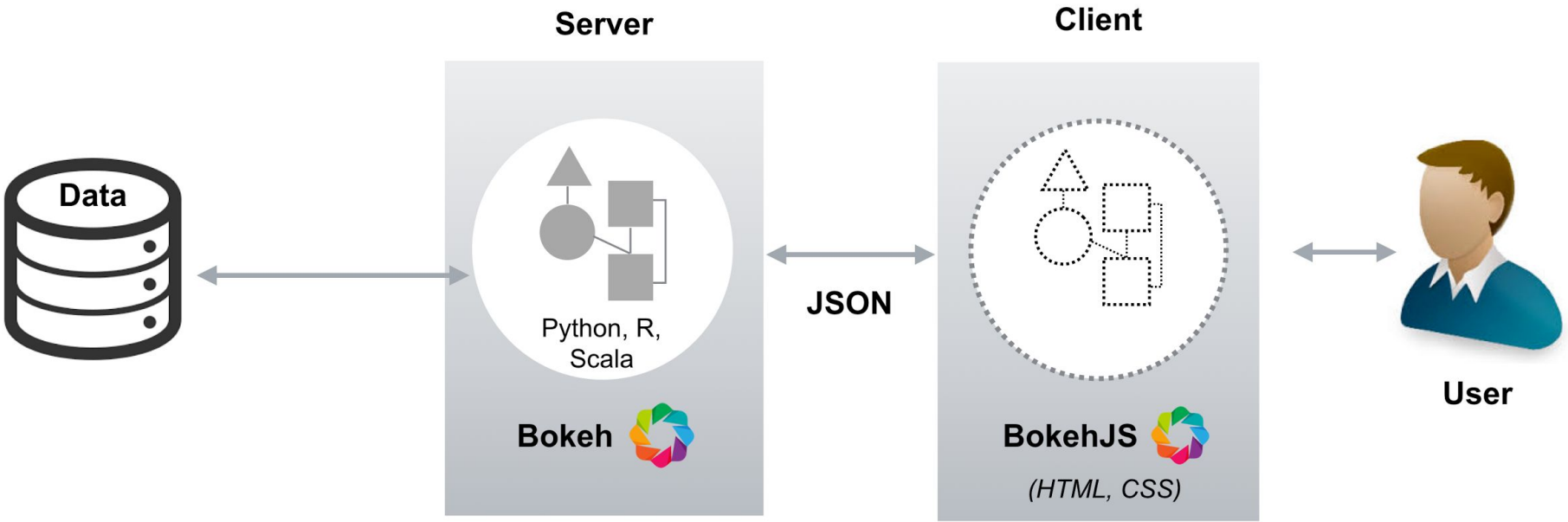
- Data visualization library
- Web-based & interactive
- NO javascript required (yupiiiiiiiii)
- Large data set visualization
- Real time data visualization

http://bokeh.pydata.org/en/latest/docs/gallery.html




```
import pandas as pd
from bokeh.charts import output_file, Chord
from bokeh.io import show
from bokeh.sampledata.les_mis import data

nodes = data['nodes']
links = data['links']

nodes_df = pd.DataFrame(nodes)
links_df = pd.DataFrame(links)

source_data = links_df.merge(nodes_df, how='left', left_on='source', right_index=True)
source_data = source_data.merge(nodes_df, how='left', left_on='target', right_index=True)
source_data = source_data[source_data["value"] > 5]

chord_from_df = Chord(source_data, source="name_x", target="name_y", value="value")
output_file('chord_from_df.html', mode="inline")
show(chord_from_df)
```

How bokeh works?



Interfaces

- Ways to use Bokeh - pick the one that's right for you:
  - **`bokeh.charts`:** high speed. One-line charts. Processes your data & spits out a chart
  - **`bokeh.plotting`:** sensible defaults. Tries to pick sensible defaults You organize your data, it organizes your plot
  - **`bokeh.models`:** high customization. The lowest level. Offers you the most control. Do all the work yourself

Bokeh charts

Area, Bar, Box, Donut, Dot, Heatmap, Histogram, Horizon, Line, Scatter, Step, Timeseries

Wherever possible, the interface is designed to be simple to use with pandas, by accepting a DataFrame and names of columns directly to specify data.
reference

Pandas friendly

- Inputs:
  - categorical: values / label (Bar, Dot)
  - continuous: x / y (Scatter, Line)
- Defaults:
  - plot_width, plot_height, tools, legend, xgrid, ygrid, xlabel, ylabel, xscale, yscale, title_text_font_size, responsive.....

Bokeh on server, bokeh dashboard, bokeh data shader