

CIS 4170 -- Data Visualization

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Lab/Practicum Tools

Bokeh is an interactive visualization library for modern web browsers

- go to terminal
- Bokeh [sample data](#)

To generate plots, the client library BokehJS JavaScript and CSS code must be loaded into the browser. By default, the `output_file()` function will load BokehJS from `cdn.bokeh.org`.

Lab/Practicum Tools

Bokeh

Plots are containers that hold all the various objects (renderers, guides, data, and tools) that comprise the final visualization that is presented to users.

Glyphs are the basic visual marks that Bokeh can display. At the lowest are glyph objects, such as `Line` (`bokeh.model`). Higher-level glyph methods include `line()` and `circle()` (`bokeh.plotting`).

Guides are visual aids that help users judge distances, angles, etc. including grid lines or bands, axes (such as linear, log, or datetime) that may have ticks and tick labels as well.

Annotations are visual aids that label or name parts of the plot. These include titles, legends, etc.

Lab/Practicum Tools

Matplotlib is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, the Python and IPython shells, the Jupyter notebook, web application servers, and four graphical user interface toolkits.

Lab/Practicum Tools

The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning

Lab/Practicum

Simple Plots

Simple Plots

Simple Plots
Bokeh

- including zoom, pan, save, and other tools

1. Prepare data

In this case plain python lists, but could also be NumPy arrays or Pandas series.

2. Tell Bokeh where to generate output

In this case using `output_file()`, with the filename "lines.html". Another option is `output_notebook()` for use in Jupyter notebooks.

3. Call `figure()`

This creates a plot with typical default options and easy customization of title, tools, and axes labels.

4. Add renderers

In this case, we use `line()` for our data, specifying visual customizations like colors, legends and widths.

5. Ask Bokeh to `show()` or `save()` the results.

These functions save the plot to an HTML file and optionally display it in a browser.

6. Steps three and four can be repeated to create more than one plot.

Simple Plots

Bokeh

```
1.  from bokeh.plotting import figure, output_file, show
2.  # prepare some data
3.  x = [1, 2, 3, 4, 5]
4.  y = [6, 7, 2, 4, 5]
5.  # output to static HTML file
6.  output_file("lines.html")
7.  # create a new plot with a title and axis labels
8.  p = figure(title="simple line example", x_axis_label='x', y_axis_label='y')
9.  # add a line renderer with legend and line thickness
10. p.line(x, y, legend="Temp.", line_width=2)
11. # show the results
12. show(p)
```


Simple Plots

Simple Plots
Matplotlib

1. `from typing import List, Any, Union`
2. `import matplotlib.pyplot as plt`
3. `x = [1,2,3,4,5,6,7,8]`
4. `y: List[Union[float, Any]] = [0.1,0.2,0.5,0.6,0.8,0.8,0.9,1.3]`
5. `plt.plot (x,y)`
6. `plt.show()`

Simple Plots

Simple Plots Matplotlib

```
1. import matplotlib
2. import matplotlib.pyplot as plt
3. import numpy as np

4. # Data for plotting
5. t = np.arange(0.0, 2.0, 0.01)
6. s = 1 + np.sin(2 * np.pi * t)

7. fig, ax = plt.subplots()
8. ax.plot(t, s)

9. ax.set(xlabel='time (s)', ylabel='voltage (mV)',
10.        title='sin wave')
11. ax.grid()

12. fig.savefig("test.png")
13. plt.show()
```

Lab/Practicum

Geo Earth

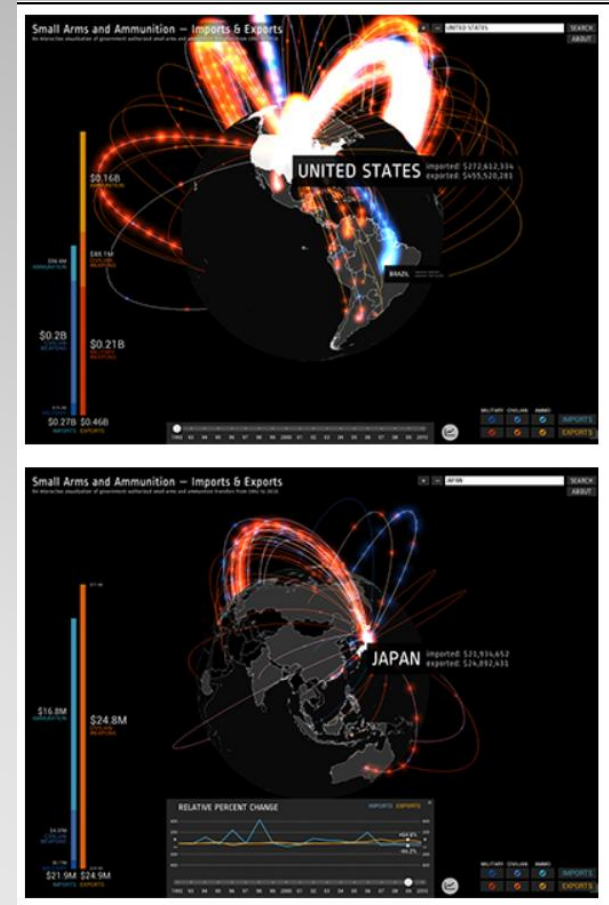
Geo Earth

This project is now open source:
<https://github.com/dataarts/armsglobe>

BUILT WITH: 3D, WebGL

produced by Google as part of the 2012 Google Ideas INFO (Illicit Networks, Forces in Opposition) Summit with support from the Igarape Institute and data provided by the Peace Research Institute Oslo (PRIO) small arms database

The data includes annual customs report data providing >1 million data points of individual exports and imports



Source - <https://experiments.withgoogle.com/arms-globe>