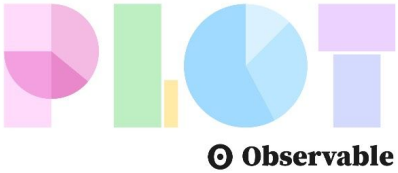


Online Course
Data Visualization for Professionals

THE UNIVERSITY of EDINBURGH

Data Exploration with Observable

https://observablehq.com/

June 14, 2022

design informatics

THE UNIVERSITY of EDINBURGH

Goals

Understand what Observable can do

Be **inspired** by others' projects

Get **hands-on** with some data

Start to build your own basic data **narrative**

Feel comfortable diving into Observable!

Not goals

Become an immediate **expert** in Observable

Build visualizations from scratch in **D3.js***

Teach you (much) **JavaScript** or **programming**

*D3.js: the visualization library powering Observable

Disclaimer!

Observable requires good coding understanding!
If you cannot keep up, sorry!

Outline

1/ What is Observable?

2/ Intro/overview

3/ Inspiring projects

4/ Adapting others’ work

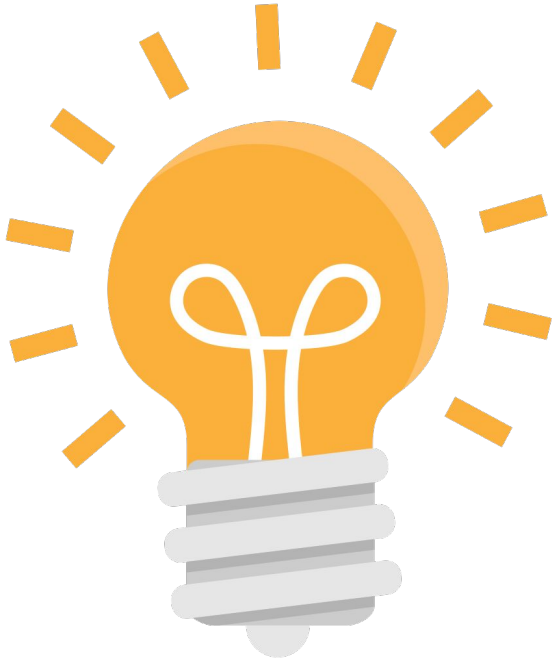
5/ Data Exploration in Observable Plot

6/ Resources

What do I need?

- Observable: https://observablehq.com/
- *Ideas!*

- Maybe some data?



1/ What is Observable?

What is Observable?

Observable

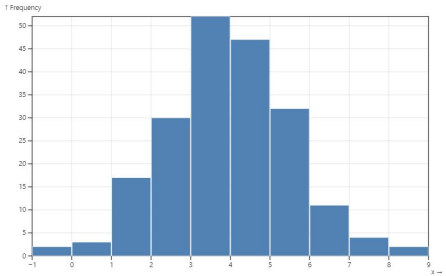
> “is a **platform** for **exploring data and code, visually**, **live** in your browser”

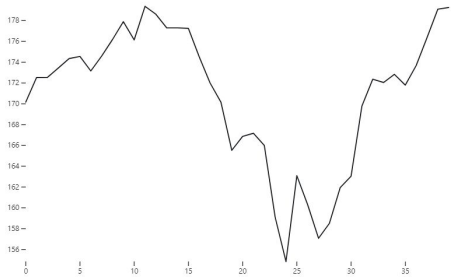
- Great for creating narratives that also allow users to explore data
- Great for collaboration
- Great community & plenty of resources to get started

A lot like Jupyter Notebooks, but with some differences

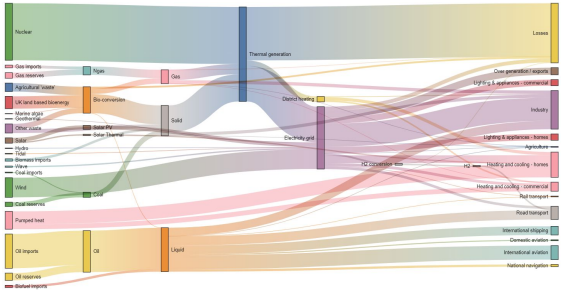
What is Observable?

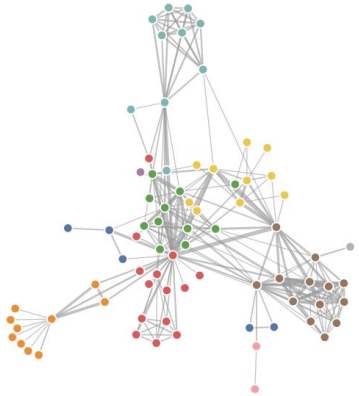
Basic charts



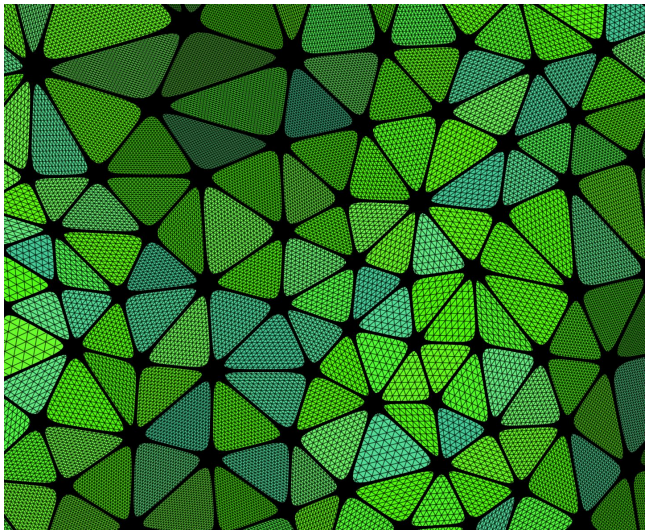


Advanced charts





Digital art



What is Observable NOT?

Observable is **not** particularly:

- Out-of-the-box intuitive
- Quick to learn
- Suitable for code-phobic individuals

It is possible to get stuck down “dead-ends” in visualization

2/ Intro/Overview

Intro/Overview

Notebooks

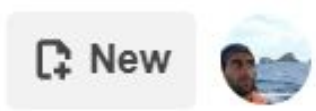
- Like a document
- Contain cells

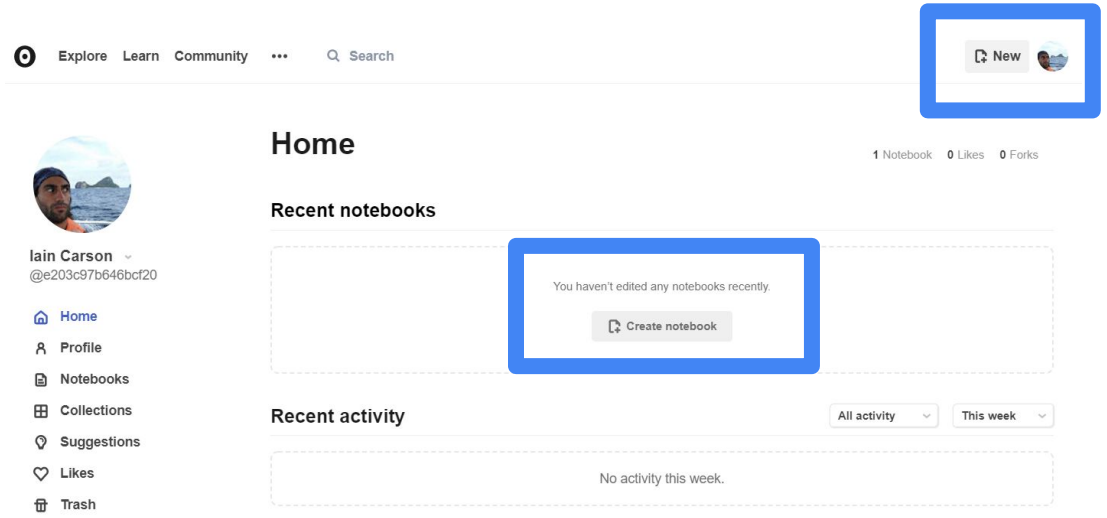
Cells

- Contain & output text (MD), code, inputs/controls, graphics, data, SQL, HTML/iframes… and more!

Intro/Overview

Create a new notebook!





Intro/Overview

- Populating cells
  - Text & narrative
  - Inputs
  - Functions/calculations
  - Data import
  - Outputting visualisations and tables
- Variety of presets and templates available

Types of cell – narrative

Markdown/HTML

Utilise JavaScript `` `string literals` ``

Literals in md/html:

My favourite fruit is orange

```
<p>My favourite fruit is <span style="color:${fruit}">${fruit}</span></p>
```

```
fruit = "orange"
```

```
fruit = "orange"
```

Types of cell – input

- “viewof” keyword
  - Forces Observable to watch user inputs and value changes in mutable cells
- Exposes the variable (e.g. “name”) to other cells
- More info: Introduction to Views (observablehq.com)

What kinds of input can I use?

- Observable Inputs (observablehq.com)

Types of cell – function

- All Observable cells are a chunk of JavaScript (expression) which resolve to a single value
- Some things are a bit different:
  - Observable cell value:

```
language = "JavaScript"
language = "JavaScript"
```

  - JavaScript variables:

```
"hi!"
{
  let myString = "hi!";
  return myString;
}
```

  - {} = code block
  - ({}) = object literal
  - use “return” in code block to resolve output

```
5
5

"hello"
"hello"

▸ Array(3) [1, 2, 3]
[1,2,3]

▸ Object {item: "banana", price: 10}
({ "item": "banana", "price": 10.00 })

true
2 * 3 === 6

hiya = ƒ()
function hiya() {
  return "hello world";
}

"hello world"
hiya()

hello = "hi"
hello = new Promise((resolve) => setTimeout(() => resolve("hi"), 1000))

"HI"
hello.toUpperCase()
```

Types of cell – function

Observable includes several Recommended Libraries libraries by default:

Symbol	Name	Version
_	Lodash	4.7.21
aq	Arquero	4.8.8
Arrow	Apache Arrow	4.0.1
d3	D3.js	7.4.4
dot	Graphviz	0.2.1
htl	Hypertext Literal	0.3.1
Inputs	Observable Inputs	0.10.4
L	Leaflet	1.8.0
mermaid	Mermaid	9.0.0
Plot	Observable Plot	0.5.0
SQLite	SQL.js	1.6.2
topojson	TopoJSON Client	3.1.0
vl	Vega, Vega-Lite	5.22.1, 5.2.0

Types of cell – data

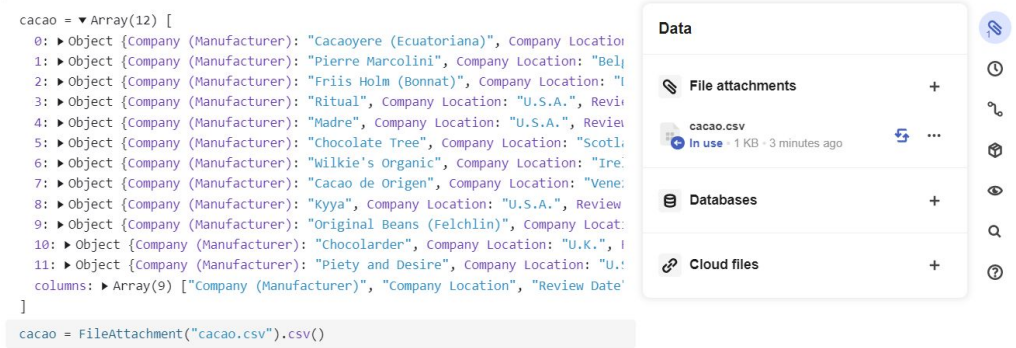
Several ways to get data into Observable:

- “Inline” data:

```
books = ▼ Array(3) [
  0: ▶ Object {author: "Tolkein", title: "LOTR", sales: 150000000}
  1: ▶ Object {author: "Rowling", title: "HP", sales: 500000000}
  2: ▶ Object {author: "Pullman", title: "DM", sales: 18000000}
]
```

```
books = [
  {author: "Tolkein", title: "LOTR", sales: 150000000},
  {author: "Rowling", title: "HP", sales: 500000000},
  {author: "Pullman", title: "DM", sales: 18000000}
]
```

- “Attached” data:



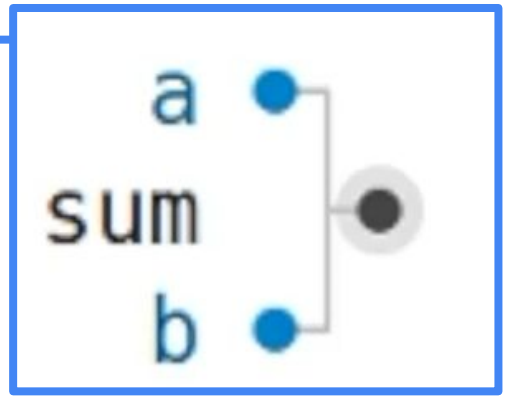
- “Linked” data
  - E.g. DB or API
  - Advanced!

Types of cell – output (visualization)

- Several “built-in”
  - Observable Plot
- “return” an svg or image to view
- Can use e.g. vega-lite

Comments

- Observable doesn’t care about cell order!
  - Re-order to suit your narrative, not the code
- Cells automatically run when edited (or dependents edited)
  - Use the minimap to see dependencies



- [Notebook Visualizer (observablehq.com)]

3/ Inspiring Projects

Visualized Narratives

Real and Nominal Money / John Hartnup / Observable (observablehq.com)

Andy's Walgreens COVID-19 Tracker Tracker / Andy Bloch / Observable (observablehq.com)

NBA Finals, Game 3 / Observable / Observable (observablehq.com)

Sustainable Design in U.S. Communities / Maryanne Wachter / Observable (observablehq.com)

Great Visualizations

Plot Examples / Observable / Observable (observablehq.com)

- Plot: regression / Fil / Observable (observablehq.com)
- Greenhouse gas emission projections / rcatlord / Observable (observablehq.com)
- Variants of SARS-Cov-2 in Europe / Fil / Observable (observablehq.com)

3D Graphs with THREE.js / Lao / Observable (observablehq.com)

Cool, Reusable Techniques

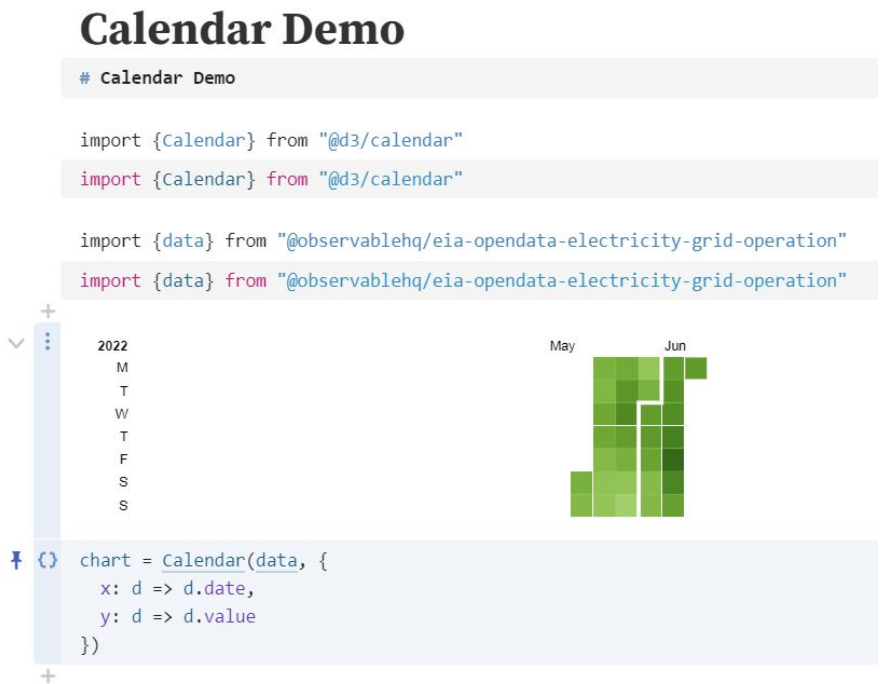
Raincloud Plots with Observable Plot / Torsten Sprenger / Observable (observablehq.com)

Chord Dependency Diagram / D3 / Observable (observablehq.com)

4/ Adapting others’ work

Adapting others' work - Importing cells

- Individual cells can be imported



Adapting others' work – Forking workbook

Sometimes a cell or two is not enough. Fork!

Here's a quick (quite bad!) example:
Ridgeline Plot (observablehq.com)

5/ Data Exploration and Narration With Observable Plot

Start from scratch!

Let’s explore something from the Observable sample dataset.

Sample Datasets / Observable / Observable (observablehq.com)

6/ Resources

Resources

- Tutorials
  - Data Sources
  - Inputs
  - Plots
- Examples
- Documentation

- Plot Cheatsheets