HKUST
VISLAB

COMP 4462
Data Visualization Tutorial

Leo Yu Ho, Lo
Ming Yao

Tuesday 9 April, 2019

https://bit.ly/vis-t09

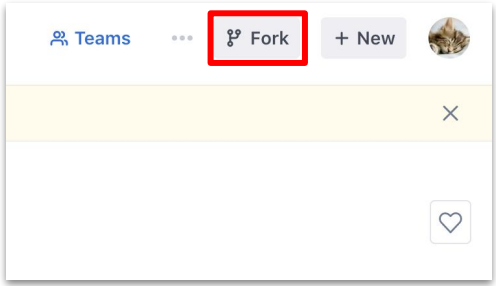
Visualization and Interaction with D3.js

- Interaction with visualization
  - Visualization has well established before the invention of computer
    - But interaction with visualization only available through the use of computers
  - Huge space of possibilities
    - But all successful interaction designs follow **“Overview first, details on demand”**
  - Visualization interactions mostly through mouse
    - Seldomly with keyboard
    - Interaction through touch devices is a grand challenge in data visualization
- Animation
  - Makes interaction smoother, more responsive
  - Keep conceptual consistency, objects enter the scene instead of appear suddenly
  - Motion is a very attention attractive channel
    - It is built-in in our mind to track moving objects (because of primal instincts?)
    - But too much moving objects will overwhelm viewers

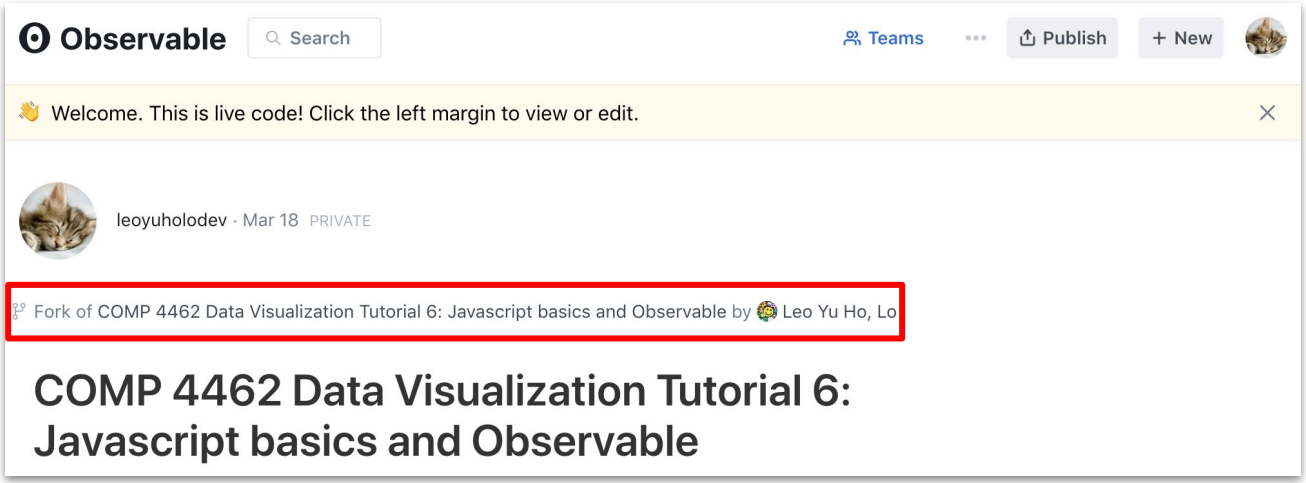
Fork Observable notebook

1. Go to the notebook of this tutorial

2. Click Fork



3. Check if you're working on your copy of the notebook (otherwise, your work will not be saved)



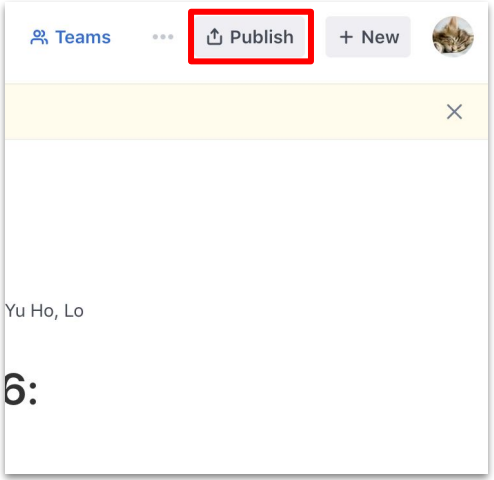
Visualization and Interaction with D3.js

- See the Observable notebook of this tutorial
- Choropleth (maps with color encoding)
- Interaction
  - Overview first, details on demand!
  - Tooltip with <title> element, d3-tip
  - Mouse events: mouseover, mouseout, click
  - Observable inputs: dropdown menu, slider
  - Linked views
- Animation
  - Eyes beat memory!
  - Animation with redraw, D3.js transition
  - Motion encoding, pop-out effect
- Data analysis techniques
  - Daily average over month total
  - How to handle missing data?

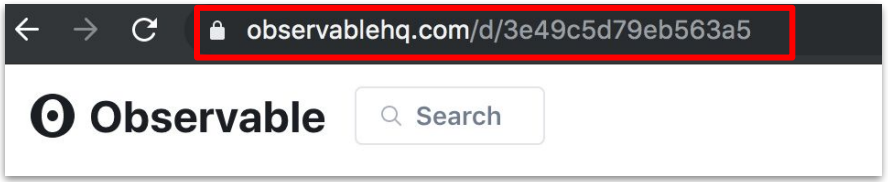
Publish your Observable notebook

1. In your working copy of the notebook

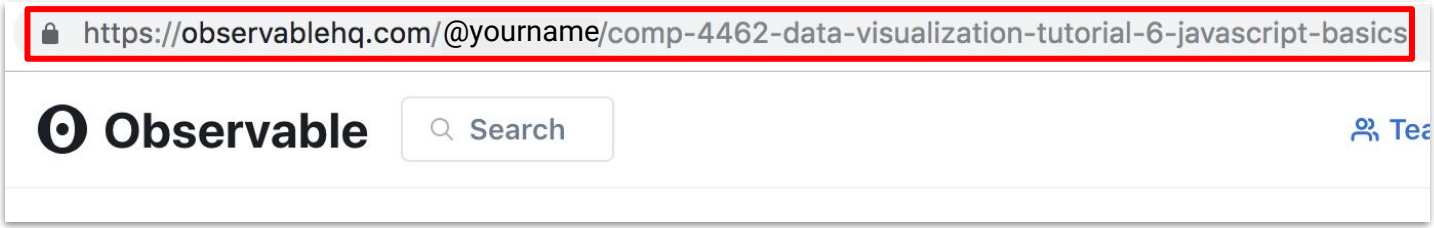
2. Click Publish



3. The URL changes from a hash...



4. To a meaningful URL, this URL is publicly accessible



Lab exercise

- Tasks
  - Sign in Observable
  - Open this Observable notebook and fork it (otherwise, your work will not be saved)
  - Read through the notebook and fill in the “TODO” cells
  - Try to use tooltips with SVG <title> element and d3-tip library
  - Use Observable inputs (dropdown, slider) to explore the spotify dataset
  - Learn how to plot choropleth (map with color encoding)
  - Learn about using transition with D3.js, and different kind of easing
  - Publish your notebook when finished
  - Copy the URL of your Observable notebook and submit to Canvas
    - The URL should be something like:
      - https://observablehq.com/@yourname/comp-4462-data-visualization-tutorial-9-visualization-and
  - Help us improve this tutorial by answering the questionnaire
- Optional
  - Like our Observable notebook ❤❤❤ and star our GitHub repository ⭐⭐⭐Thank you! ❤
  - Learn about how to make wordle/graph, and using D3.js/Vega outside Observable notebooks

More on interactions and D3.js

- More on interactions
  - D3.js: d3-drag, d3-zoom, d3-brush
    - Demos: d3-drag, d3-zoom, d3-brush
  - Vega-Lite:
    - Interactive Plots with Selection in Vega-Lite
  - Altair:
    - Making Charts Interactive in Altair
- Visualizations not covered in tutorials
  - Wordle (a.k.a. Word Cloud)
    - Javascript implementation of wordle by Jason Davies
    - Vega Word Cloud Example
  - Graph visualization
    - D3 in Depth: Layouts and D3 in Depth: Force layout
    - Vega Force Directed Layout Example
    - Besides D3, Gephi is a professional graph visualization tool

This is our last tutorial

Have fun making beautiful visualizations!

- We have learnt to make visualizations with:
  - MS Excel
  - Tableau
  - Python, Pandas and Altair
  - Javascript, Observable, Vega-Lite and D3.js
- We have gone through a long way!