

Data visualisation for cultural heritage collections

N8 CIR Training Dr Olivia Vane



Course structure

Part I: Monday 19 April, 10.30am–12pm	What is data visualisation? Why visualise cultural heritage data?
<mark>Part II</mark> : Monday 26 April, 10am–12pm	Making visualisations: Typical steps making dataviz + working with data Best practice design Tools
12–1pm / 1–2pm	Off-Zoom exercises making graphics with British Library data with non-programming tools (DataWrapper and RawGraphs).

From Data to Visualisation

Things That Are Good

Cats, maps & open data-made possible with Google dataset search engine

25 hn ss.



The map shows the estimated cat population per 25 square kilometer area in Great Britain, as of January 1, 2015 when the estimates were modeled.

Click on a square to see that estimated number of cats, visualized in a CIFs, where every one cat GIF represents one hundred cats. To not make half-GIFS, every cat amount is rounded to the next one hundred cats. For example, 102 cats would be represented by two GIFs.

Sources*

Animal and Plant Health Agency, Charles Roper, Cats As A Service, Office for National Statistics & the Scottish Covernment

About 30,459 cats in this area namenanananananananananananananana

By Rachael Dottle https://medium.com/nightingale/how-i-go-from-zero-to-map-6b3398ea1f07



By Rachael Dottle https://medium.com/nightingale/how-i-go-from-zero-to-map-6b3398ea1f07



Data visualisation pipeline



Data processing



What you can make is determined by the content and shape of the data you have (or can get)

Collections as Data



Case study: The Press Picker

Title-level list of British & Irish newspapers held by the British Library

https://bl.iro.bl.uk/work/7da47fac-a759-49e2-a95a-26d49004eba8

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Press Picker: Visualisation of British Library newspaper title holdings

Formats

----- Microfilm holdings/year ------ Hardcopy holdings/year

Olivia Vane, Kasra Hosseini & Giorgia Tolfo *Dataset credit:* BL Contemporary British and BL Collections Metadata.



Case study: The Press Picker





Data processing



Data Cleaning Example: the Press Picker

- Remove duplicate records
- Separate multiple values contained in the same field eg. Date spans eg. 1850-1851: split into date_start=1850, date_end=1851.

Categories eg. Mineral samples|Specimens|Mineral Samples-Geological: split into individual cells

• Group together different representations of the same reality

Categories: Reconcile different spellings/letter cases/use of punctuation, remove empty spaces eg. Inverness-shire - Isle of Skye, Inverness-shire (Isle of Skye)

• Make data values machine-readable eg. Dates: 18th Century: date_start: 1700, date_end: 1799

Tools –

Excel

OpenRefine [Programming Historian tutorial:

https://programminghistorian.org/en/lessons/cleaning-data-withopenrefine]

Python with Pandas

R with dplyr



Filtering Example: the Press Picker

Filtering

- no titles already digitised or on digitisation picklists
 'Burney' == null, 'BNA' == null ...
- Geographic: curated list of 'General area of coverage' field 'General area of coverage' == 'Merseyside' or 'Liverpool' or 'Lancashire' or ...
- Temporal (overlapping 1780-1918) Records where date_start <= 1918 and/or date_end >= 1780



Joining to other datasets

Example: the Press Picker

- Item level data for microfilm holdings
- Item level data for hardcopy holdings. [Join on newspaper title ID]



Computational analysis & adding new facets Example: the Press Picker

CLEANING

• Create summary data For each title calculate: Total number of microfilms Total number of hardcopies, Total number of microfilms likely on acetate

West Glamorgan: The Cambria Daily Leader

 Record linkage Title name changes

> Preceding titles = "Continues: Derby Exchange Gazette. no.2-6 (14 Jan. - 11 Feb.1860)"

• Enrich metadata

Eg. Add a 'Corrected County' facet from 'General area of coverage' field

- Reconcile with external dataset, eg. wikidata
- Named entity recognition
- Image recognition



Restructuring data



Certain data visualisation types **expect (and require!)** your data in a particular form



Record by record data

Title name	Year	etc	
Title A	1781		
Title A	1782		
Title A	1783		
Title B	1782		
Title B	1782		
etc			

Summary time-series data

Title name	1780	1781	1782	1783	etc
Title A	0	1	1	1	
Title B	0	0	2	0	
etc					



Record by record data

Title name	Country of publication	etc	
Title A	England		
Title B	England		
Title C	Netherlands		
Title D	Ireland		
Title E	Ireland		
etc			

Summary data

Country of publication	Total records
England	2
Netherlands	1
Ireland	2

Records per Country of Publication



Network data eg.

NODE

NODE

LINK

Nodes		Links			2nd Gravedigger Gravedigger Ist Player Researcrantz Guildenstern V	ornelius /oltemand
id	name	source	target	value (eg. number of interactions between characters)	Ghost	dessenger dessenger
1	Hamlet	1	2	5	Barnardo	(
2	Horatio	1	3	7	Francisco	Gentleman
3	Polonius	1	4	2	Horatio	
4	Claudius	5	7	9	Gentleman	
					Sallor	
	NODE	14 UNK NODE		[Dummy data]	Norwegian Captain Priest Reynaldo	

Hamlet's network (the set of characters he interacts with directly) from Moretti, F. (2011) Network theory, plot analysis. In: *Literary Lab Pamphlet 2*, Figure 2.

Hierarchical data

Hierarchy level 1 Metadata category A	Hierarchy level 2 Metadata category B	Hierarchy level 3 Metadata category C	Value Number of datasets
Social Sciences	Environmental Studies		29
Social Sciences	Economics		113
Social Sciences	Political and Administrative Sciences	Political Science	30
Social Sciences	Political and Administrative Sciences	Social and Public Administration	40
Social Sciences	Science of Law	History of Law	1
etc			



Restructuring data



	1780	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890
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Record by record data

Title name	Connected titles	Title ID	etc
Title A	Title D, Title C	123	
Title B		124	
Title C	Title A, Title D	125	
Title D	Title A, Title C	126	
Title E		127	

50 • 91 51 West Glamorgan: The Cambria Daily Leader 1 1 West Glamorgan: The Cambrian Daily Leader 17 2 50 Greater Manchester: Manchester Daily Times 10 40 Greater Manchester: Manchester Daily Examiner & Times 20 58 Greater Manchester: Manchester Examiner & Times 3 4 Greater Manchester: The Manchester Examiner	1780	1790	1800	1810	1820	1830	1840	1850
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Nested into connected title groups

Total titles in group	Title name	Title ID	etc
3	Title A	123	
	Title C	125	
	Title D	126	

Total titles in group	Title name	Title ID	etc.
1	Title B	124	

Total titles in group	Title name	Title ID	etc.
1	Title E	127	

Data visualisation pipeline



Visual design





Visual design

Graphical Integrity

Legibility

Clarity of purpose

Tone, associations, context



The Visual Display of Quantitative Information

EDWARD R. TUFTE



Graphical Integrity

The representation of numbers, as physically measured on the surface of the graphic itself, should be directly proportional to the numerical quantities represented.

Clear, detailed, and thorough labeling should be used to defeat graphical distortion and ambiguity. Write out explanations of the data on the graphic itself. Label important events in the data.

Graphics must not quote data out of context.

The visual display of quantitative information. Edward Tufte.





Disabled people in Scotland were least likely to own their own home

Proportion of disabled people aged 16 to 64 years who are owner occupiers, by country, UK, 2019



Bad practice

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Good practice

Gun deaths in Florida

Number of murders committed using firearms



C REUTERS
Gun deaths in Florida

Number of murders committed using firearms



Gun deaths in Florida

Number of murders committed using firearms



Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

C REUTERS

Top 5 Counties with the Greatest Number of Confirmed COVID-19 Cases

The chart below represents the most impacted counties over the past 15 days and the number of cases over time. The table below also represents the number of deaths and hospitalizations in each of those impacted counties.

County Cobb DeKalb Fulton Gwinnett Hall

Georgia State Health Department, USA

Top 5 Counties with the Greatest Number of Confirmed COVID-19 Cases

The chart below represents the most impacted counties over the past 15 days and the number of cases over time. The table below also represents the number of deaths and hospitalizations in each of those impacted counties.

County Cobb DeKalb Fulton Gwinnett Hall



Georgia State Health Department, USA

How Charts Lie



Getting Smarter about Visual Information

Alberto Cairo

Government statistical service **'Introduction to data visualisation'**: <u>https://gss.civilservice.gov.uk/policy-store/introduction-to-data-visualisation/</u>

Office of National Statistics 'Data visualisation: Guidance for creating charts and tables and best practice for using colour in your work': <u>https://style.ons.gov.uk/category/data-visualisation/</u>



Data visualisation as rhetoric

Maps as tools of persuasion and power

"...maps, truth, and belief have a complicated relationship with one another. Every map is a representation of reality, and every representation, no matter how accurate and honest, involves simplification, symbolization, and selective attention. Even when a map isn't actively trying to deceive its readers, it still must reduce the complexity of the real world, emphasizing some features and hiding others. Compressing the round globe onto a flat sheet of paper, and converting places, people, and statistics into symbols, lines, and colors is a process inherently fraught with distortion." https://www.leventhalmap.org/digital-exhibitions/bending-lines/intro/



Donald J. Trump @realDonaldTrump



12:05 pm · 1 Oct 2019 · Twitter for iPhone

63.1K Retweets 237.4K Likes



 \sim

Spotted: A map to be hung somewhere in the West Wing



 \bigcirc 5,078 people are talking about this

y

>



https://observablehq.com/@karimdouieb/tryto-impeach-this-challenge-accepted



Exercise: Alternative election maps

https://docs.google.com/document/d/1S1InP0PdjHFAtI7mN4h6i02O7YsF8DsIrWtGnzmQ4Kg/edit?usp=sharing

BENDING LINES

Maps and Data from Distortion to Deception.

Leventhal Map & Education Center

Digital exhibition by the Leventhal Map & Education Center at the Boston Public Library examining the many ways in which maps and data can bend the lines of reality: <u>https://www.leventhalmap.org/digital-exhibitions/bending-lines/</u>

Legibility: visual mappings

Legibility: tidying up

Visual marks and channels for conveying information

Marks Points ① Lines Areas

Channels



From Tamara Munzner. Visualization Analysis and Design. 2014. Chap. 5

The New York Times

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Hong Kong Election Results Mapped

By K.K. Rebecca Lal and Jin Wu. Nov. 24, 2019

间读简体中交版·開闢繁璧中交版

In a stunning sign of support for the protests that have rolled Hong Kong this year, more than half of the 452 seats in <u>Sunday's local</u> <u>district council elections</u> flipped from pro-Beijing to pro-democracy candidates.





Hong Kong Election Results Mapped. The New York Times. 2019. https://www.nytimes.com/interactive/2019/11/24/world/asia/hong-kong-election-results.html

Note: Candidates were classified as pro-democracy or pro-Beijing based on their party attiliations, as well as by their public activities and statements. The chart includes 27 ex-officis members who are runit committee charmen in the New Tentities.



Some visual encodings are 'better' than others

Ranking of visual encodings for quantitative/ordered data (based on Cleveland and Robert McGill 1984) https://i.pinimg.com/originals/56/49/ea/5649ea50c413f4feb248550abb14a7b4.png







https://twitter.com/rJBeecham/status/1204399520328691712/photo/1



Hap & Huselization: Tobios Rover Research & Data: Loca Haria Avilio, Rosamo Schilanella, Dariele Quercia, Lacia Dell'Pete.

The map associates the prevalence of diabetes in London neighborhoods with the diservity of nutrients of L.M. grockey purchases. In terms of diabetes prevalence, socia-consens: conditions matter less than head habits. Issuer income areas with headity acting habits do not tend to be associated with diabetes. Hower on the quadrants to discover the areas with the healthinst sating habits. Hower on the map to see those difference areas fare in terms of headth and mutrition habits. Find out mem.

'Poor but Healthy' http://goodcitylife.org/food/



Legibility: visual mappings

Legibility: tidying up

Data-ink ratio



The Visual Display of Quantitative Information

EDWARD R. TUFTE

"Data graphics should draw the viewer's attention to the sense and substance of the data, not to something else...Above else show the data"

Data-Ink ratio = data-ink / total ink used to print graphic

Maximise the data-ink ratio (within reason) Erase non-data ink (within reason)







J. Could Sculp!

Publikel as the Ast divers to A day! 1985.



Étienne-Jules Marey, Graphic of the progress of trains upon a railway, after Ibry's method.

As above, but with lightened grid lines







Press Picker: Visualisation of British Library newspaper title holdings

Formats

----- Microfilm holdings/year ------ Hardcopy holdings/year

Olivia Vane, Kasra Hosseini & Giorgia Tolfo *Dataset credit:* BL Contemporary British and BL Collections Metadata.





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Figurative Map of the successive losses in men of the French Army in the Russian campaign 1812–1813. By Charles Minard, 1869. https://commons.wikimedia.org/wiki/File:Minard.png

Clarity of purpose

Good design is clear thinking made visible – Edward Tufte

How Music Preferences Have Changed in Two Decades

Music styles preferred by University of Miami students. Survey based on interviews with 1,000 students. SOURCE: WishfulThinkingData Inc.



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'A businessman stands behind a podium' by Gahan Wilson

https://images.fineartamerica.com/imagesmedium-large-5/a-businessman-standsbehind-a-podium-gahan-wilson.jpg



"Tll pause for a moment so you can let this information sink in."





Where the wild bees are. By Moritz Stefaner https://truth-and-beauty.net/projects/wild-bees

Uncertainty



Design is not a science - it's not a question of the 'correct answer'

Ask yourself:

-

- Do I think this is clear? Could it be clearer? How could I help my audience?
- What are the most important elements of this visualisation?
 - Are there elements I don't need here, that I could remove?
 - Are there elements that I should emphasise more?
 - Are there elements I want to keep, but could draw less attention to
 - What is this visualisation for? What do I want my audience to see? What do I want them to be able to do with it? What do I want to convince my audience of?
 - Does my current design achieve this?

It can be difficult especially when you're dealing with complex, multi-variate data, especially at scale. It's often a case of balancing-trade offs, seeking compromises between requirements

Try out changes - often the only way to know if certain changes will improve the visualisation is if you try them to see what they look like!

Visual design for communication: Tone Associations Context








Tracking of an Eagle over a 20 year period

https://www.reddit.com/r/MapPorn/comments/avbaf7/tracking of an eagle over a 20 year period/



Albatrosses circling Antarctica

https://i2.wp.com/geoawesomeness.com/wp-content/uploads/2017/01/01-maps-animalsalbatrosses.adapt __1190.1.jpg?ssl=1_

Visual design for communication: Tone Associations Context Why does this matter for visualising cultural collections?



Places of Residence for Accused Witches (total named accused witches: 3141) (+)

Filters 🖂



Generous interfaces





Explore Australian Prints + Printmaking. Mitchell Whitelaw and Ben Ennis Butler. 2013.

Interface design for the National Gallery of Australia's Australian Prints + Printmaking site.

These interfaces demonstrate the philosophy of generous interfaces, providing exploratory, data-dense views of the collection. Blending web design and data visualisation approaches, the aim is to create rich "overviews" of the collection that are more engaging and revealing than conventional search or browse techniques.

http://mtchl.net/explore-australian-printsprintmaking/ Exploring the Manly Local Studies Image Library

View by: Title | Decade



About this project | Images are copyright Manly Library, used with permission.

Manly Images. Mitchell Whitelaw.

This project is an experimental web interface to the Manly Local Studies Image collection a set of around 7000 images that document the history of the Manly area from the 1800s to the 1990s. The interface lets you explore the collection by title or decade. Its aim is to provide a rich, engaging overview of the collection, and encourage exploration and discovery without the use of search.

http://mtchl.net/manlyimages/ explore.html#title

When the Tech Kids are Running Too Fast: Data Visualisation Through the Lens of Art History Research

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ABSTRACT

The recent years have seen a rise in humanities interest for digital data analysis tools, including data visualization. However in the field of art history, major resistance to, and distrust of digital tools are still prevalent. Through collaboration and discussion with art historians, we identified the unique perspective of digital art historians, the specific nature of data handled in the field, and the culture behind such a wide-spread reticence. In this paper, we introduce this perspective to the growing discussion around the collaboration between the fields of data visualization and digital humanities. We also suggest principles for digital tools that better cater to the needs of art history researchers, and ways for art historians to foster a culture that is more open to digital tools.

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Index Terms: Human-centered computing-Visualization-Visualization design and evaluation methods

1 INTRODUCTION

In recent water, disital tools have been cloudy but comby azining

being able to work quickly to release research in preliminary and iterative stages is vitally important. Finally, the discipline is seen as overly conservative, operating under a century-old, risk-averse model. For those who are vested in this model, digital art history threatens their operational paradigm, requiring new training, methodologies, and modes for communicating and distributing research that changes the practice of art history as it is now conducted."

A few years later, the tools introduced for art historians have not been able to bridge the acceptance moat surrounding the practice of art history research.

Recently, increasingly more researchers are looking into analysing and improving the collaboration between visualization and humanities [13] [5] [9]. To this growing debate, we want to contribute the lessons we learned from a year-long collaborative project designing and building a visualization tool in an art history context. Throughout our collaboration with art history professors

· Designing for aesthetic experience

Aesthetic experience is critical for an audience of art history experts. When we first started collaborating in this project, one of our partners had to apologize before partly explaining the disinterest from art historians for digitals tools being due to software tools being "ugly". However, if we keep in mind the academic and personal manner with which art historians experience aesthetics, this becomes self-evident. Attracting more interest in the art history community therefore also means putting aside the aesthetic standards used in the software world to propose visualizations users will be satisfied to engage with.



The end is near

What syllables do German towns and villages end with?



Compare visualisations

Where do you feel these visualisation's 'belong'?

Who are they for?

What is the overall impression each gives?

How does the choice of colour or how the interaction works affect the impression the visualisation gives?



http://truth-and-beauty.net/experiments/ach-ingen-zell/



https://tobiaskauer.org/projects/end/

Data visualisation tools

Choosing a data visualisation tool

- 1. App or programming library? (Am I already using a particular programming language?)
- 2. Where am I going to do the data processing?
- 3. Is this making a quick chart, or do I want to spend longer customising?
- 4. What level of customisation/flexibility do I want in the design?
- 5. Interactive? Or static?

Data visualisation tools (a selection)

Apps

Programming

Spreadsheets	'Business Intelligence' apps	Web-based apps (aimed at journalists)		Low-level	High-level
X Excel Google Sheets	Image: Power Bl Image	Datawrapper Flourish [*]	Python	matpl&tlib	Bokeh seaborn
		RAW Graphs	R	ggl	olot2
One Chart, Twelve Charting Libraries https://lisacharlotterost.de/2016/05/17/one-chart-code/			JavaScript	33	Vega & Vega-Lite

https://lisacharlotterost.de/2016/05/17/one-chart-code/ One Chart, Nine Tools – Revisited https://lisacharlotterost.de/datavistools-revisited By Lisa Charlotte Rost



The best way to learn is through making - so have a go!



Data visualisation exercises with British Library datasets on <u>Datawrapper</u> and <u>RAWGraphs</u>

Surnames A-F (Inclusive) will be in the 12.10 -1pm session Surnames G-W will join the 1.10-2pm session.

https://docs.google.com/document/d/1Imq5xWSzXArYQooi9nrAVmXbm3-3k_95Q6rghTzy0C0/edit?usp=sharing

