

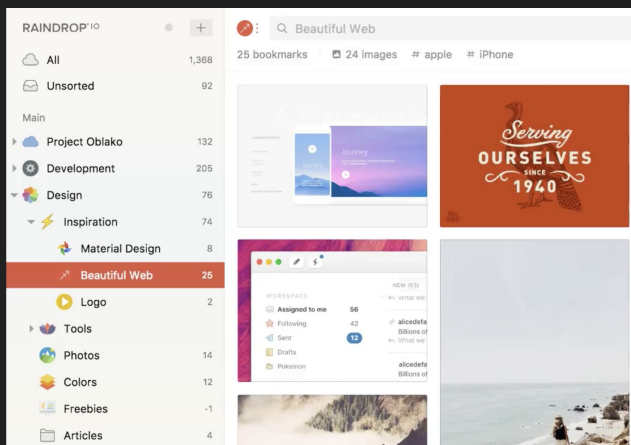
Bewilder

Handling Web Resource Complexity in Online
Learning and Research

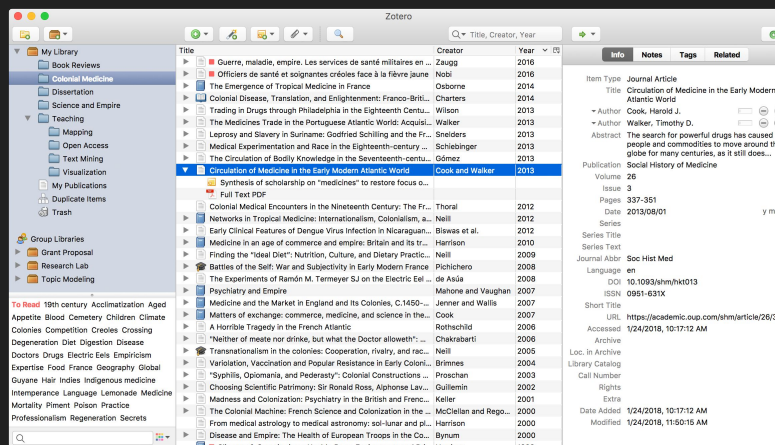
Eric Easthope

Motivation

- **Visual clutter:** folders are not always the best container ...



(source: www.raindrop.io)



(source: www.zotero.org)

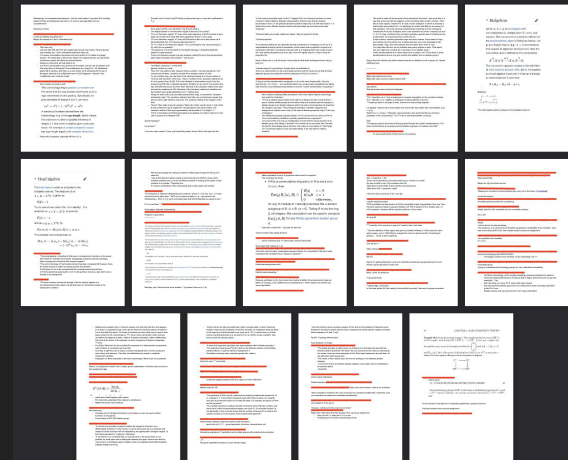
- The problem of “tab overload” ...

Motivation (cont'd)



(source: an interviewee's tab bar)

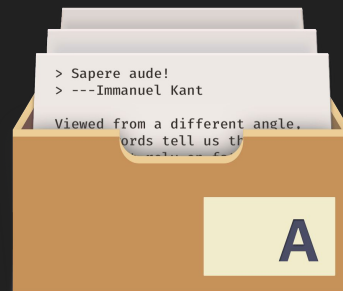
1. How do we make it visually and cognitively easier to collect, review, and share web links in multiple contexts?
2. How do we visualize these collections at scale?
 - e.g. **70 links** for a single weekly assignment ...



(source: another interviewee's graduate math notes)

Related work

- Online exploration & archiving
 - *HyperPhysics*
 - *Zettelkasten (The Archive)*
- Bookmark managers
 - *Raindrop.io*
 - *Pocket*
 - *Dropmark*
 - ... and many others.
- Bibliographies
 - *Zotero*
- Large-scale online databases
 - *Open Graph Protocol*
 - *Google Knowledge Graph*
 - *The Dataverse Project*

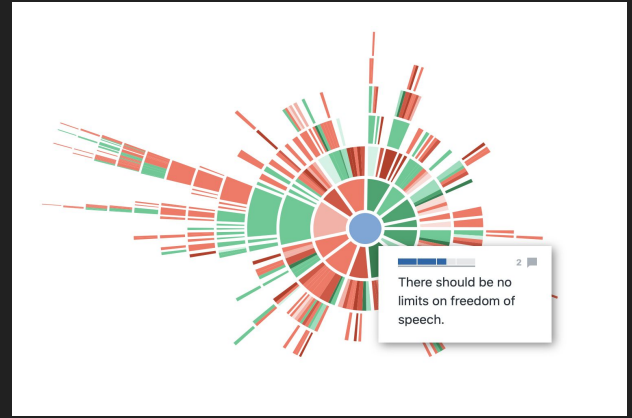


(logos available under fair use)

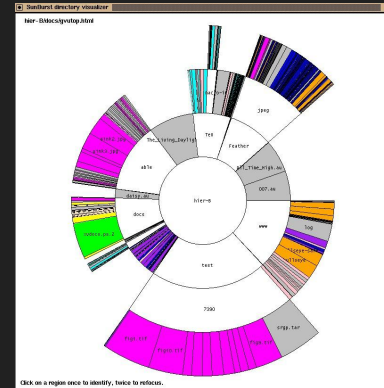
Related work (cont'd)

- *Kialo's* “discussion topology” [1]
- *StArt* [2]
 - Systematic literature review & mapping
- *DocuBurst* [3]
 - Visualize documents based on text content

- Many visualizations derived from Stasko et al.'s *SunBurst* technique [4]
- Users cannot navigate & edit hierarchical content directly



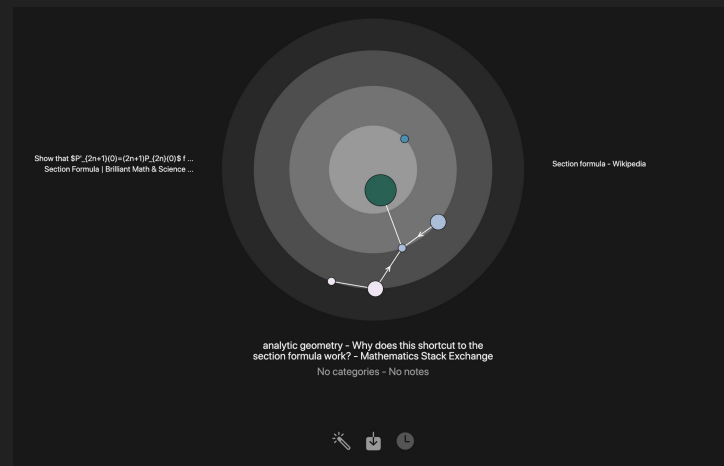
(*Kialo's* “discussion topology” [1])



(*SunBurst* technique [4])

Project: Bewilder

- Overview, annotate, and arrange collected web items
- Retain *why* & *when* we save web items
- Connect web items to each other
- **Want:**
 - More control over web link and research article collections
 - To modify, explore, and enjoy auto-generated arrangements of collections
 - Visible web item connections & hierarchy



(source: Bewilder user interface)

Data

- Need to unify disparate web link file formats
 - .webloc
 - .url
 - HTML (multiple bookmarks)
- Using JSON file format
- Social & sharing data available through Open Graph Protocol
- Combine web links + social & sharing metadata to make “nodes” & “links”
- “Nodes” are web items
- “Links” are (editable) connections between web items

Results: Demo

- **“User stories”**
- Discussions & interactions  Practical use cases for Bewilder ...

e.g. “As a student, how can I quickly aggregate and group web links by their similarities, as well as rearrange and annotate them, to understand and perhaps even solve resource-heavy problems faster?”

Discussion

- Others can receive, overview, and add content to a web link collection
- Connections are explicit!
- **Con:** JSON data structures require more file space than HTML bookmarks

- **Want:** Bewilder to handle hundreds or more web items (*post-project*)
- **Future:**
 - Hierarchically order web links based on timestamps
 - Refine “default connections”
 - Integrate more Open Graph & Twitter metadata
 - Improve JSON shareability

References

- [1] S. Chaudoin, J. N. Shapiro, D. Tingley, “Revolutionizing Teaching and Research with a Structured Debate Platform,” working paper, Harvard University, Cambridge, MA, USA, 2017. [Online.] Available: <https://scholar.harvard.edu/files/dtingley/files/structureddebate.pdf>
- [2] S. Fabbri, E. Hernandez, A. di Thommazo, A. Belgamo, A. Zamboni, C. Silva, “Managing Literature reviews information through visualization,” in *ICEIS 2012 - Proceedings of the 14th International Conference on Enterprise Information Systems*, 2012. [Online.] Available: <https://pdfs.semanticscholar.org/e5fb/4d8f9207dbec71a1b60115230e70add1b2ab.pdf>
- [3] C. Collins, S. Carpendale, G. Penn, “DocuBurst: Visualizing Document Content using Language Structure,” *Eurographics/IEEE-VGTC Symposium on Visualization 2009*, 2009. [Online.] Available: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.160.7051&rep=rep1&type=pdf>
- [4] J. Stasko, R. Catrambone, M. Guzdial, K. McDonald, “An evaluation of space-filling information visualizations for depicting hierarchical structures,” *International Journal of Human-Computer Studies*, 2000. [Online.] Available: <https://www.cc.gatech.edu/~john.stasko>

Thank you!

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