Big Data and History:
Seeing the Past through a Macroscope

Ian Milligan, PhD
Assistant Professor
@ianmilligan1

UNIVERSITY OF WATERLOO
FACULTY OF ARTS
Department of History

Historians are largely unprepared to engage with the quantity of digital sources that will fundamentally transform their trade.

… we need to think about big data …

Today's Talk

- **1. Prologue:** Big Data is everywhere
- **2. The Web Age:** Will accelerate this process
- **3. What can we do with big data?**

A Prologue: Big Data is Everywhere

What do we mean by Big Data?

- Computational definition: the 5 Vs (Volume, Velocity, Variety, Veracity, and Value)

- "For us, as humanists, big is in the eye of the beholder. **If it's more data that you could conceivably read yourself in a reasonable amount of time, or that requires computational intervention to make new sense of it, it's big enough!**" (Shawn Graham, Ian Milligan, Scott Weingart, *Exploring Big Historical Data*)

Why is it everywhere?

Google

https://www.google.ca/?gfe_rd=cr&ei=jJSnVu2THIvK8AfOrJioCA&gws_rd=ssl

Ian

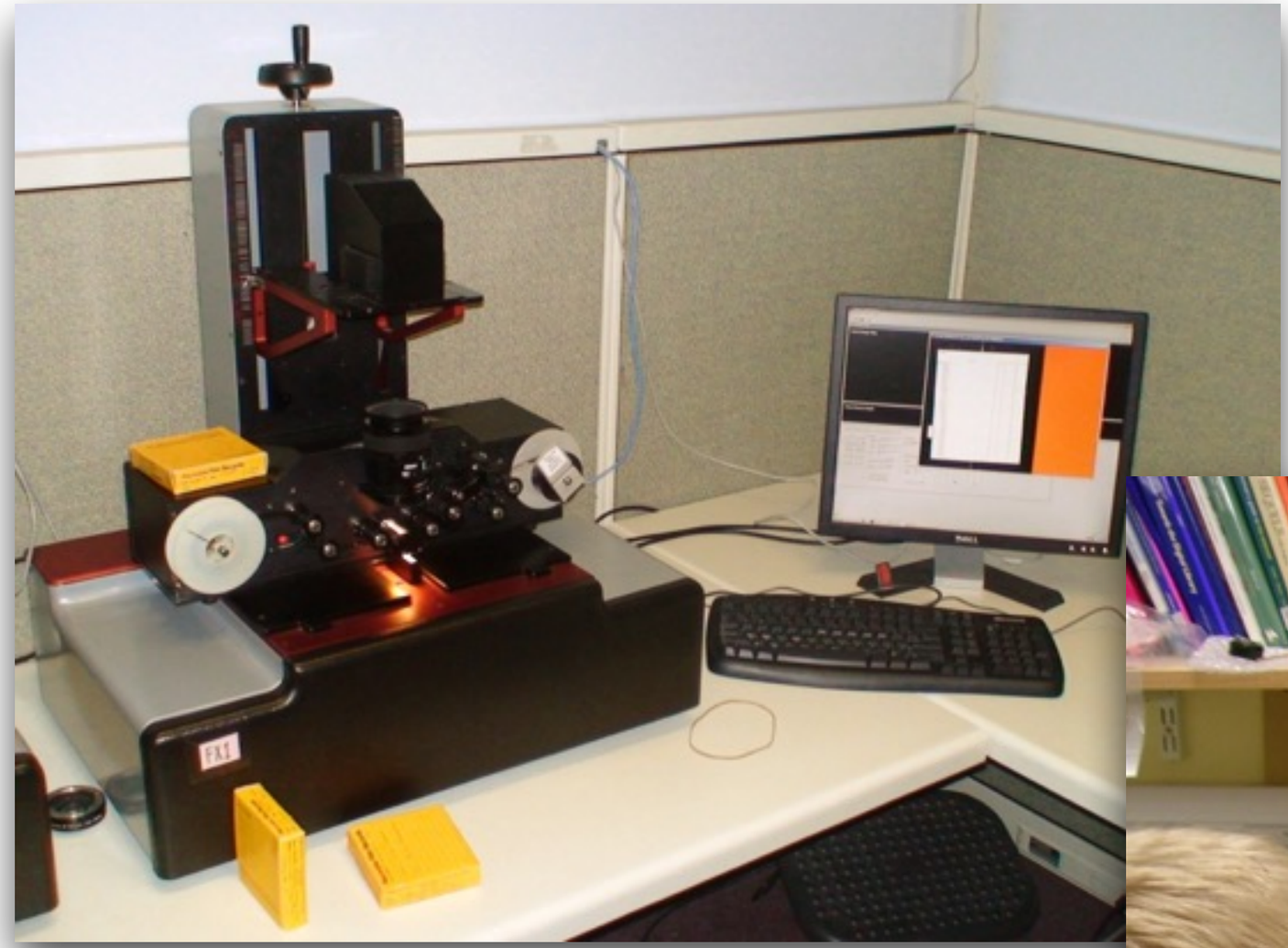
Ian Gmail Images

Google Search I'm Feeling Lucky

Google.ca offered in: Français

Advertising Business About Privacy Terms Settings Use Google.co

https://www.google.ca/search?site=&q=who+invented+the+m...




Canon
Microfilm Scanner 300 II
The Shetland Times
SALE

Advanced Search - ProQu

search.proquest.com/hnptorontostar/advanced/accountid=14906

Searching: 1 database | 0 Recent searches | 0 Selected items | My Research | Exit

< All databases | News & Newspapers databases | Preferences | English | Help

ProQuest

ProQuest Historical Newspapers: Toronto Star (1894-2011)

Basic Search | Advanced | Obituaries | Publications

Advanced Search

Look Up Citation | Command Line | Find Similar

Field codes | Search tips

in Anywhere

AND (OR) in Anywhere

AND (OR) in Anywhere

Add a row | Remove a row

Search Clear form

Search options

Publication date: All dates

Sort results by: Publication date (most recent first)

Items per page: 50

Duplicates: Include duplicate documents

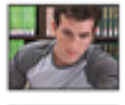
Search Clear form

Search subject areas

Use search forms customized for each subject.


The Arts


Business

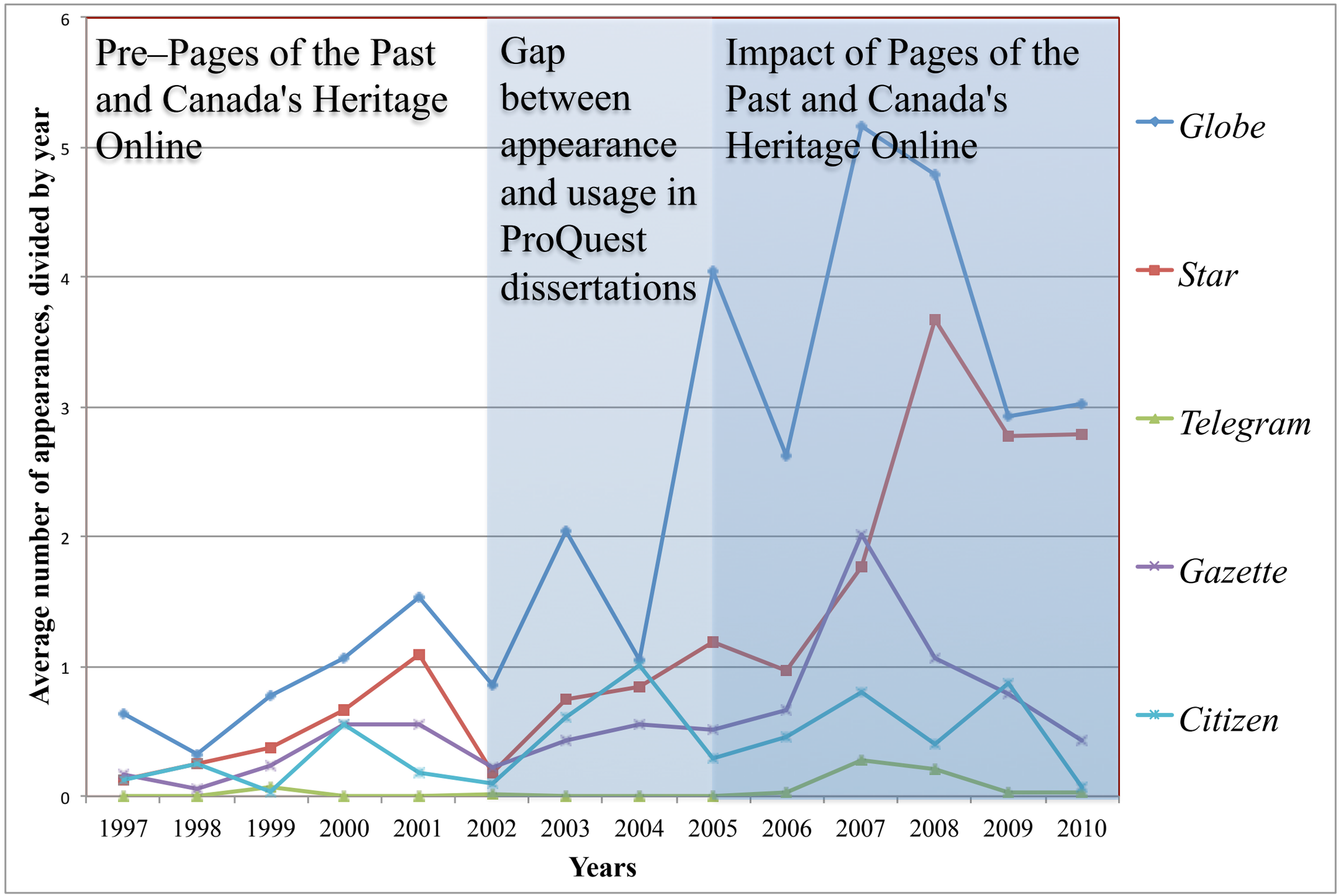

Dissertations & Theses


Health & Medicine


History


Literature & Language


News & Newspapers



Ian Milligan, "Online Databases, Optical Character Recognition, and Canadian History, 1997–2010," *Canadian Historical Review*, 94.4 (December 2013): 540-569.

... this is our long-term track record w/ digital resources ...

Our history with digital sources is the unreflective use of technology.

… we've become, in some ways, a discipline defined by the keyword …

A process that is only now beginning to accelerate.

First - more data than ever before being preserved;

Second - it'll be saved/delivered to us in very different ways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Democratic Party
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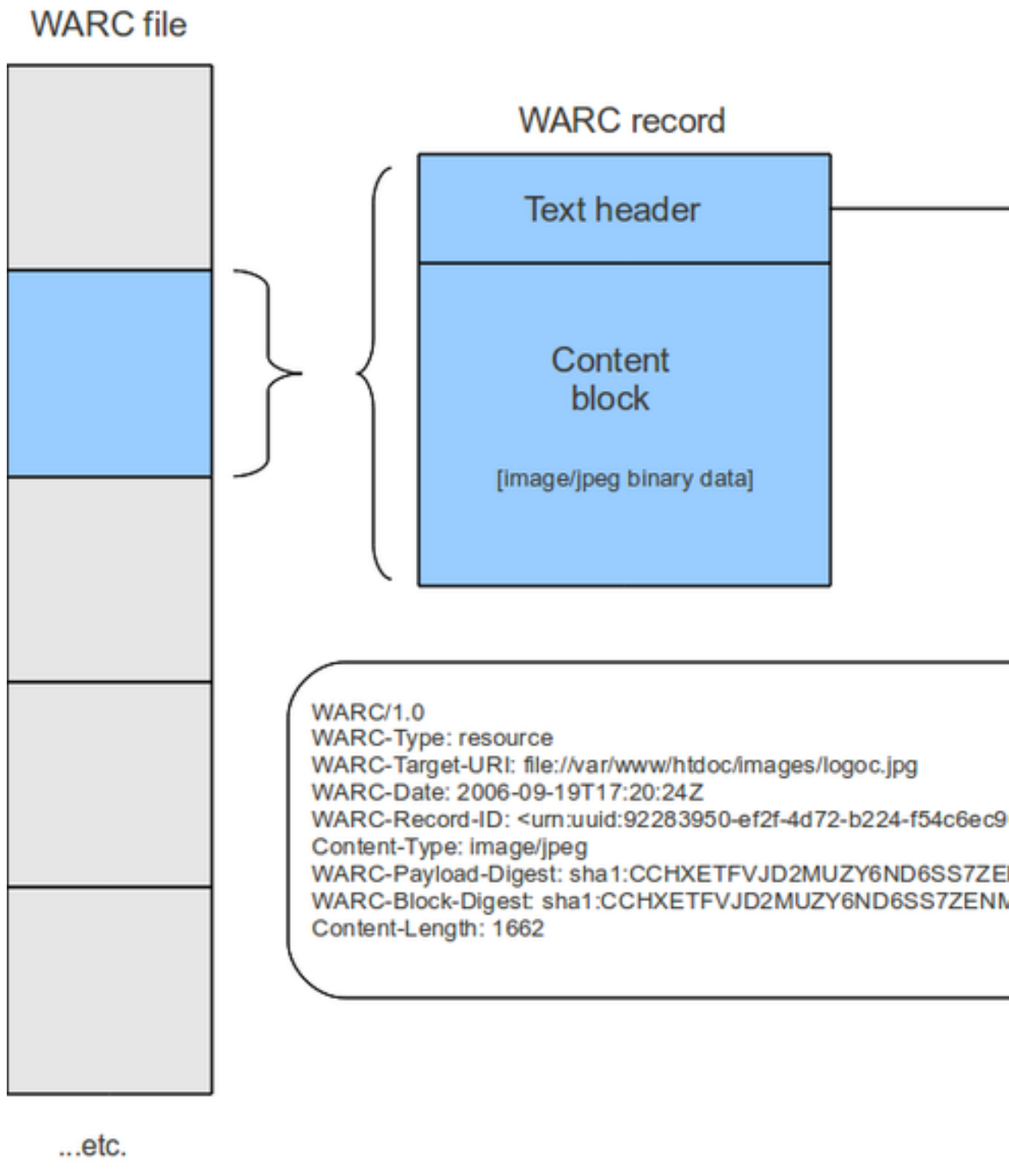
Scarcity

WebARChive (WARC) File

????

- What does this really mean?



Danmarks Radio Online

https://web.archive.org/web/19961102165719/http://www.dr.dk/

INTERNET ARCHIVE WayBackMachine | http://www.dr.dk/ | Go | 2,813 captures 2 Nov 96 - 17 Jan 16 | OCT 1995 | NOV 2 1996 | DEC 1997 | Close | Help

DR ONLINE

Om DR Online - English version - Tekst-version

Logo: DR Online

Radio på DR Online

Så er tiden endelig kommet, hvor DR begynder egentlige radiosendinger over Internettet. De sidste to måneder af 1996 kører vi et forsøg med nyheder og magasinstof sendt via RealAudio.

Logo: DR TV

Grevinden op tredje

Dokumentarprogrammet 'Grevinden på tredje' om Erna Hamilton blev modtaget med begejstring af seere og presse. Programmet genudsendes søndag 27.10. kl. 14.55. Læs manuskriptet, anmeldelser og instruktørens artikel fra Politiken på DR Online.

Logo: DR TV

Den afslørende hjemmeside

Rapporten - DR1's dybdeborende journalistiske program - har sin egen hjemmeside, hvor du kan finde mere information om programmets afsløringer.

OccupyWallStreet

The revolution continues worldwide!

Welcome login | signup
Language **en** es fr

News | LiveStream | #HowToOccupy | Forum | Chat | User Map | NYCGA | About | Donate

Farmers Join Occupy Wall Street, Calling for Food Justice

Posted 5 hours ago on Dec. 2, 2011, 6:21 p.m. EST by OccupyWallSt

As Wall Street's corrupt influence on the economy has grown, the corporate ownership of our food system has hurt the health and livelihood's of some of our most vulnerable communities. This *Sunday, December 4th* food justice activists and occupiers will be traveling from as far as Colorado, Iowa, Maine and Upstate New York to join together for the Occupy Wall Street FARMERS' MARCH.Through a day of dialogue, musical performances, and a march, farmers and their urban allies working for food justice in their communities will form alliances to fight and expose corporate control of the food supply.

Events throughout the day will call and inspire participants to fight against the corporate manipulation of the agriculture system. An industry that is responsible for using chemical toxins tied to soaring obesity rates, heart disease and diabetes and limiting access to affordable, wholesome food to the country's poorest citizens.

Read More...

30 Comments

Occupy Wall Street Goes Home

Posted 1 day ago on Dec. 1, 2011, 3:04 p.m. EST by OccupyWallSt

On December 6th Occupy Wall Street will join in solidarity with a Brooklyn community to re-occupy a foreclosed home. The day of action marks a national kick-off for a new frontier for the

General Inquiries:
general@occupywallst.org
Press Inquiries:
press@occupywallst.org
Press Phone: +1 (347) 292-1444
Help & Directions: +1 (516) 708-4777
Watch: The world we're building
Read: This call to action
Liberty Square Eviction Defense:
Text "@occupyalert" to 23559 to receive alerts in the event of imminent emergency.

Occupy Wall Street is leaderless resistance movement with people of many colors, genders and political persuasions. The one thing we all have in common is that We Are The 99% that will no longer tolerate the greed and corruption of the 1%. We are using the revolutionary Arab Spring tactic to achieve our ends and encourage the use of nonviolence to maximize the safety of all participants.

This #ows movement empowers real people to create real change from the bottom up. We want to see a general assembly in every backyard, on every street corner because we don't need Wall Street and we don't need politicians to build a better society.

the only solution is WorldRevolution

Click here for NYCGA committee meeting times.

This webpage is not available

Details

OccupyWallStreet

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the only solution is WorldRevolution

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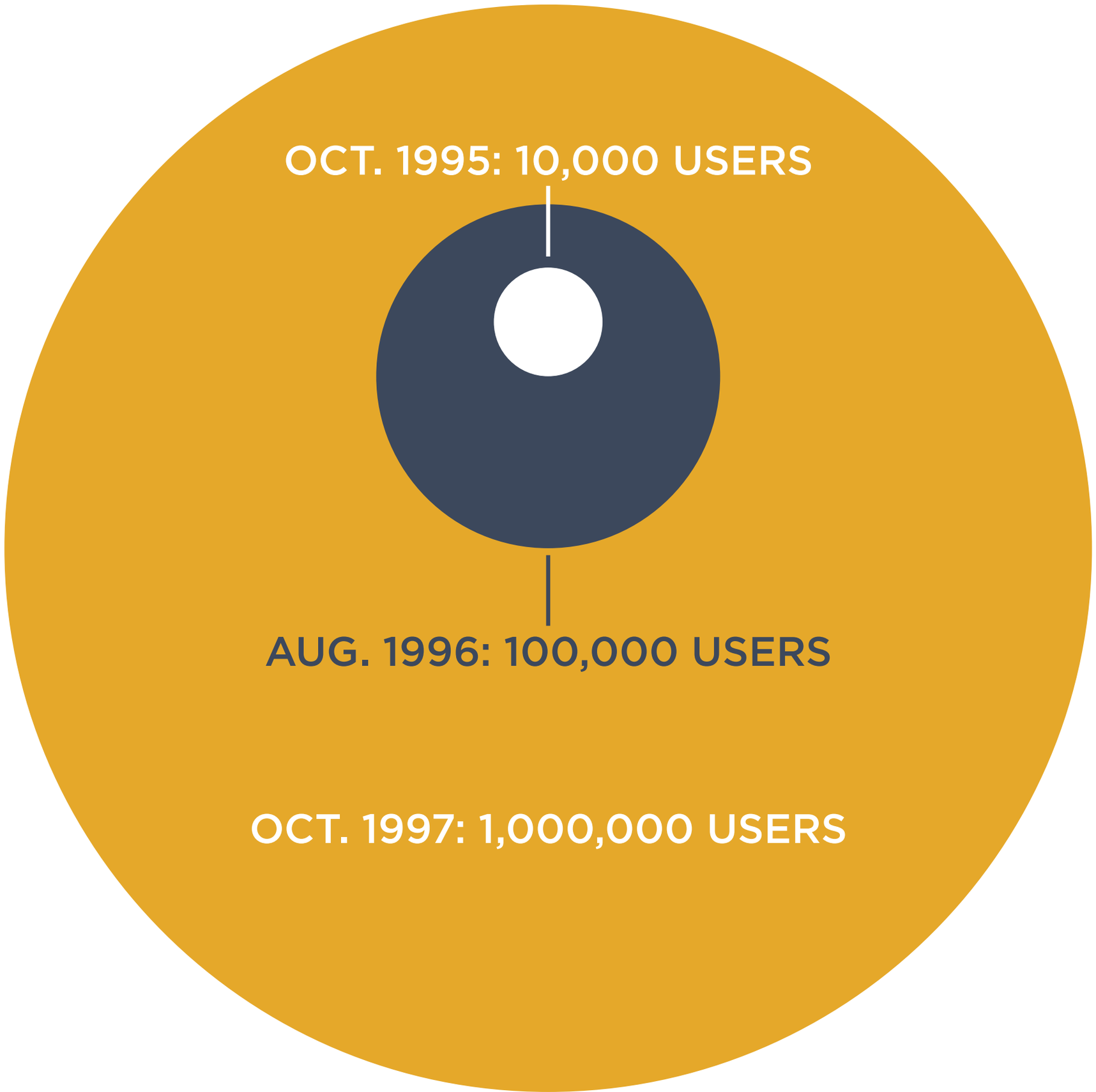
~~Scarcity~~

Abundance

GEOCITIES USERS:



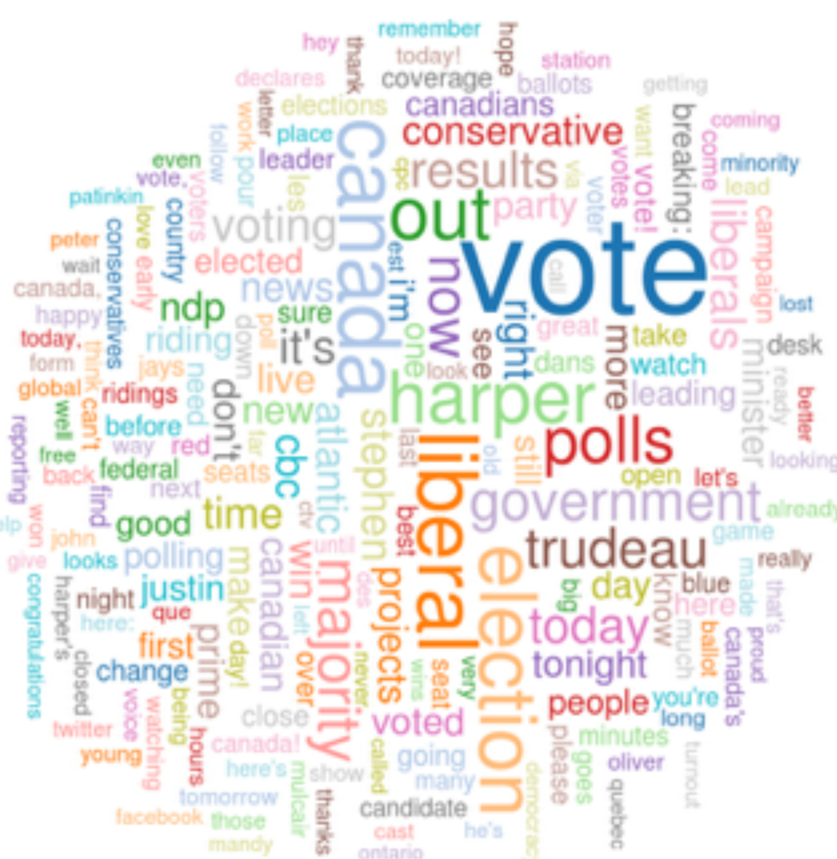
This is a scale that **boggles the mind** - compare it to the Old Bailey (197,745 trials between 1674 and 1913)

IDLE NO MORE

October 17, 2015

October 18, 2015

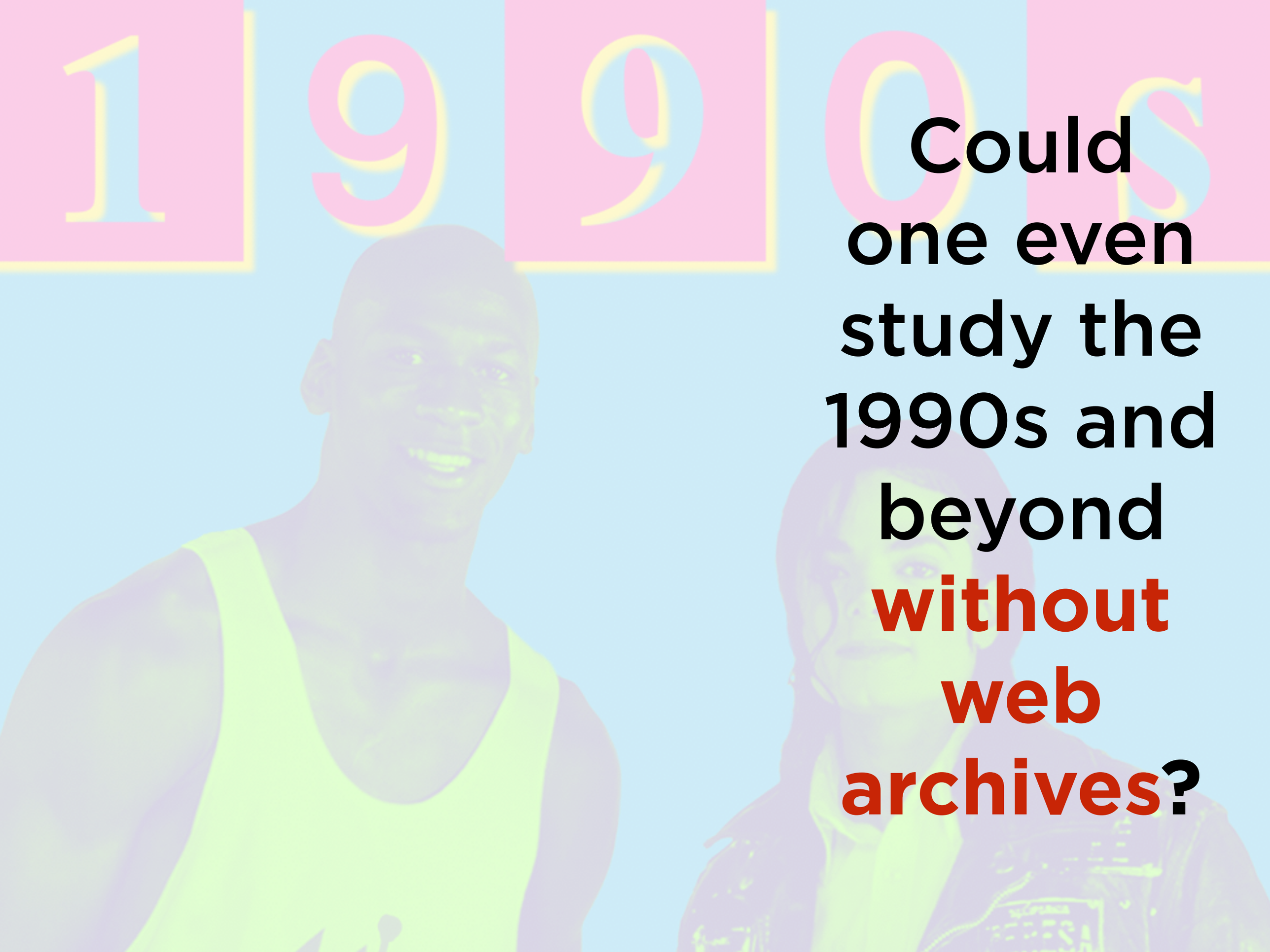
October 19, 2015



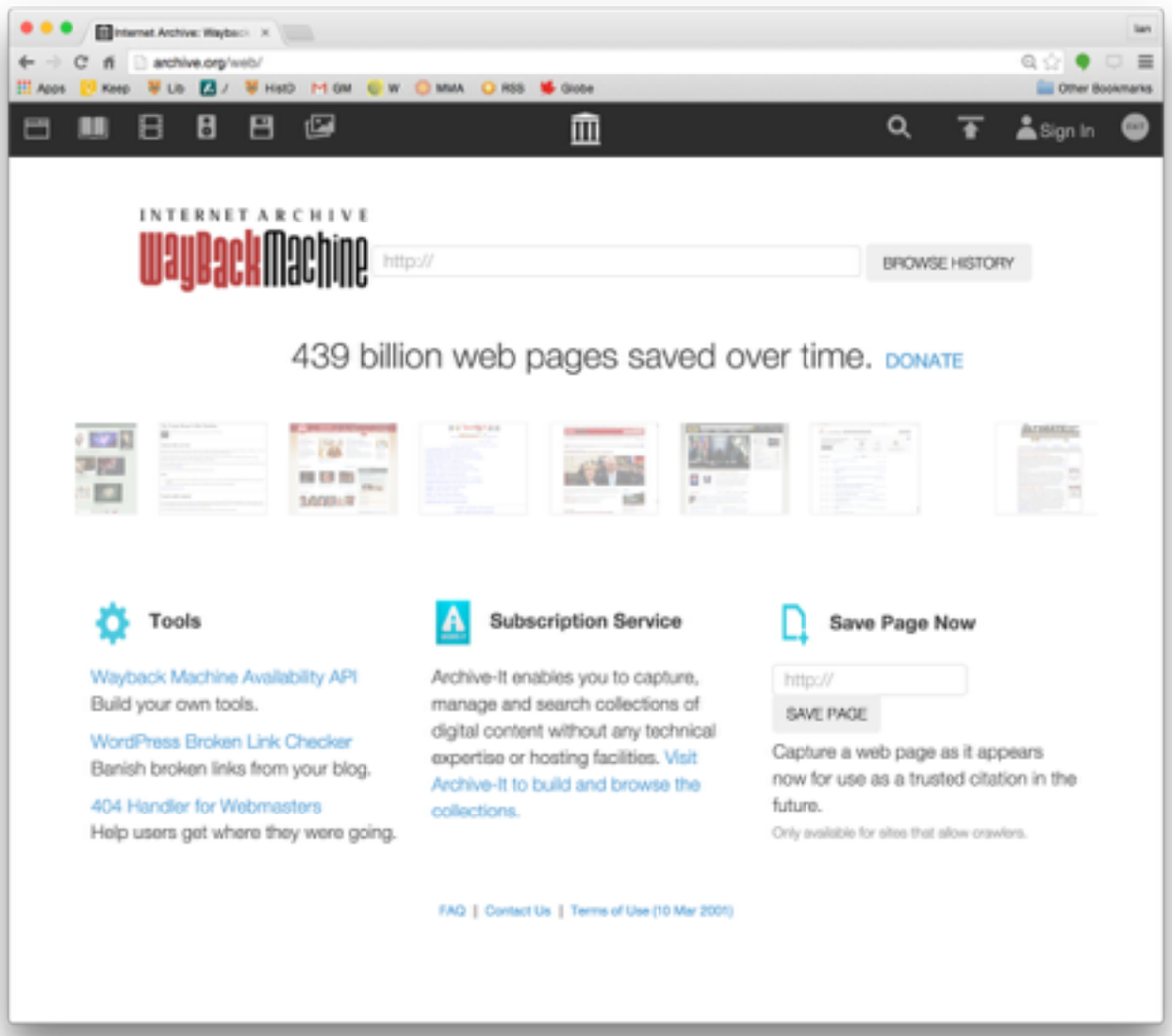
October 20, 2015

“…. [n]ow expectations have inverted. Everything may be recorded and preserved, at least potentially.”

- James Gleick

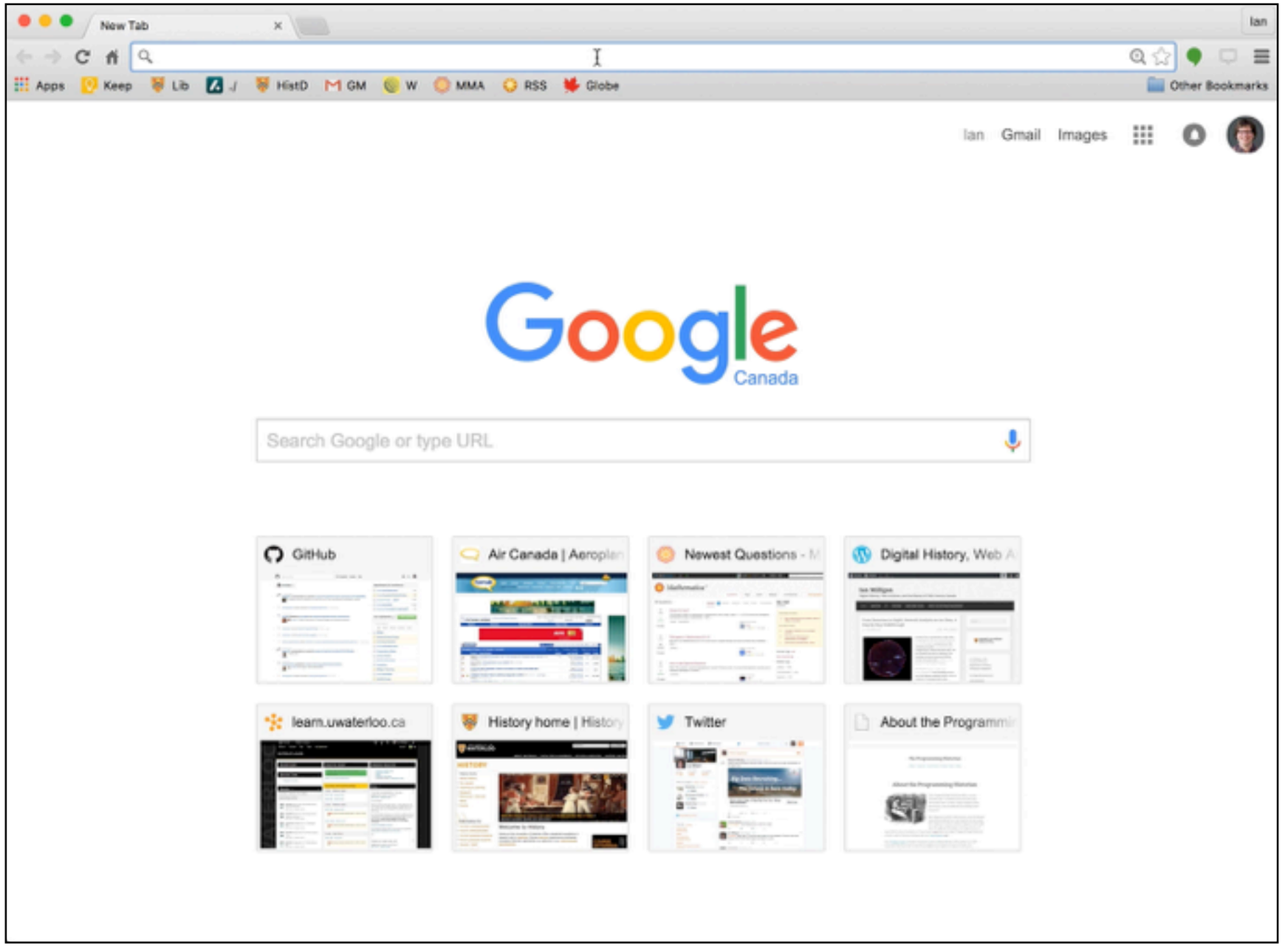

1990s
Could one even study the 1990s and beyond without web archives?

Nightmare Scenario



This won’t be enough!

Nightmare Scenario

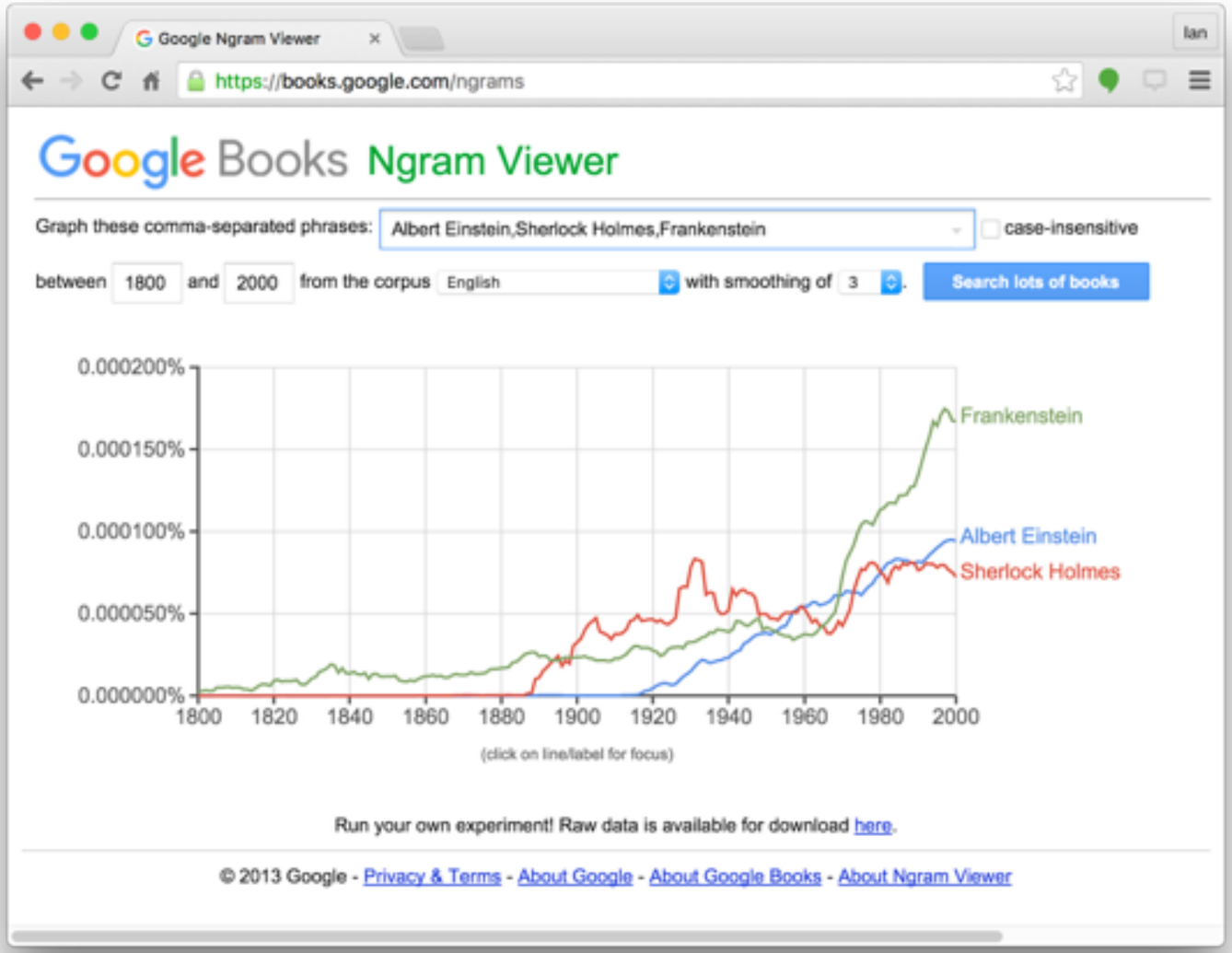


This won't be enough!

... but what will our search engines look like?

Nightmare Scenario

- Historians rely uncritically on **date-ordered keyword search results**, putting them at mercy of search algorithms they do not understand (similar to digitized newspapers);



My deepest fear:

Historians are completely left out of post-1996 research, letting everybody else do the work (a la Culturomics project/ Science magazine article);
Our profession gets left behind...

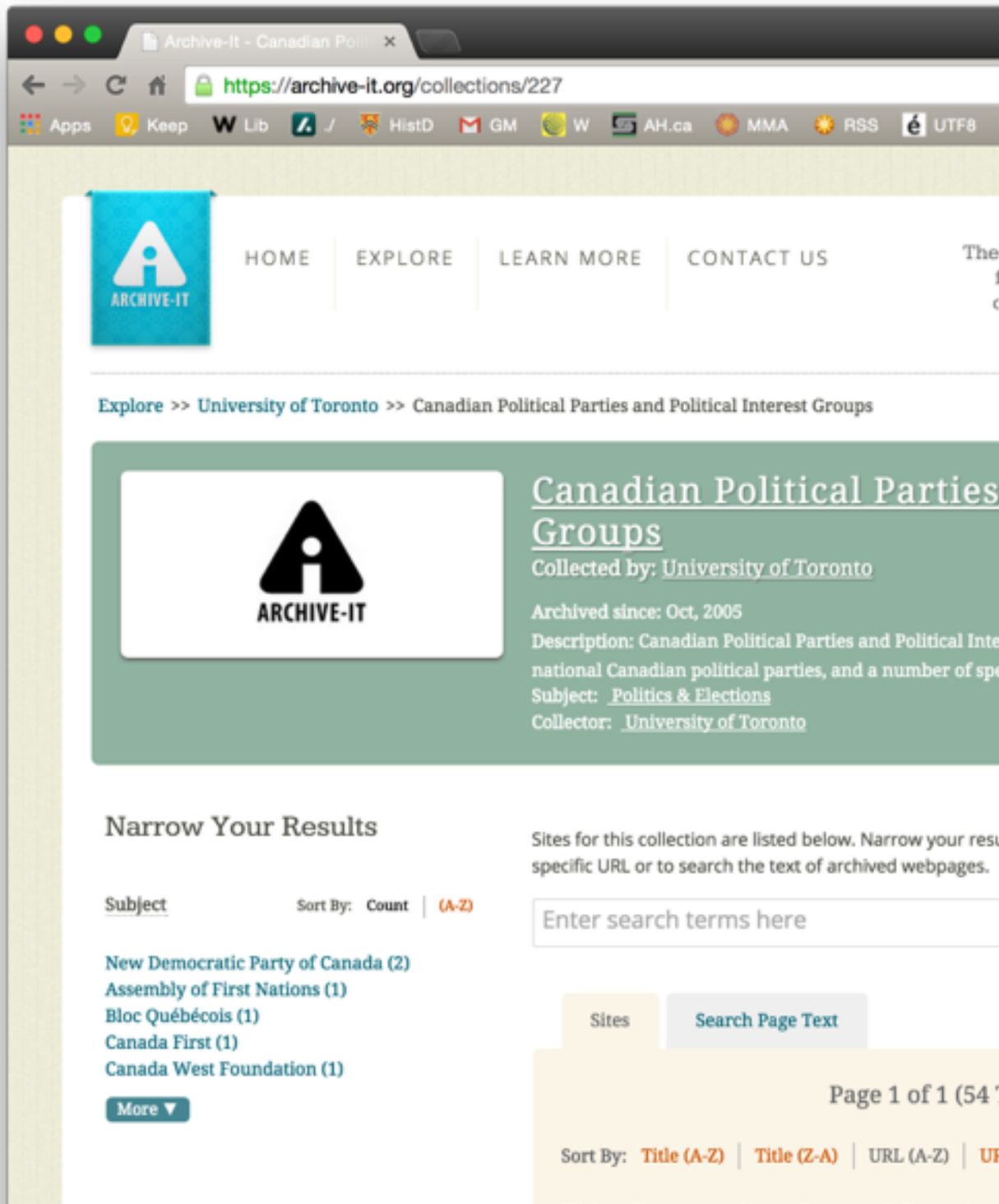
The historians who came to the meeting were intelligent, kind, and encouraging. But they didn't seem to have a good sense of how to wield quantitative data to answer questions, didn't have relevant computational skills, and didn't seem to have the time to dedicate to a big multiauthor collaboration. It's not their fault: these things don't appear to be taught or encouraged in history departments right now.

- Erez Leiberman Aiden and Jean-Baptiste Michel

What can we do to access this information and avoid my nightmare?

Building Portals

- Democratizing access so that historians can use them.
- Building **transparent indexes**.
- But they have to be useful and tested…



Pivotal Changes in Canadian Politics, 2005-2015

- Militarization of Canadian society?

- Change from ‘natural governing party’ of Liberals to Conservatives

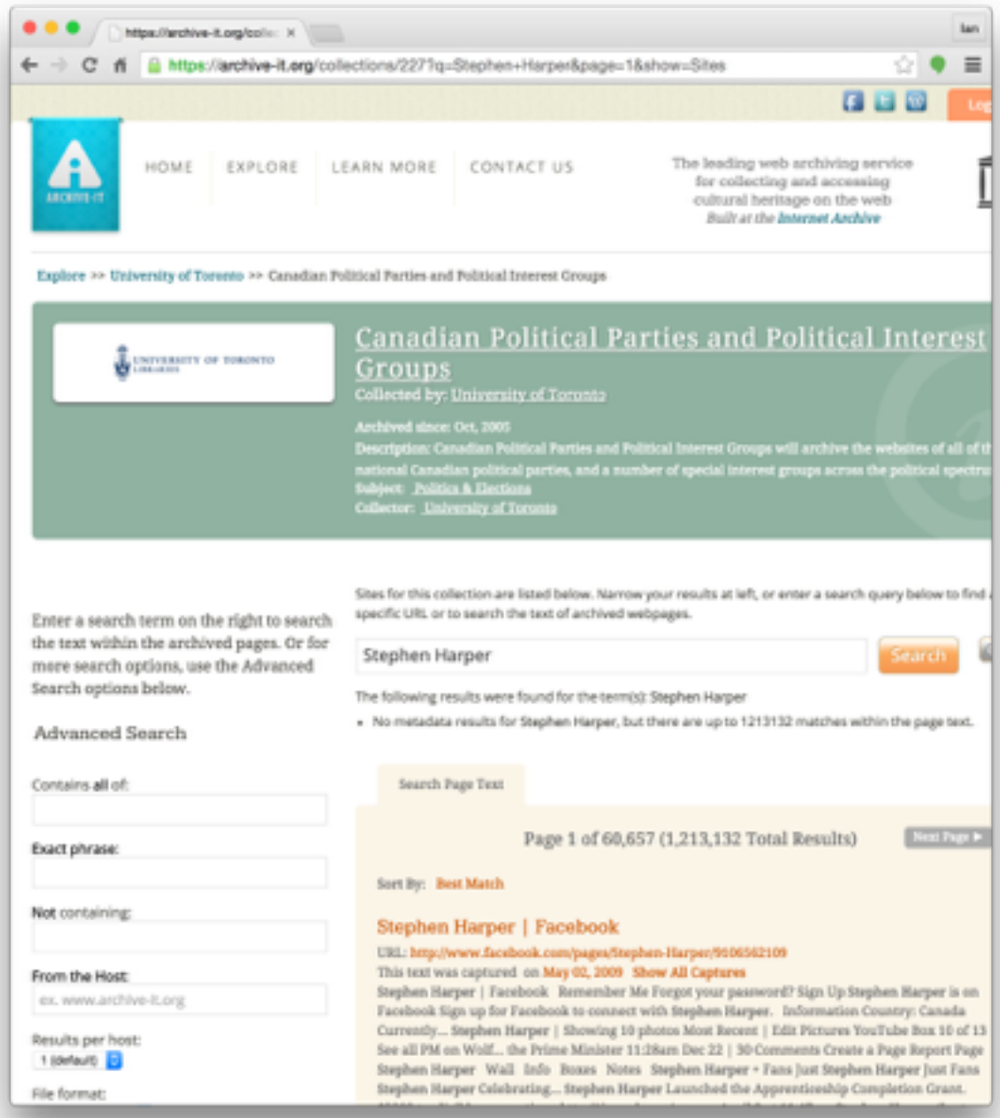
- Major policy changes on foreign policy, environment, etc.

- How to measure?

Current Interface

- Very limited - simple search engine, some advanced options; no facets

- Great collections.. but nobody uses them!



ukwa/shine

GitHub, Inc. [US] https://github.com/ukwa/shine

This repository Search Pull requests Issues Gist

ukwa / shine

Unwatch 13 Unstar 7 Fork 2

Prototype SOLR-powered web archive exploration UI. https://github.com/ukwa/shine/wiki

637 commits 1 branch 0 releases 5 contributors

Branch: master shine / +

GilHoggarth Added trailing slash to web archive url — Latest commit 11ace26 on Sep 18

python	jisc ssd ~506k ~optimized to 7 segments	2 months ago
shine	Added trailing slash to web archive url	2 months ago
.gitattributes	gitattribute file	2 years ago
.gitignore	Prevent cache being versioned.	a year ago
.gitmodules	Initial "check-in" of the bootstrap submodule	2 years ago
.travis.yml	Looks like it's simpler than I expected.	a year ago
README.md	Added Travis-CI status and a brief outline.	2 years ago

Code
Issues 40
Pull requests 0
Wiki
Pulse
Graphs

HTTPS clone URL
https://github.com

You can clone with HTTPS, SSH, or Subversion.

Clone in Desktop
Download ZIP

README.md

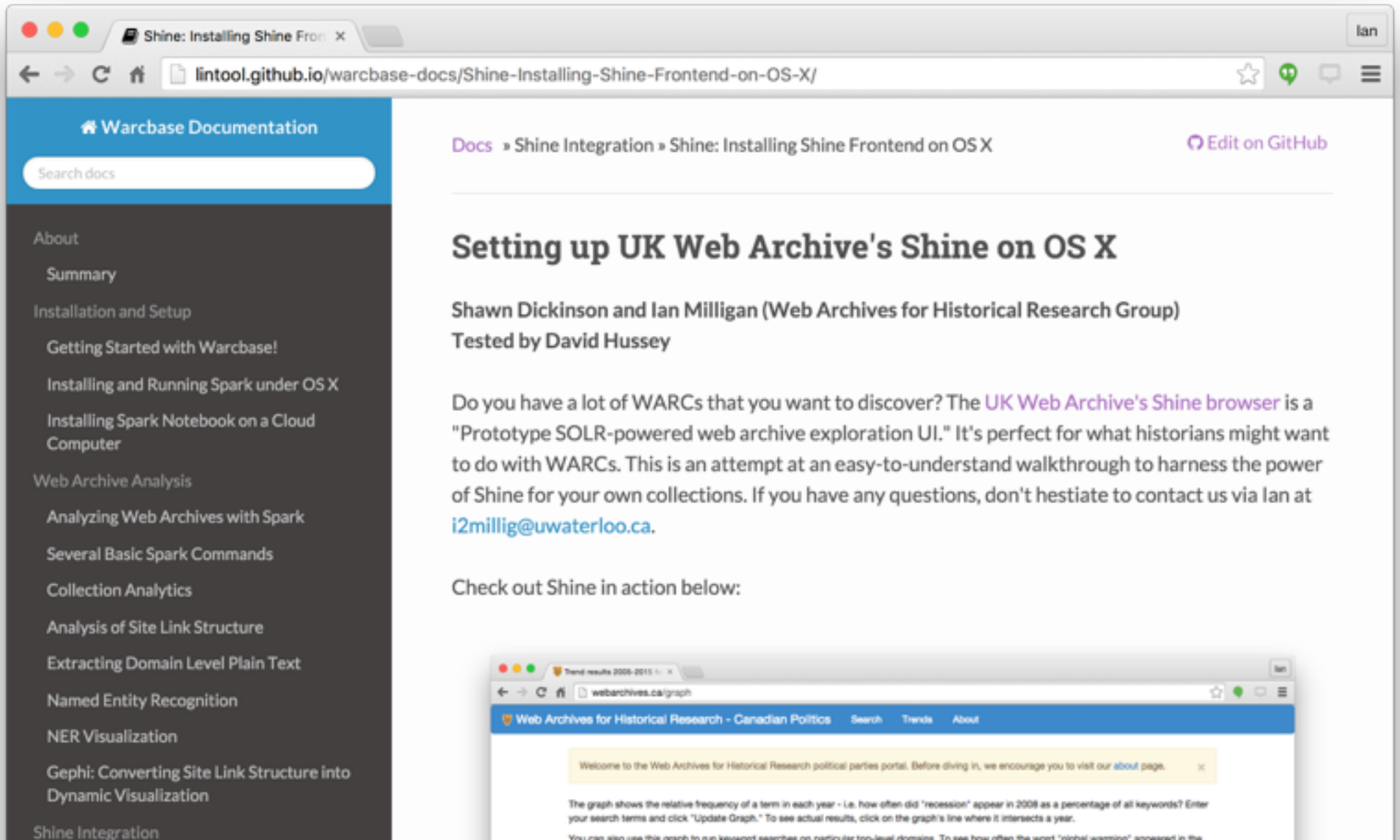
Shine

A prototype web archives exploration UI, based on a Solr back-end that has been populated using the warc-discovery indexer.

build passing

Walkthroughs at:

http://lintool.github.io/warcbase-docs/Shine-Installing-Shine-Frontend-on-OS-X/



Great research question that our contemporary historians were studying (Canada changing)

+

Great collection (all the political parties + many interest groups)

+

Ope Source Software

Trend results 1996-2013 fo ×

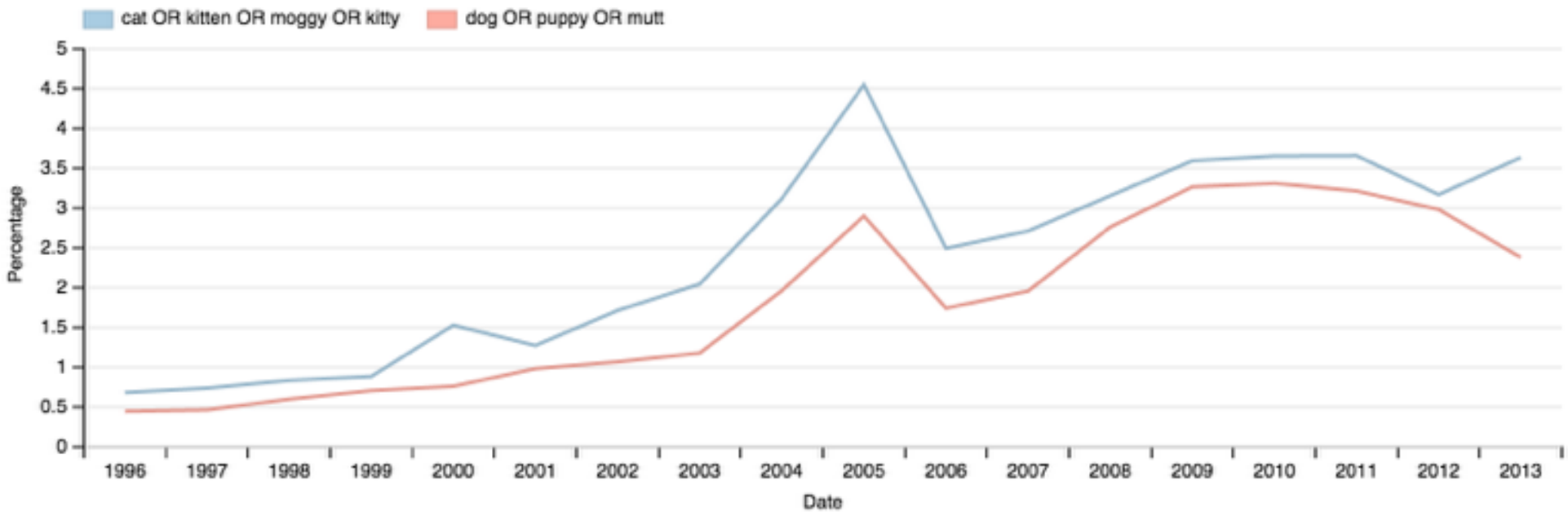
Ian

https://www.webarchive.org.uk/shine/graph?query=cat+OR+kitten+OR+moggy+OR+kitty%2C+dog+OR+pu...

UK Web Archive | Search | Trends | Login

Warning! This is a research prototype for a web archive search service, and may be taken down at any time. ×

cat OR kitten OR moggy OR kitty, dog OR | 1996 | 2013 | Update Graph | Reset All



Click on a point on the graph to show a random sample of the matching records from that year...

With Nick Ruest (York University), Nich Worby (University of Toronto), Jimmy Lin (University of Waterloo)

Welcome to the Web Archives for Historical Research political parties portal. Before diving in, we encourage you to visit our about page. ×

The Canadian Political Parties and Political Interest Groups Portal

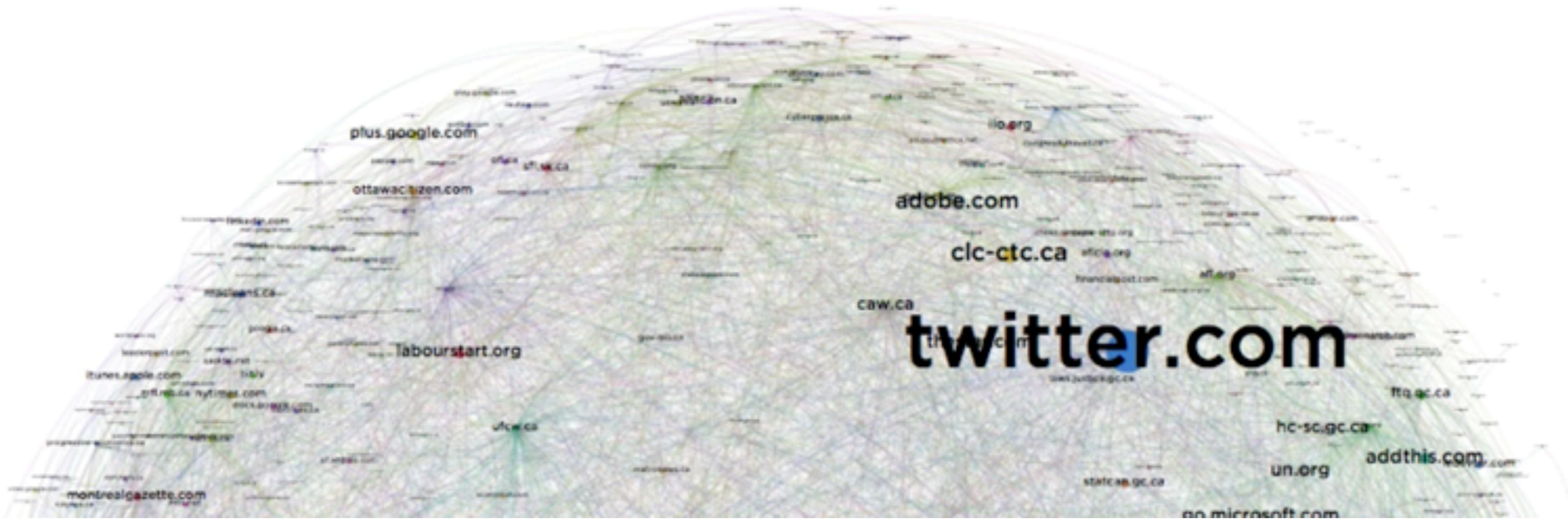
On this website, you can search web archived content from 50 political parties and political interest groups, from October 2005 to March 2015.

Curious how the Liberal Party of Canada responded to the 2008 financial crisis (a search for "recession" in 2008, liberal.ca)? How the Canadian Centre for Policy Alternatives reacted to Michael Ignatieff? Now you can check it all out.

Options include:

- **Basic keyword searching** [Example: "Rob Ford", only Liberal.ca]
- **Graphing trends over time** [Example: Liberal Opposition Leaders, 2005-2015]
- **Advanced search, including words in proximity to each other** [Example: environmental and tax within 25 words of each other]

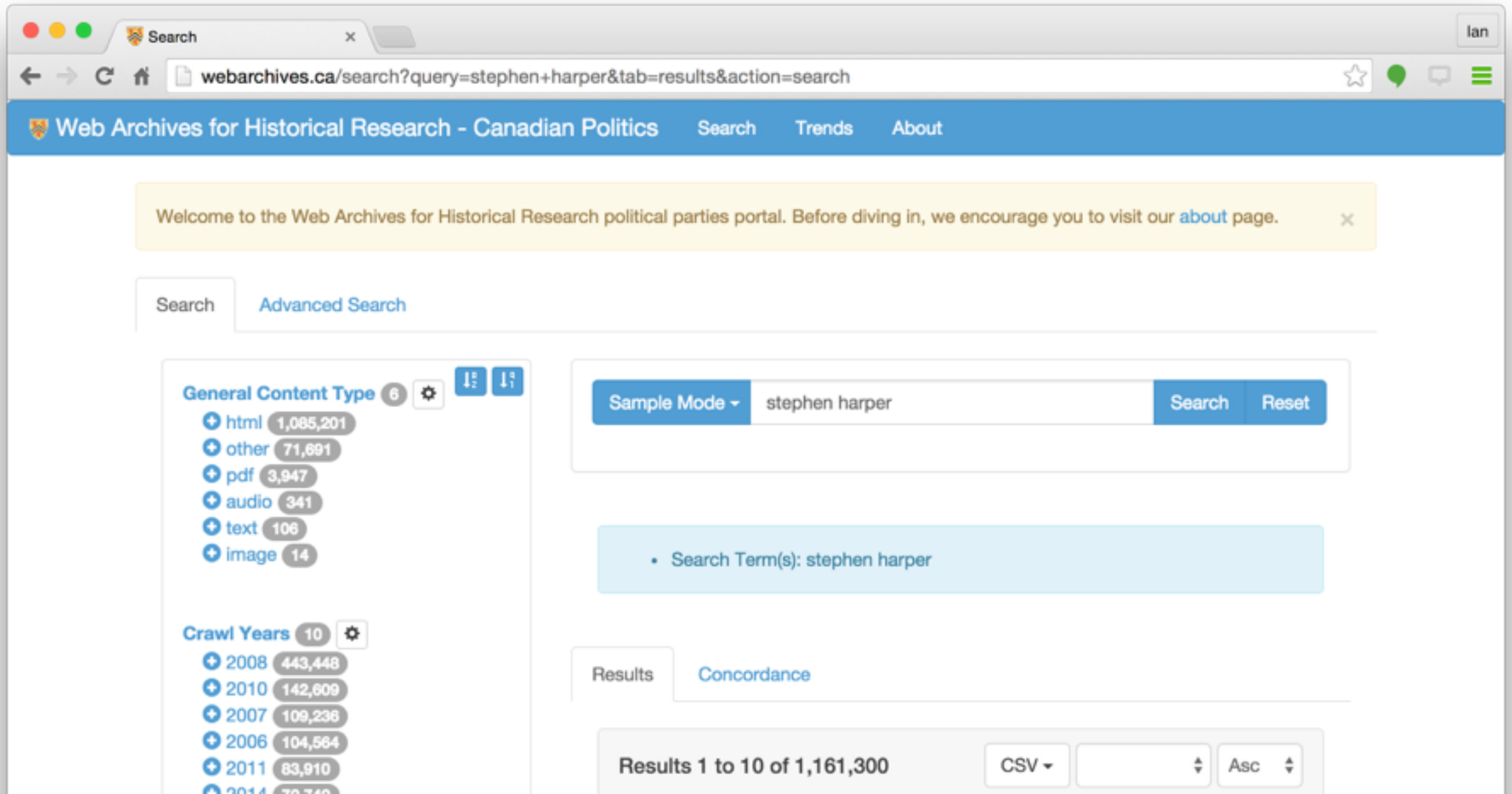
Below, here are all of the links for the entire time period, visualized below.



Five Things We Learned

- Political parties delete content
- User-generated comments were more common in political parties
- Absences can be more informative than presences
- We can see the rise/fall of prominent people
- Enabling user access is truly transformative

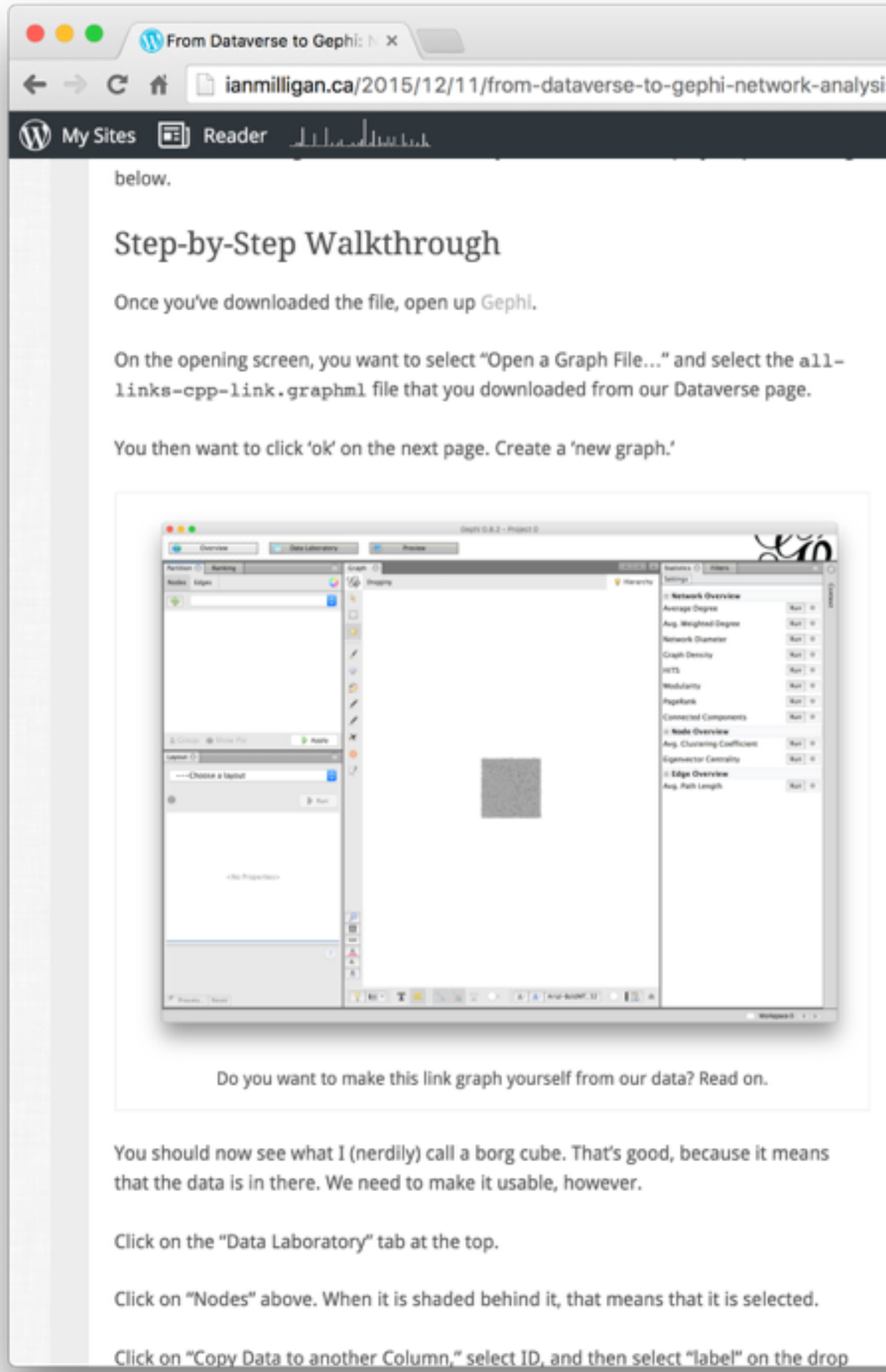
Good for public engagement - but limited for scholarship....



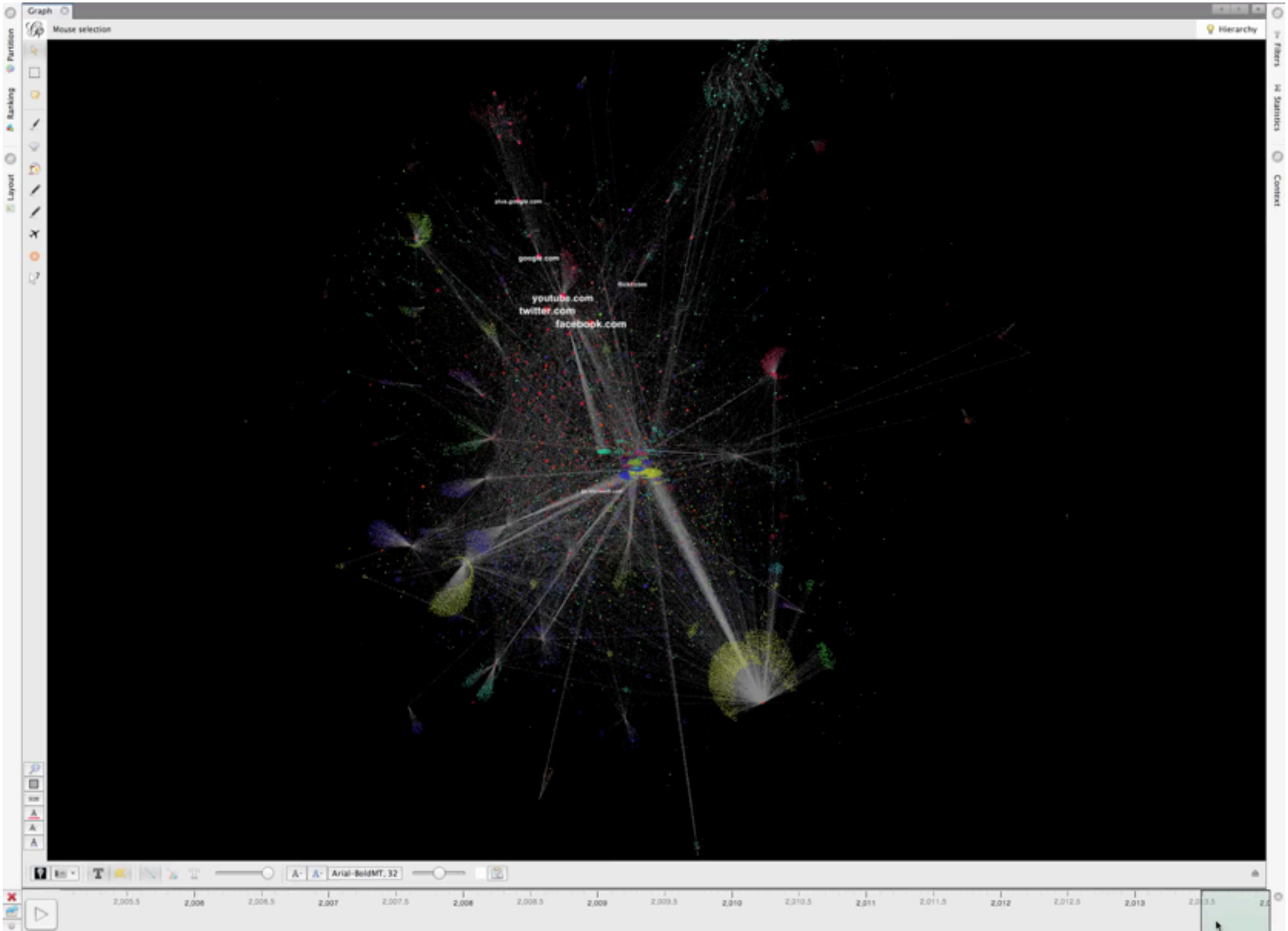
Getting over my bias towards content **and embracing metadata**

Gephi 0.9 (http://gephi.github.io/)

Walkthrough at ianmilligan.ca: “From Dataverse to Gephi” - try it on this data!



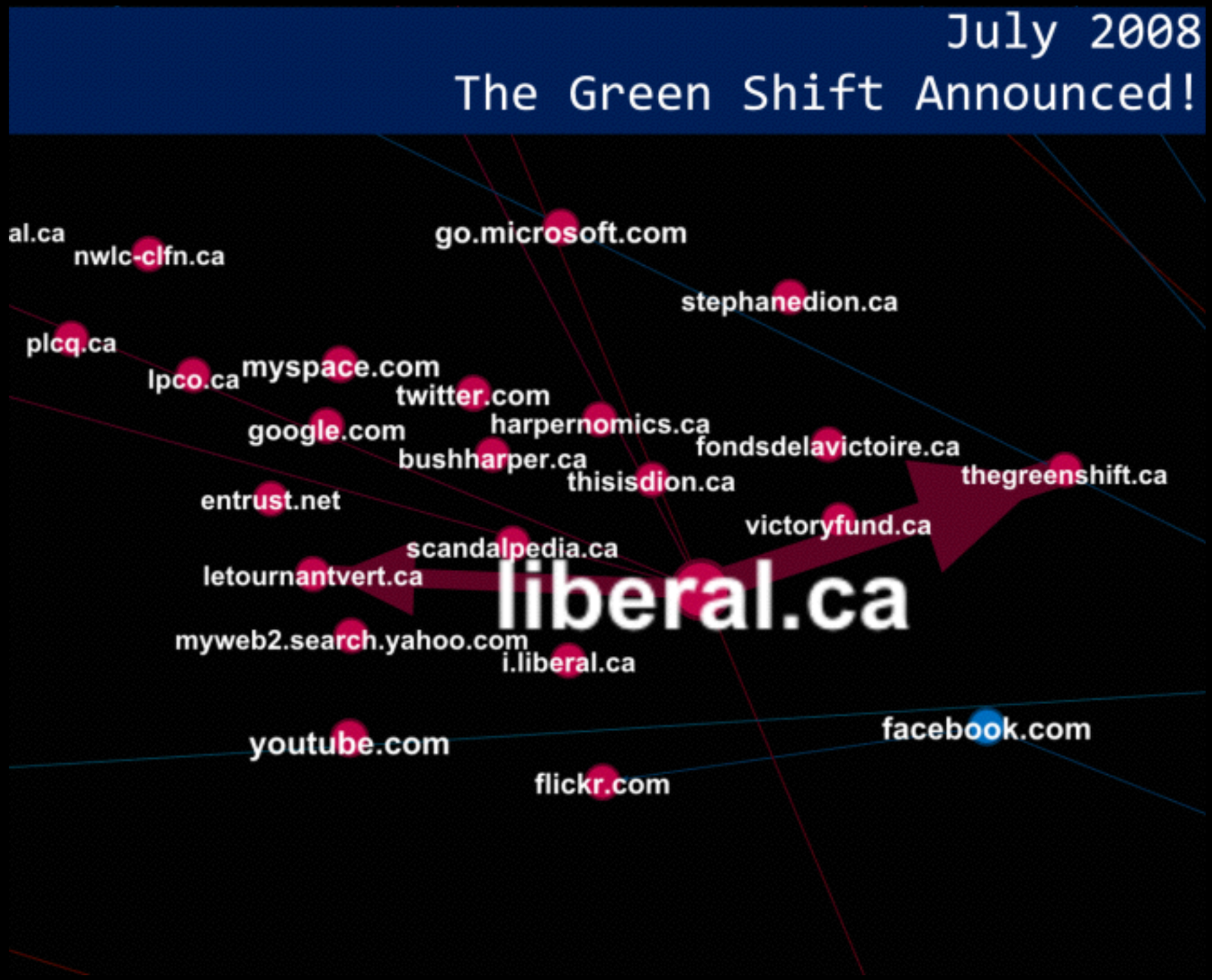
Metadata Extraction



December 2006
Stephane Dion Elected Leader of Party

December 2007
Rise of Social Media

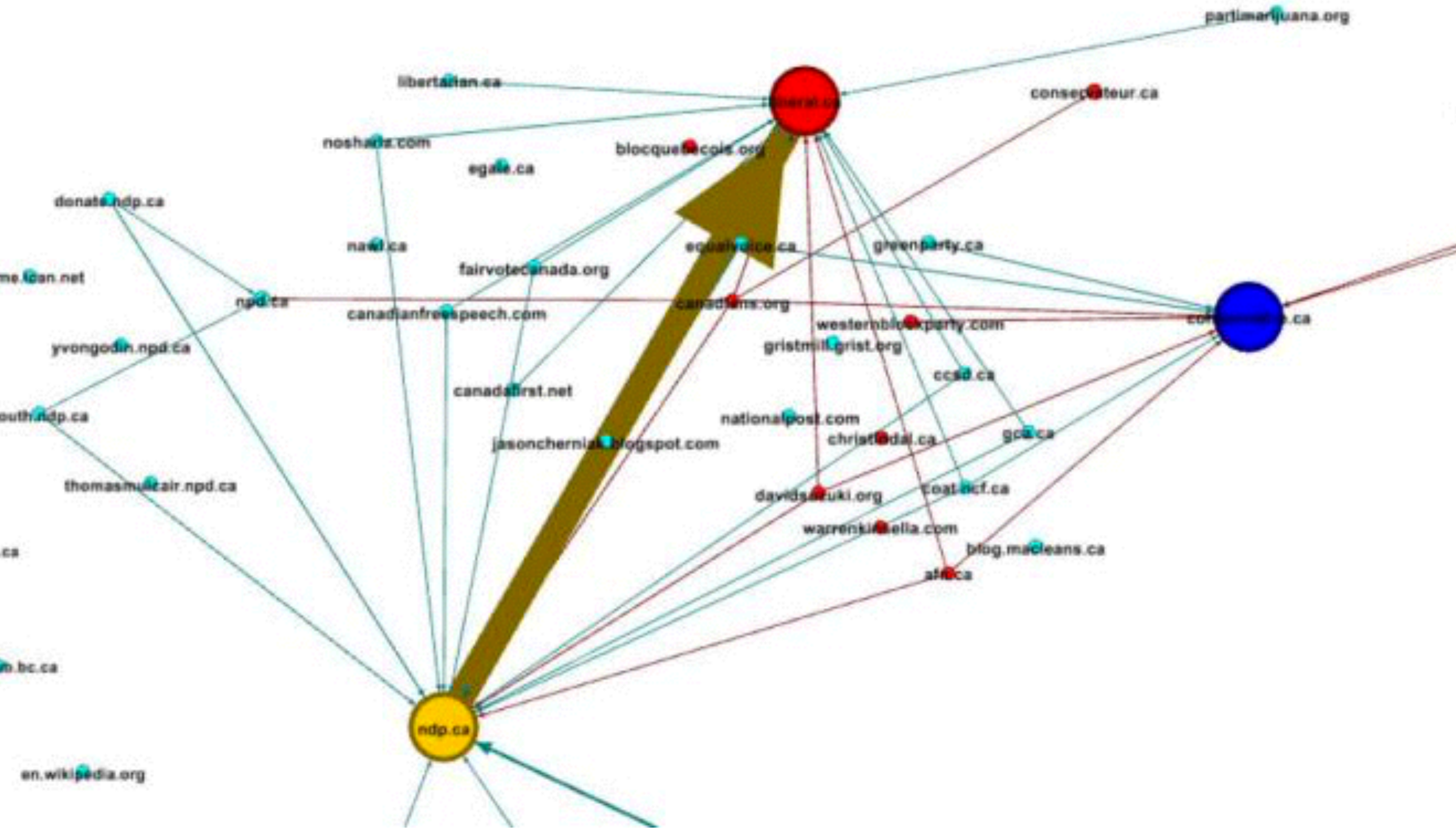
April 2008
Fundraising with the Victory Fund/ Fonds de la Victoire


July 2008
The Green Shift Announced!
al.ca
nwlc-clfn.ca
go.microsoft.com
stephanedion.ca
plcq.ca
lpco.ca
myspace.com
twitter.com
google.com
harpernomics.ca
fondsdelavictoire.ca
bushharper.ca
thisisdion.ca
thegreenshift.ca
entrust.net
victoryfund.ca
scandalpedia.ca
letournantvert.ca
liberal.ca
myweb2.search.yahoo.com
i.liberal.ca
youtube.com
facebook.com
flickr.com

October 2008
Election Campaign - Advertisement Sites

December 2008
Election campaign Ends; Attacking Harper on Anti-American Grounds (bushharper)

2005 Canadian Federal Election



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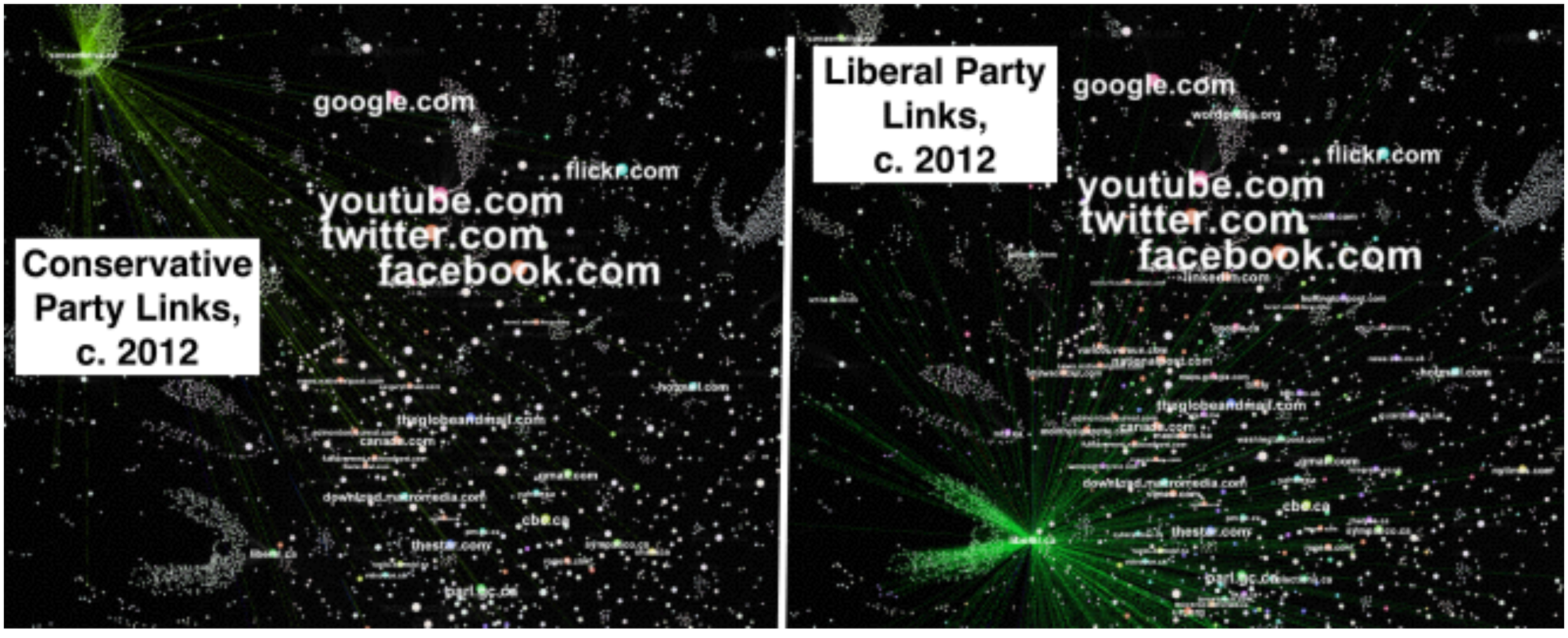
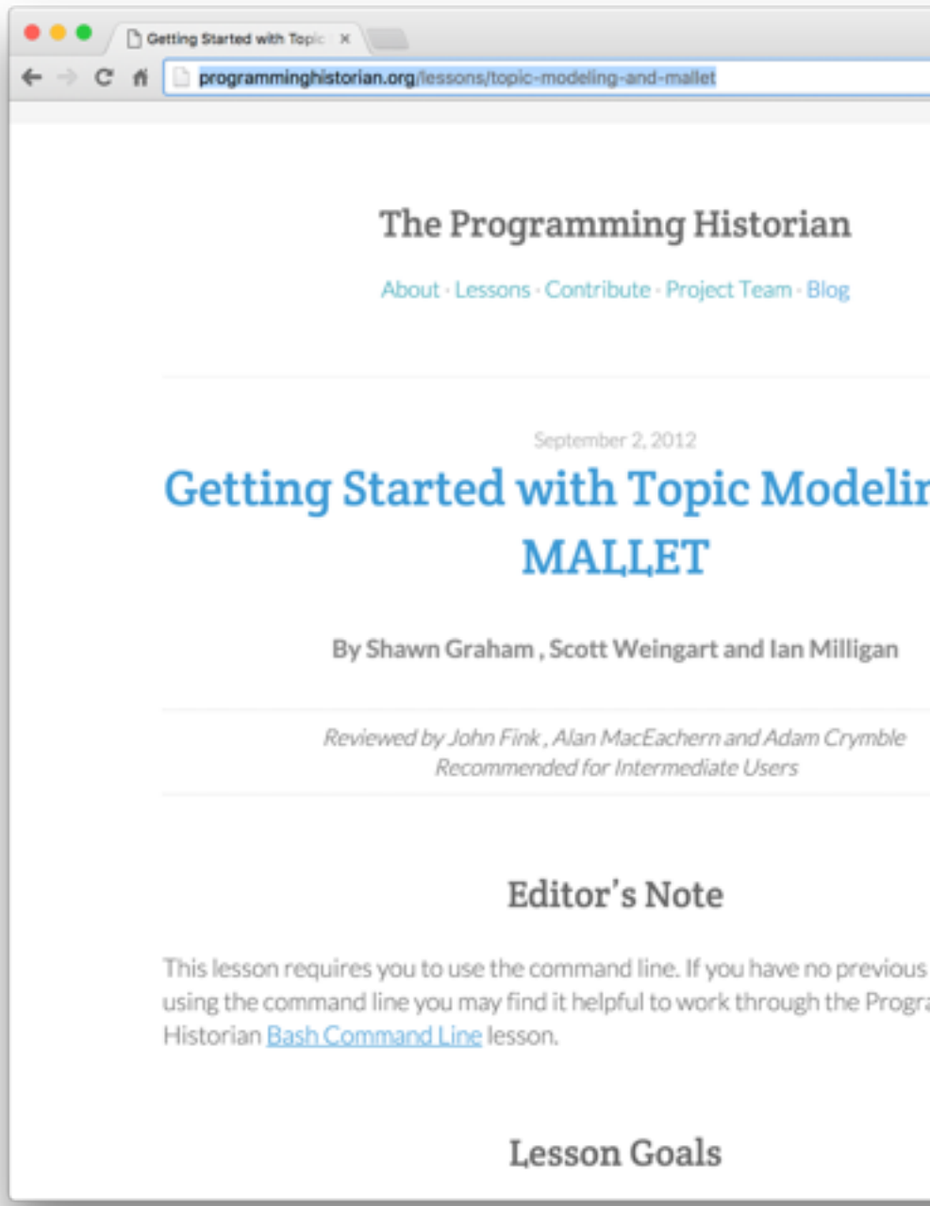


Topic Modelling using MALLET (http://mallet.cs.umass.edu/)

Walkthrough: http://programminghistorian.org/lessons/topic-modeling-and-mallet



Metadata Extraction

liberal.ca	27
liberal.ola.org	27
liberal.us1.list-manage.com	27
liberal.us1.list-manage1.com	27
liberal.us1.list-manage2.com	27
liberaluniversity.liberal.ca	27
license.icopyright.net	27
live.cbc.ca	27
lpc.ca	27
macleans.ca	27
masses.tao.ca	27
mcss.gov.on.ca	27
mediaignite.com	27
mediasales.cbc.ca	27
membercentre.cbc.ca	27
mentalhealthcommission.ca	27
metrics.mmailhost.com	27
mondesdesfemmes.ca	27
music.cbc.ca	27
nawl.ca	27
newswire.ca	27
nowtoronto.com	27
npd.ca	27

colincarriemp.ca	12
colincarriemp.ca&lang=fr	12
colinmayes.ca	12
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congrespcc.ca	12
conservateur.ca	12
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corneliuchisu.ca&lang=fr	12
costasmenegakis.ca	12
costasmenegakis.ca&lang=fr	12
cpcconvention.ca	12

Metadata Extraction

- Conservative themes (2014): economic development, family, immigration, legislation, women's issues, senior issues, Ukrainians, constituency offices, some prominent (and not-so-prominent) MPs, and of course, our economic action plan.

- Liberal themes (2014): Justin Trudeau (the new leader), cuts to social programs, child poverty, mental health, municipal issues, labour, workers, Stop the Cuts, and housing.

Metadata Extraction

- Conservative themes (2006): education, university, but **tons of information on Aboriginal issues**;

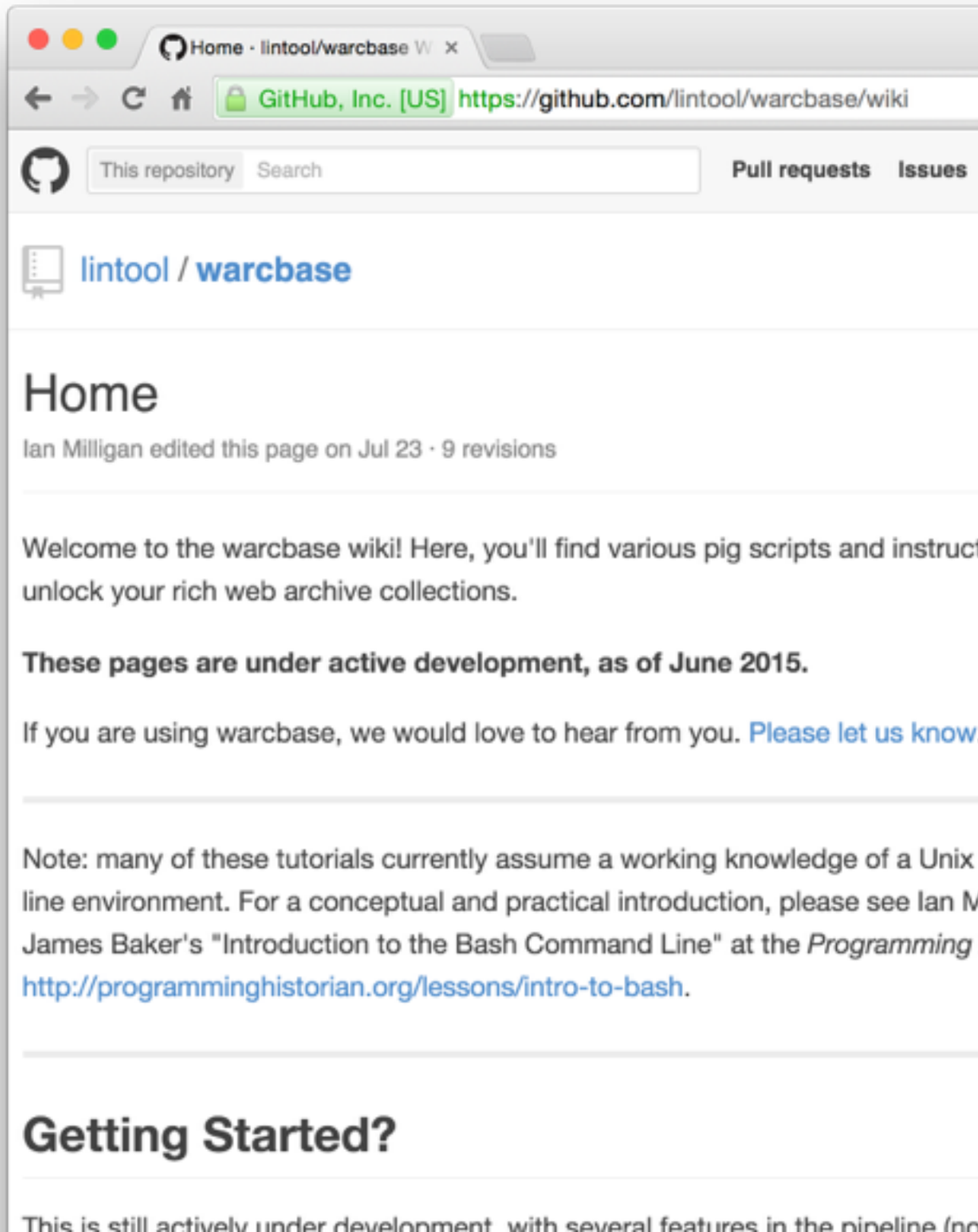
- Liberal themes (2006): community questions, electoral topics, universities, human rights, child care support.

Interdisciplinary

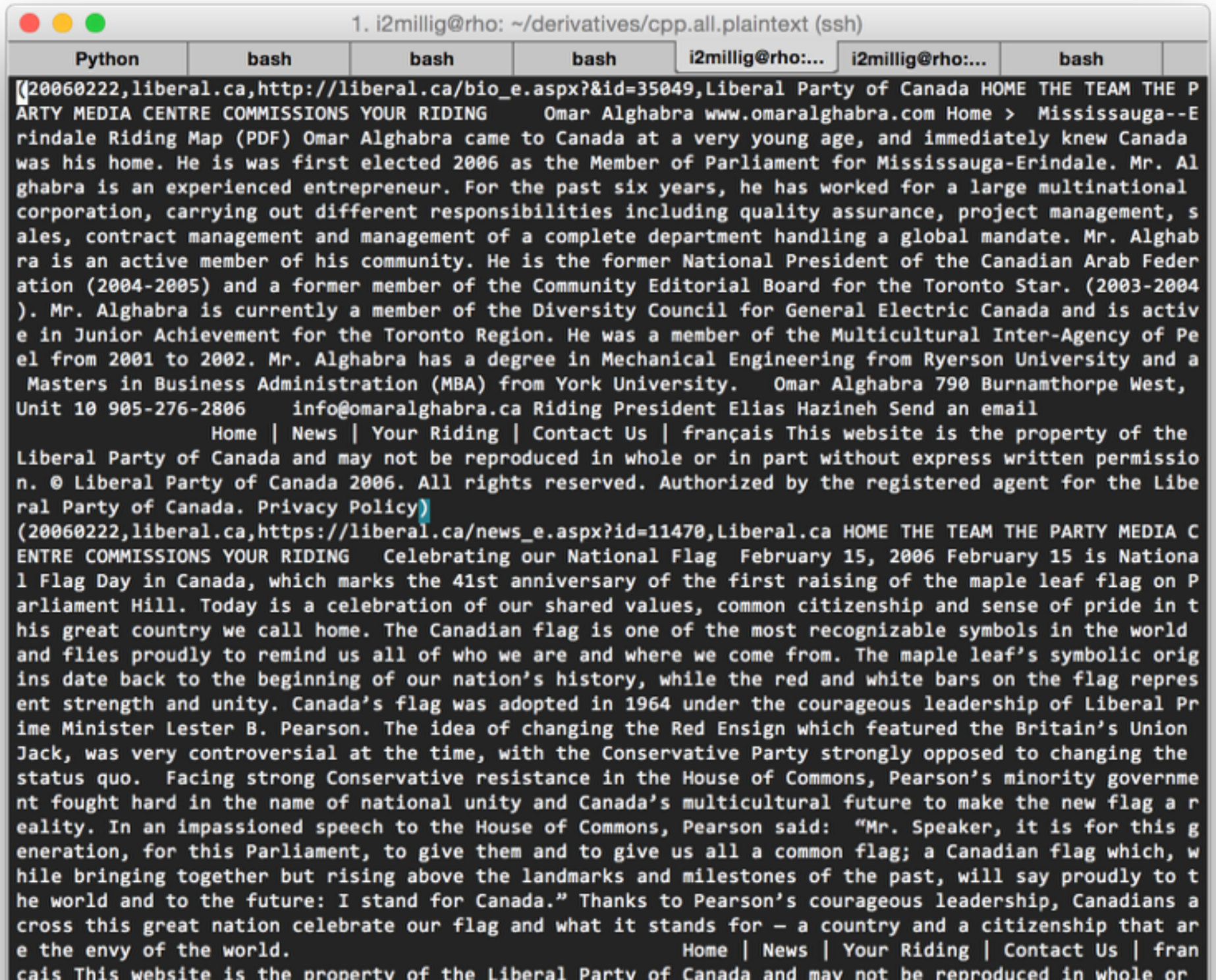
Warcbase

- Jimmy Lin (main developer), Ian Milligan, Jeremy Wiebe, Alice Zhou, all University of Waterloo

- Developing code, walkthroughs, and instructions for historians to be able to take a directory of WARCs and…



Extract all Plain Text



Extract Entities

200606
Andrew Lewis
Bill
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Cherfi
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David
David Chernsuhenko
David Chernushenko
David Kay
Derek Pinto
Ed Broadbent
Elizabeth May
Eric Walton
Fannon
Gomery
Green
Harper
Harris
Jim
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Jim Harris
Jim Harris Speech
John
Julie Baribeau
Junker
Kevin Colton
Labchuk
Layton
Leonardo DiCaprio
Manley
Mark Brooks
Mark MacGillivray
Martin
Michael Robinson
Milliken
Paul Martin

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Amélie Gingras
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Clements Verhoeven
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Lawrence Redfern
Layton
Manley

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Eric Walton
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Paul Martin
Peter Foster
Pierre Pettigrew
Schiller

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Martin
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Melanie Ransom
Michael Grayson
Michele
Paul Martin
Richard Reble
Sharon Labchuk

200611
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Jim Harris Speech
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Ross
Sharon Labchuk

Extract Entities


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Lima , The Americas , Saskatoon , Peru , Edmonton , Mexico , Chicoutimi-Jonquiere ,
New Brunswick, Canada , United States , Newfoundland and Labrador, Canada , Qandahar ,
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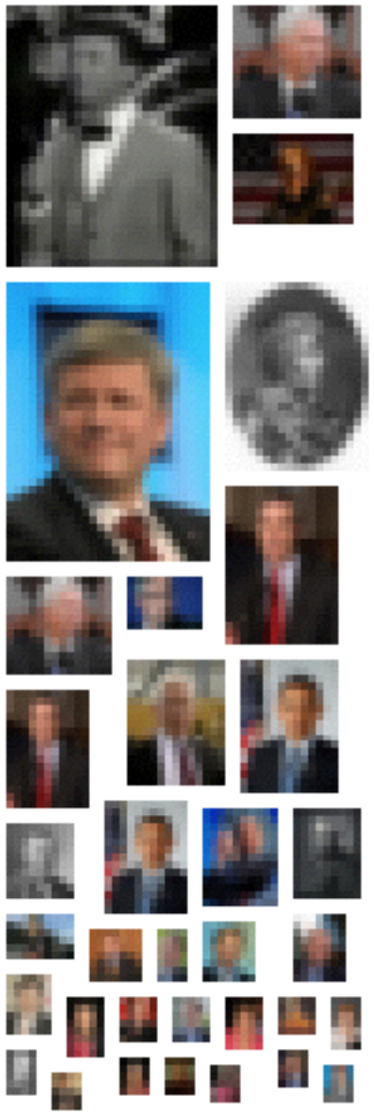
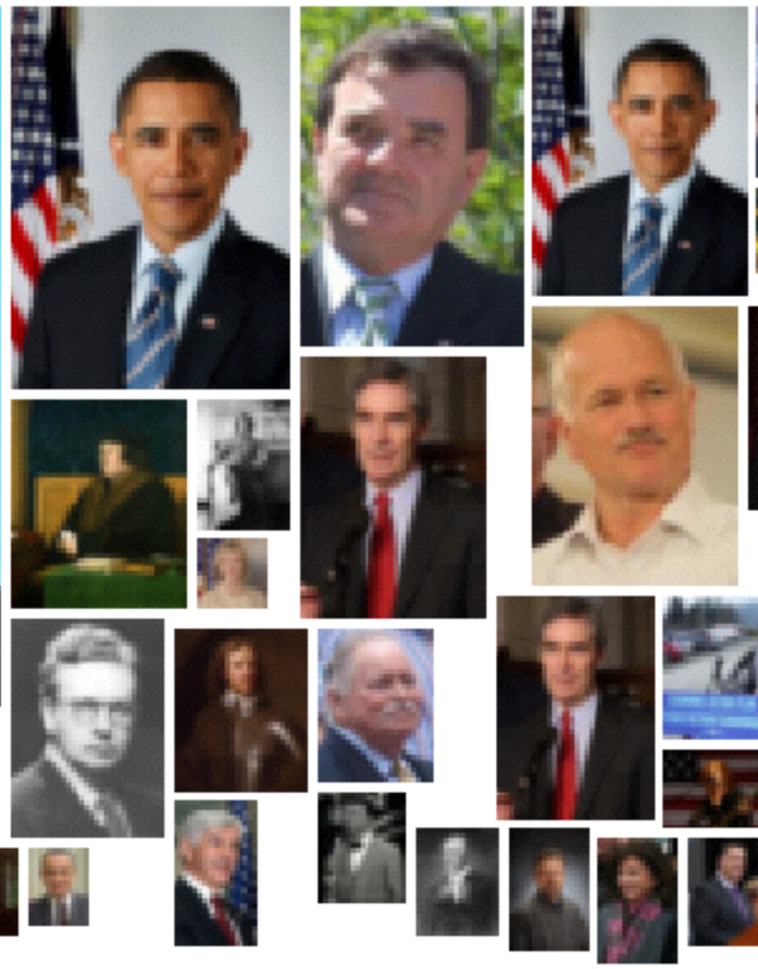
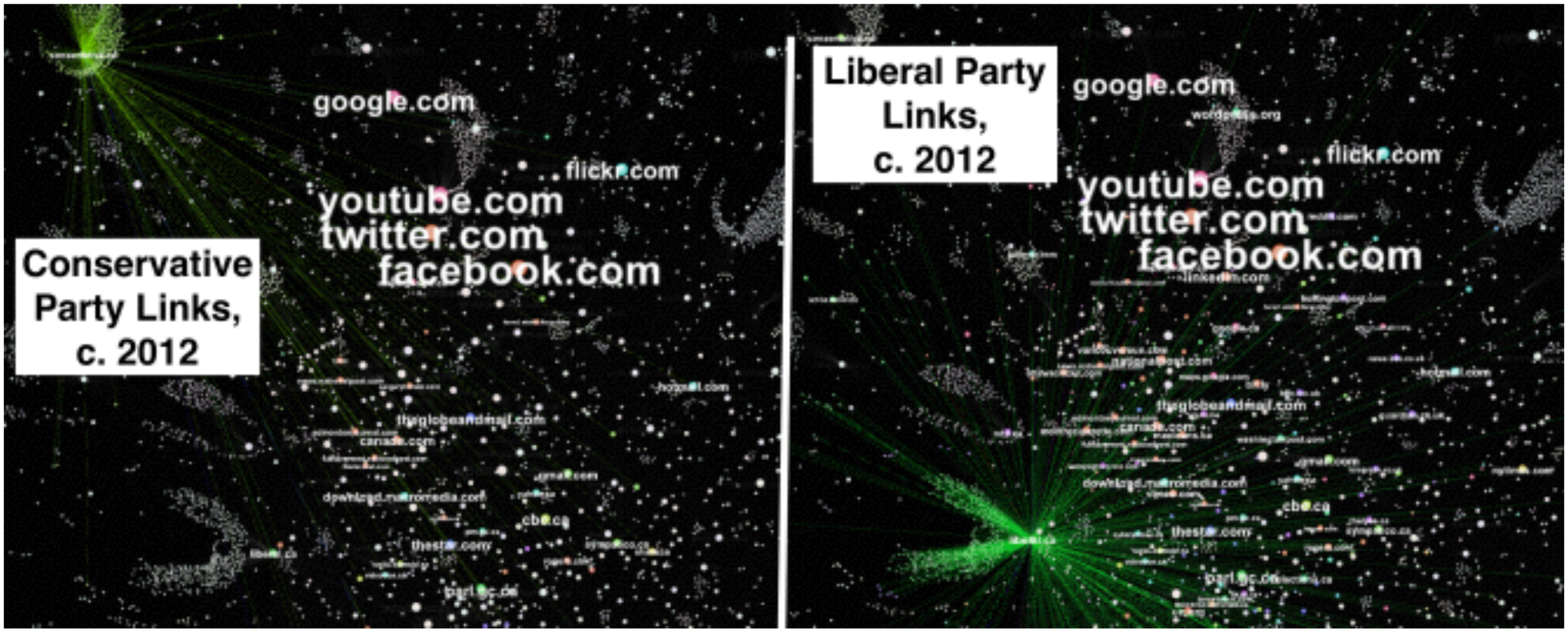
Quebec City , India , $Failed, Atlantic Ocean , St. Germain , Durham , Battle of Waterloo ,

Extract Entities

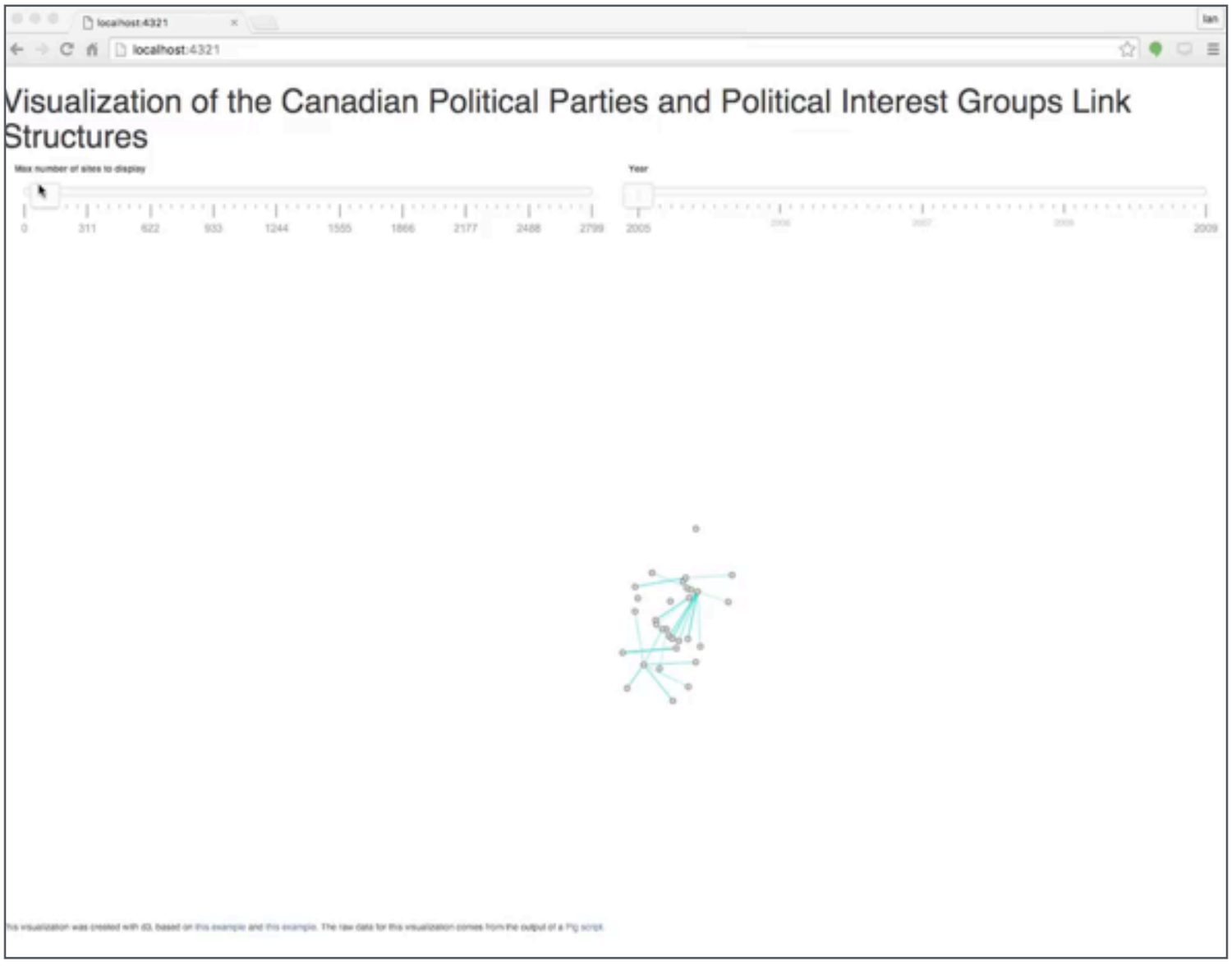




Extract Links/Gephi Connector



Or D3.js link networks in browser



All walkthroughs at:

docs.warcbase.org

Bringing it all together in a notebook environment

Spark Notebook

localhost:9000

Spark Notebook

..

adam

anomalyDetection

cassandra

core

graphx

misc

mllib

sql

streaming

tachyon

viz

Spark Notebook Demo	Duplicate	Shutdown
TTOW	Duplicate	Delete
Tachyon Test	Duplicate	Delete
Untitled1	Duplicate	Delete
Web Archives 2015, Demo	Duplicate	Delete

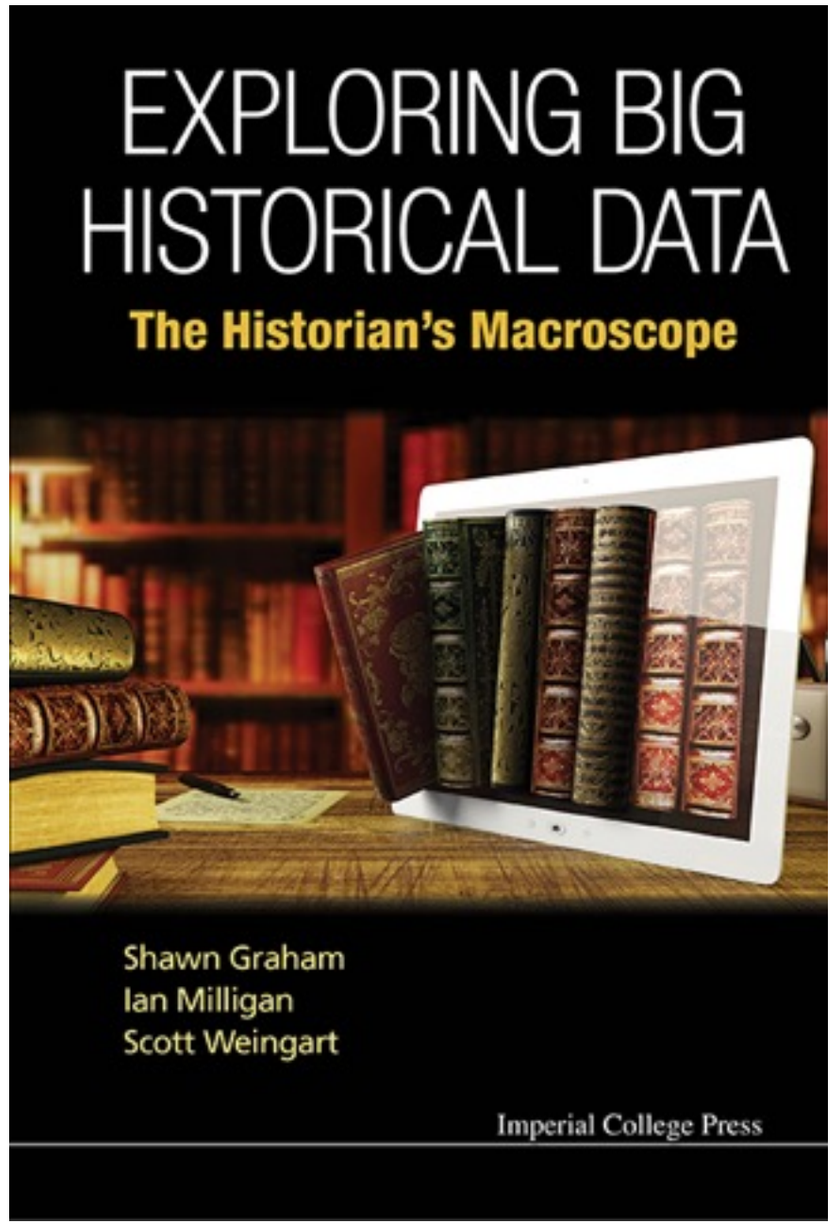
Where to learn?

Programming Historian

- Network Analysis Lessons
- Topic Modeling Lessons
- Command Line Lessons
- etc.

Exploring Big Historical Data

- Check out our draft at **macroscope.org**
  - Conceptual introduction to topic modelling
  - Network analysis
  - Visualizations
  - Field of digital humanities



Events

- **Software Carpentry** – in-person events, looking into building connections with *Programming Historian*

- **Interdisciplinary hackathons** - *Archives Unleashed* (Toronto, March 2016; Washington, June 2016 - TBA)

- **Conferences** - Like this one, or others

... but most of all, a willingness to learn and fail.

Because, as I hope I have shown today..

it’s worth it.

More voices, more people, the promise of social history achieved.

Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada
Canada
Ontario
compute • calcul CANADA
UNIVERSITY OF WATERLOO

Thanks very much!

Questions?

Ian Milligan
Assistant Professor
@ianmilligan1

UNIVERSITY OF WATERLOO
FACULTY OF ARTS
Department of History