Mapping Text:
Automated Geoparsing and Map Browser for Electronic Theses and Dissertations

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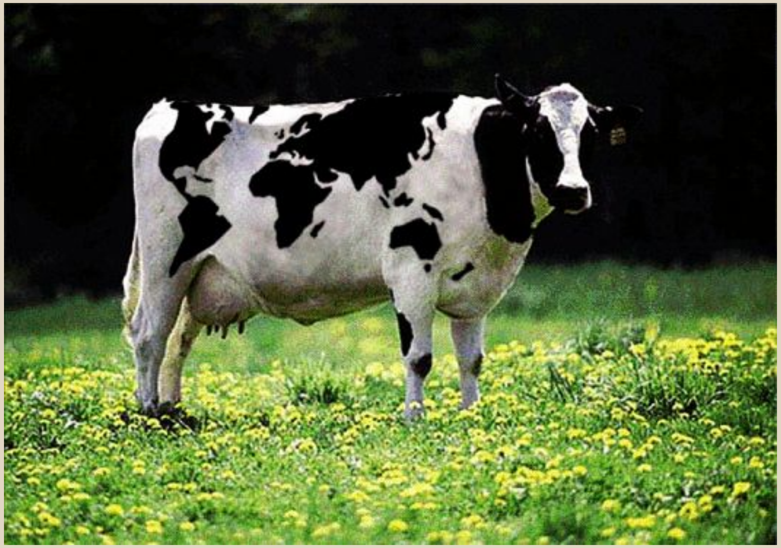
Texas A&M University Libraries

Overview

- Background
- Project concept
- Map based interface
- Geoparser
- Lessons learned
- Future plans



University Background & ETDs

- Founded in 1876 as land-grant university
  - Land-, sea and space-grant university
  - Formerly military college
- 50,000 student body
- 240 Masters and PhD programs
  - Ranks in Top 10 universities in the number of science and engineering doctorates produced
  - Ranks in Top 20 in number of doctoral degrees awarded to minorities
- ***2004 = mandate for digital T&D***
- ***Now = > 10,000 born digital theses & dissertations in repository***

rce: h[illegible]es.tamu.edu/tag/johnny-manzi

Why Map a Textual Collection?

- Increase attention and access to the collection
- Presents a unique context
- Visualize interconnections in the locations of study
- Interactive & visual format appeals to users
- Fills conceptual gaps in traditional cataloging of places
- Increasing amount of place based queries (Ahlers)
- Benefits of spatial queries (Larson) for adjacency, proximity, etc.

Project Aims and Scope

To create tools for and increase understanding of:

- Geoparsing
- Automated Metadata Creation
- Map Based Search Interfaces for Digital Collections
- Use of Digital Gazetteers

TEXAS A&M UNIVERSITY

Collaborations

- TAMU Map & GIS Library
  - Created an early prototype of map showing T&D locations of study
  - AMIGOS Fellowship (Weimer)
- TAMU Library Digital Initiatives
  - Staff support
  - IT expertise
- TAMU Thesis & Dissertation Office
  - Provided sample set
- Texas Digital Library (TDL)
  - Holds collection in DSpace
  - Enhance collection access
- TAMU Initiative for Digital Humanities, Media and Culture
  - Interest and support for base methodology and wider applications

LIBRARIES
TEXAS A&M UNIVERSITY
MAP AND GIS LIBRARY

Amigos Library Services
Resource Sharing Through Technology

ETD Policies

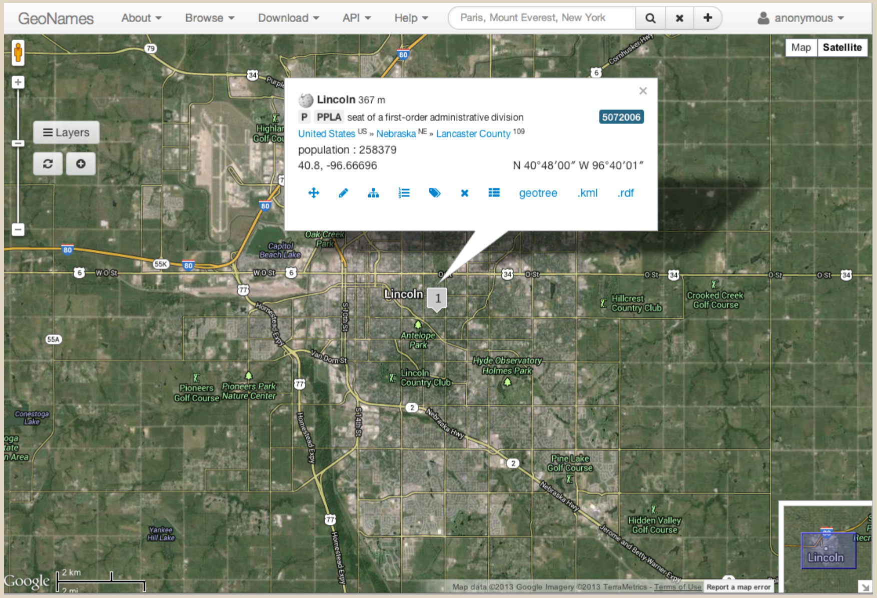
TDL.ORG
TEXAS DIGITAL LIBRARY

IDHMC
TEXAS A&M UNIVERSITY
Initiative for Digital Humanities, Media, and Culture

Geoparsing Enables a Map Based Interface

Goal is to automate geocoding

- Match toponym in text against gazetteer
- Protocol for place name disambiguation
- Obtain geographic coordinates from gazetteer
- Encode coordinates and other item metadata in KML
- Render KML in a specialized map with link to ETD in repository



Lincoln 367 m

P PPLA seat of a first-order administrative division 5072006

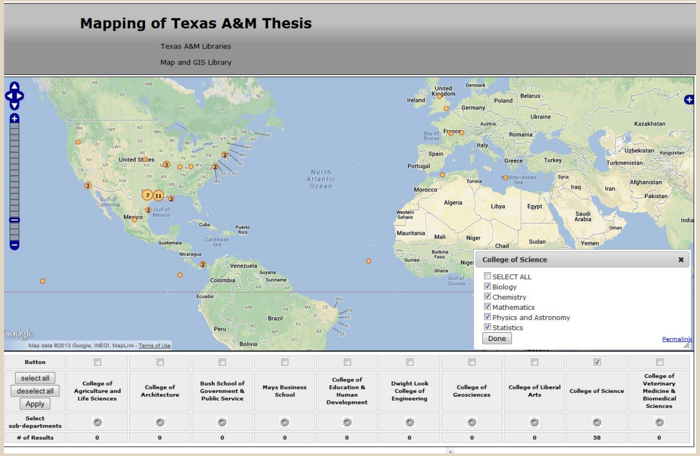
United States US » Nebraska NE » Lancaster County 109

population : 258379

40.8, -96.66696 N 40°48′00″ W 96°40′01″

Desired Map Functionality

- Read KML output from geoparser
- Base map: GoogleMaps, OpenLayers, Open StreetMaps
- Marker clustering and List of placemarks
- Dropdown menu for countries and states
- Dropdown menu for departments grouped by college
- Search by author
- Time range slider (by year)
- Use the University Brand color palette



Mapping of Texas A&M Thesis

Texas A&M Libraries

Map and GIS Library

College of Science ✖

- ☐ SELECT ALL
- ☑ Biology
- ☑ Chemistry
- ☑ Mathematics
- ☑ Physics and Astronomy
- ☑ Statistics

Done

Permalink

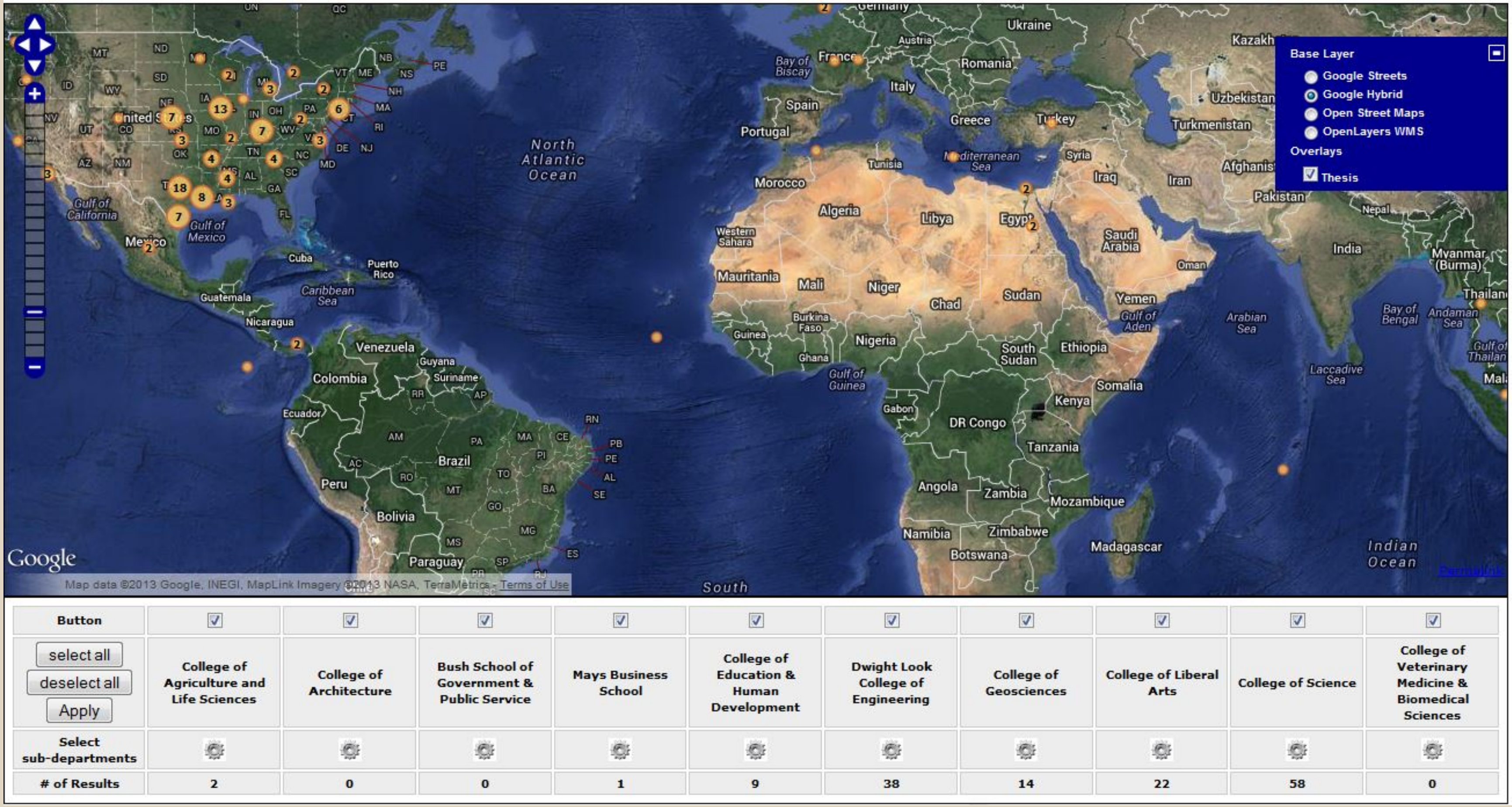
Map data ©2013 Google, INEGI, MapLink - Terms of Use

Button	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐
select all deselect all Apply	**College of Agriculture and Life Sciences**	**College of Architecture**	**Bush School of Government & Public Service**	**Mays Business School**	**College of Education & Human Development**	**Dwight Look College of Engineering**	**College of Geosciences**	**College of Liberal Arts**	**College of Science**	**College of Veterinary Medicine & Biomedical Sciences**
Select sub-departments	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙
# of Results	0	0	0	0	0	0	0	0	58	0

Metadata in KML file

• Author	*dc.creator*
• Title	*dc.title*
• Academic department	*thesis.degree.department*
• Advisor	*dc.contributor.advisor*
• PhD or Master	*thesis.degree.level*
• Year	*dc.date.submitted*
• Place *(created via geoparsing)*	*dc.coverage.spatial*
• Keywords	*dc.subject*
• URL to document	*dc.identifier.uri*

Map Prototype



Base Layer

○ Google Streets

● Google Hybrid

○ Open Street Maps

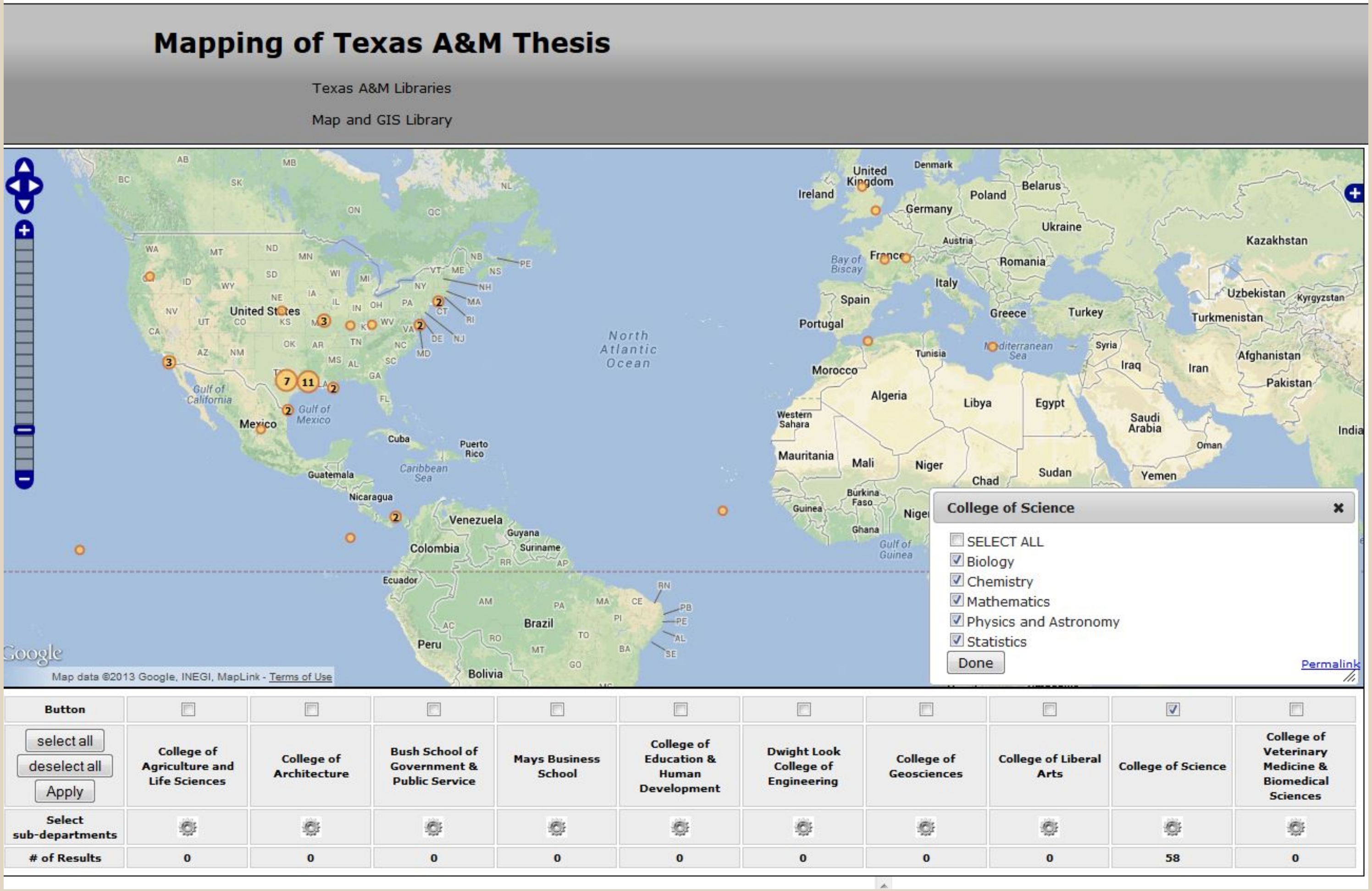
○ OpenLayers WMS

Overlays

☑ Thesis

Button	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
select all deselect all Apply	College of Agriculture and Life Sciences	College of Architecture	Bush School of Government & Public Service	Mays Business School	College of Education & Human Development	Dwight Look College of Engineering	College of Geosciences	College of Liberal Arts	College of Science	College of Veterinary Medicine & Biomedical Sciences
Select sub-departments	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙
# of Results	2	0	0	1	9	38	14	22	58	0

Map Prototype Department Filter



Mapping of Texas A&M Thesis

Texas A&M Libraries

Map and GIS Library

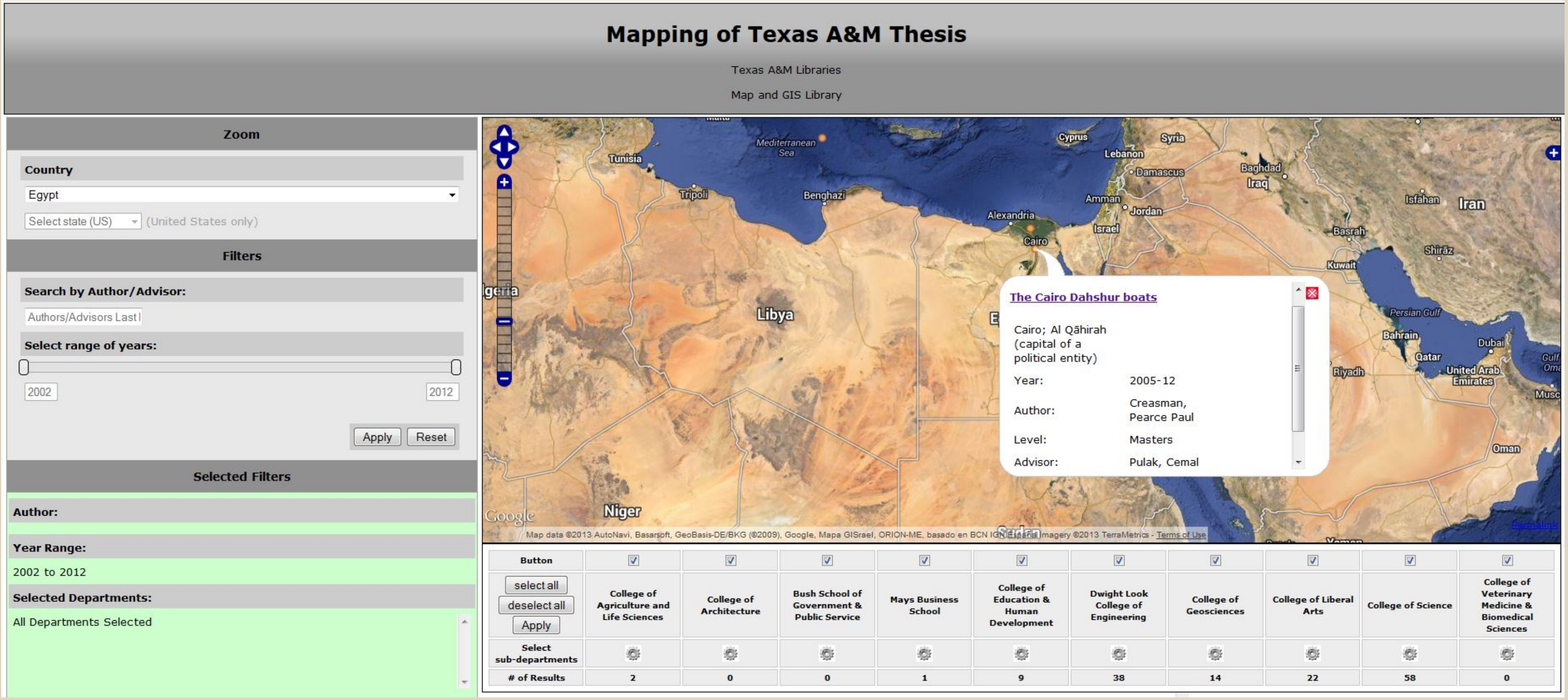
College of Science ✖

- ☐ SELECT ALL
- ☑ Biology
- ☑ Chemistry
- ☑ Mathematics
- ☑ Physics and Astronomy
- ☑ Statistics

Done

Button	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐
select all deselect all Apply	College of Agriculture and Life Sciences	College of Architecture	Bush School of Government & Public Service	Mays Business School	College of Education & Human Development	Dwight Look College of Engineering	College of Geosciences	College of Liberal Arts	College of Science	College of Veterinary Medicine & Biomedical Sciences
Select sub-departments	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙
# of Results	0	0	0	0	0	0	0	0	58	0

Map Prototype – Result Popup



Mapping of Texas A&M Thesis

Texas A&M Libraries

Map and GIS Library

Zoom

Country

Egypt

Select state (US) (United States only)

Filters

Search by Author/Advisor:

Authors/Advisors Last N

Select range of years:

2002 2012

Apply Reset

Selected Filters

Author:

Year Range:

2002 to 2012

Selected Departments:

All Departments Selected

The Cairo Dahshur boats

Cairo; Al Qāhirah (capital of a political entity)

Year:	2005-12
Author:	Creasman, Pearce Paul
Level:	Masters
Advisor:	Pulak, Cemal

Map data ©2013 AutoNavi, Basarsoft, GeoBasis-DE/BKG (©2009), Google, Mapa GISrael, ORION-ME, basado en BCN IGN España, Imagery ©2013 TerraMetrics - Terms of Use

Button	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
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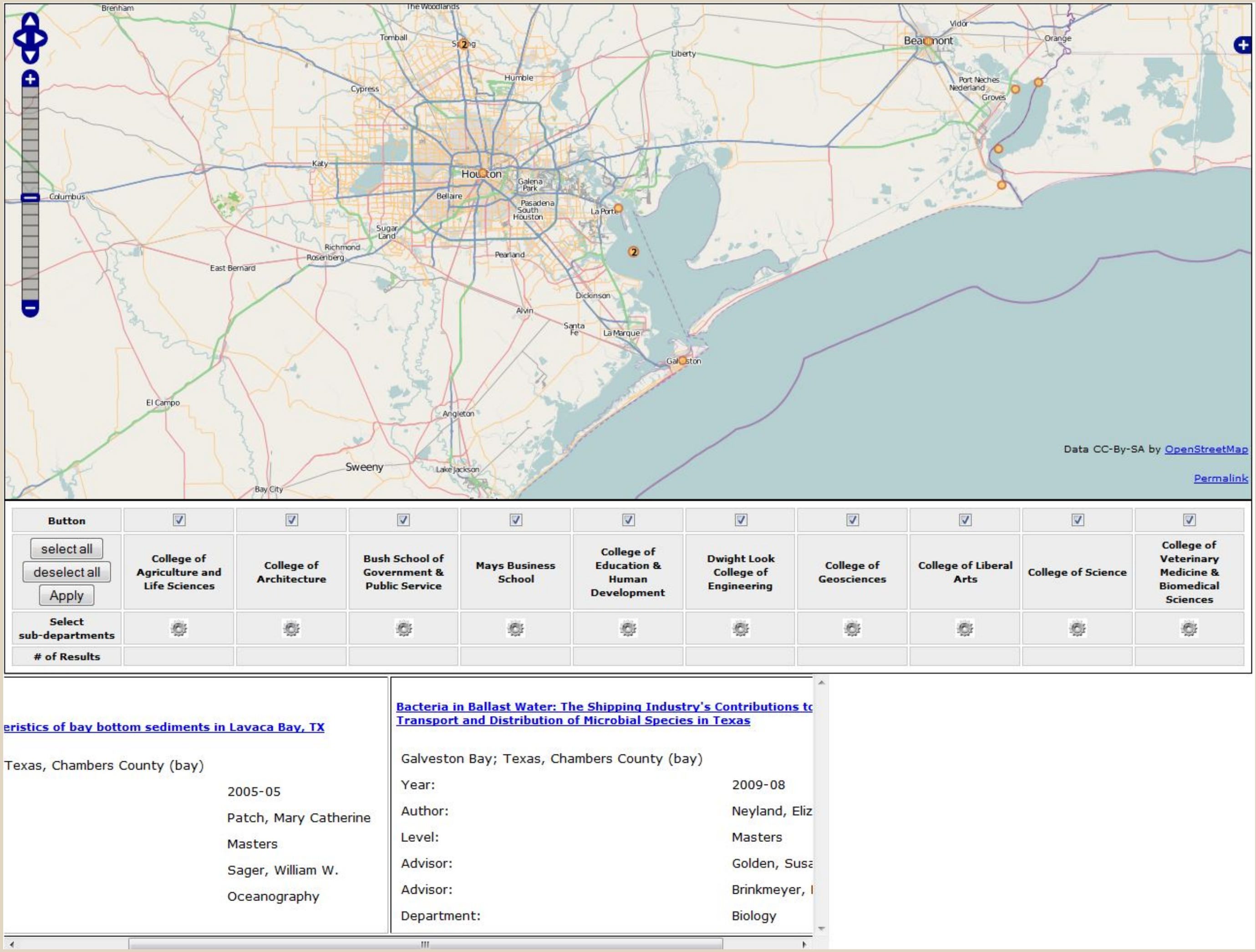
# of Results	2	0	0	1	9	38	14	22	58	0

Zoom to location of interest



Button	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
select all deselect all Apply	College of Agriculture and Life Sciences	College of Architecture	Bush School of Government & Public Service	Mays Business School	College of Education & Human Development	Dwight Look College of Engineering	College of Geosciences	College of Liberal Arts	College of Science	College of Veterinary Medicine & Biomedical Sciences
Select sub-departments	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙	⚙
# of Results										

eristics of bay bottom sediments in Lavaca Bay, TX

Texas, Chambers County (bay)

	2005-05
	Patch, Mary Catherine
	Masters
	Sager, William W.
	Oceanography

Bacteria in Ballast Water: The Shipping Industry's Contributions tc Transport and Distribution of Microbial Species in Texas

Galveston Bay; Texas, Chambers County (bay)

Year:	2009-08
Author:	Neyland, Eliz
Level:	Masters
Advisor:	Golden, Susa
Advisor:	Brinkmeyer, I
Department:	Biology

Geoparser

- Comparable Models
  - Edinburgh (Grover, et al.)
  - DIGMAP (Martins, et al.)

- Setting
  - DSpace 1.7 + supports curation tasks
  - Suggest New Metadata

Name Extraction & Disambiguation

- Name Extraction
  - ‘Named Entity Recognition’ or NER
  - OpenNLP, Stanford NLP, Mallet
  - Classifies spans of text based on freely available training data
  - Toponym occurrences are recorded in the document
- Disambiguation
  - Requires reliable knowledge base
  - Geonames.org
  - Methods: Rule-based, Heuristic, Statistical

Heuristics

Context Based:

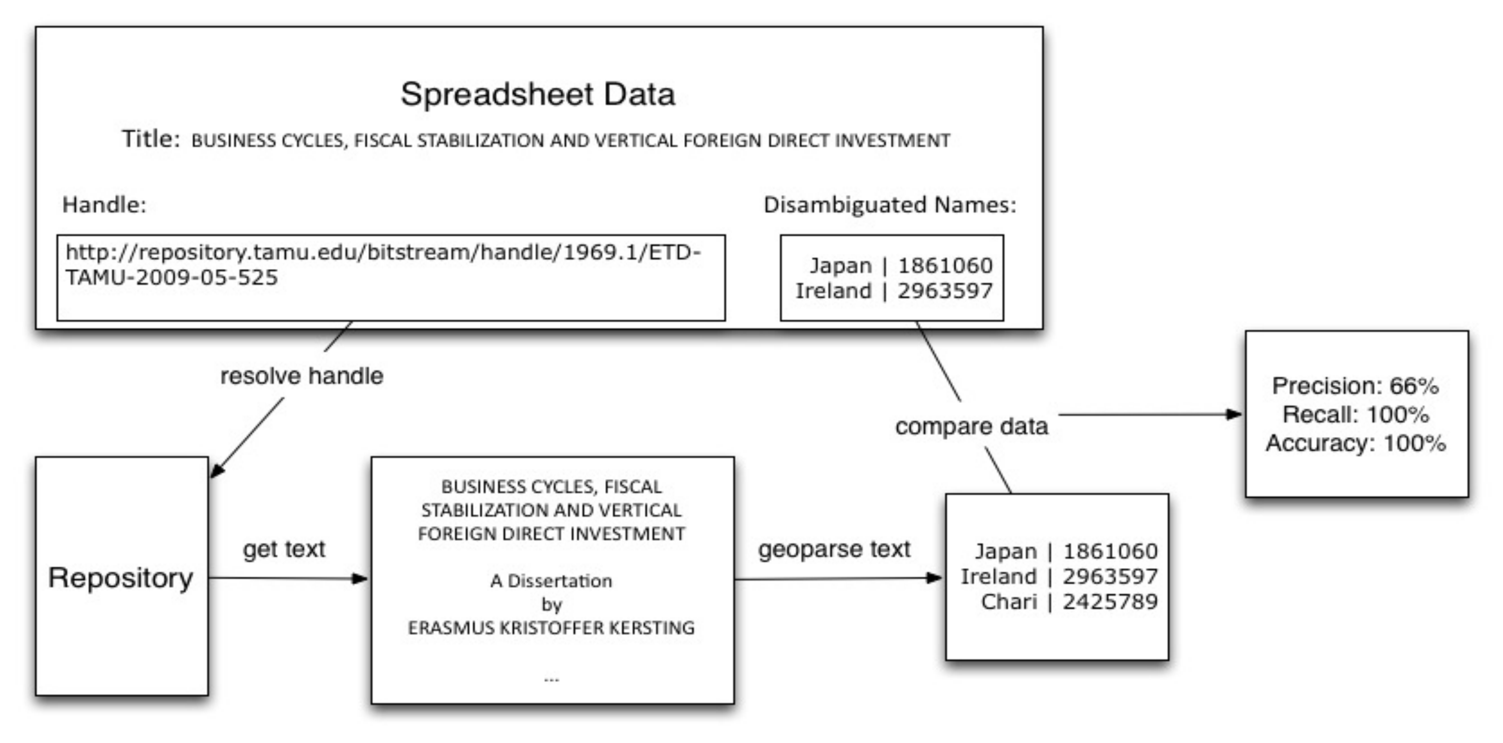
- Unambiguous extended names i.e. “Paris, France”
- Favor candidates of mentioned feature type
- Clustering of places (‘nearby locations’)
- Favor contained candidates

Generalized:

- Favor higher-level administrative units (countries, states, cities)
- Favor locations of larger population

Evaluate Output

- Compare human annotations to automated output
- Examine precision & recall of name extraction
- Examine accuracy of name disambiguation



Spreadsheet Data
Title: BUSINESS CYCLES, FISCAL STABILIZATION AND VERTICAL FOREIGN DIRECT INVESTMENT
Handle:
http://repository.tamu.edu/bitstream/handle/1969.1/ETD-TAMU-2009-05-525
Disambiguated Names:
Japan | 1861060
Ireland | 2963597
resolve handle
Repository
get text
BUSINESS CYCLES, FISCAL STABILIZATION AND VERTICAL FOREIGN DIRECT INVESTMENT
A Dissertation
by
ERASMUS KRISTOFFER KERSTING
...
geoparse text
Japan | 1861060
Ireland | 2963597
Chari | 2425789
compare data
Precision: 66%
Recall: 100%
Accuracy: 100%

Lessons Learned

- Geonames
  - Web look up returns are unclear as to how results are prioritized
  - Web look up is done by name but returns places without the search term in their name – due to inclusion of the search tem in the hierarchy
  - Suggested best practice – put geonames dataset into your own database
- OpenNLP - lots of false positives on short strings (eg. Ca, Me)
- Implementing name extraction is comparatively easier with Stanford NLP

Future Plans

- Use statistical techniques for name disambiguation
- Consider relevance of toponyms when performing name extraction
- Evaluate the tool on other digital collections
- Improve the scalability of the map on large data sets
- Integrate the tool into document submitter/curator workflow

Questions?

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