Automatically Geotagging Unstructured Text with Open Source Tools

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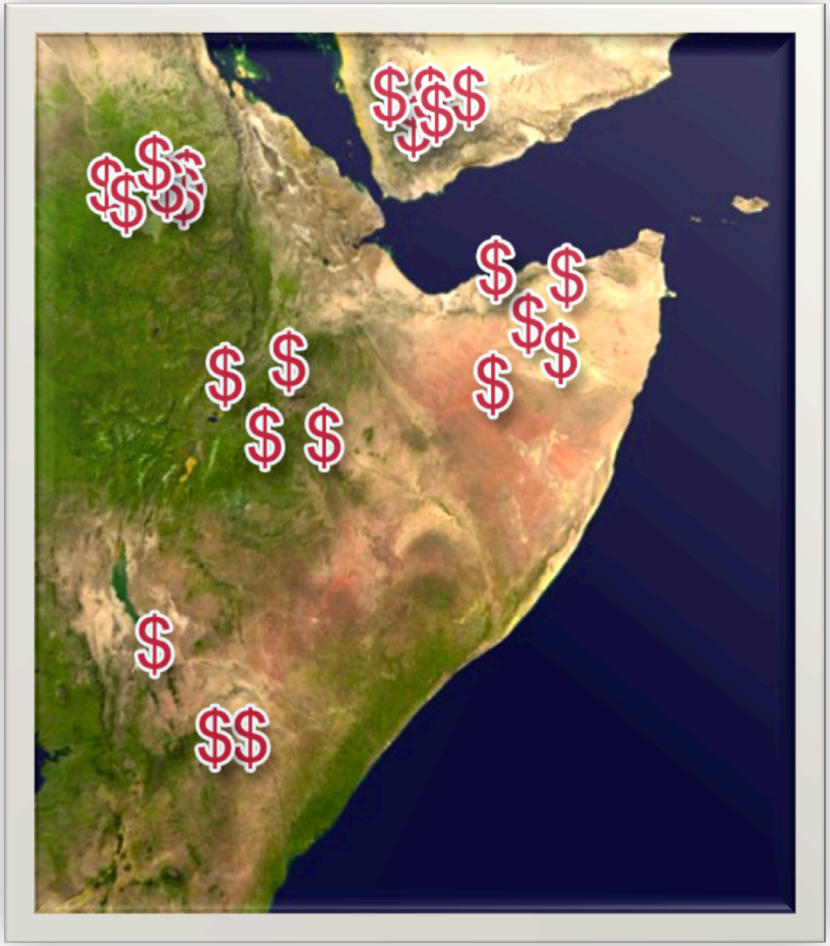
Background

- **About Me:**
  - Data Scientist
  - Natural Language Processing
  - Unstructured Data → Information
- **Berico Technologies:**
  - Veteran-owned Small Business
  - Open Source Software & Services
  - Big Data Analytics in the Cloud
  - Defense & Intel Community

Problem: Geotagging Unstructured Text

- Growing demand for geospatial analytics
- Most human knowledge is "**trapped**" in text
- Existing solutions are **expensive** & don't scale

- Need an **open source** solution!



Solution: an Open Source Geoparser

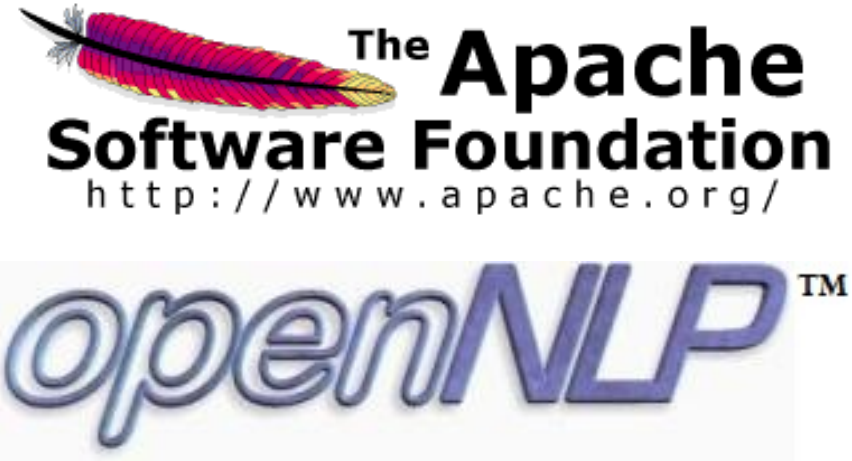
1. **Ingest unstructured text**
2. **Extract place names**
   - Geo entity extraction
3. **Disambiguate names**
   - Geo entity resolution
4. **Enrich text w/ geo data**

Ingest Unstructured Text

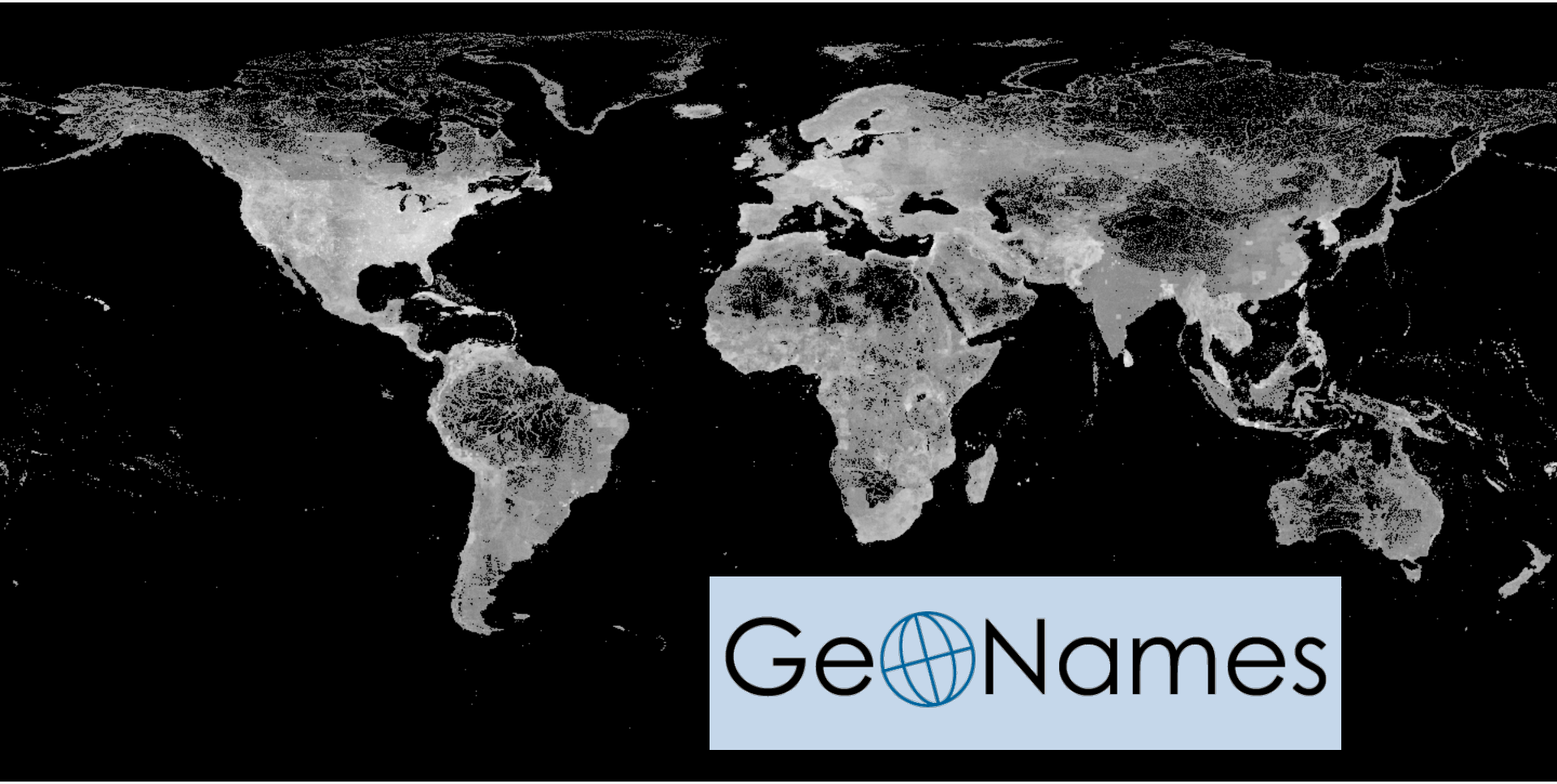
photo: Flickr user NS Newsflash

Extract Place Names

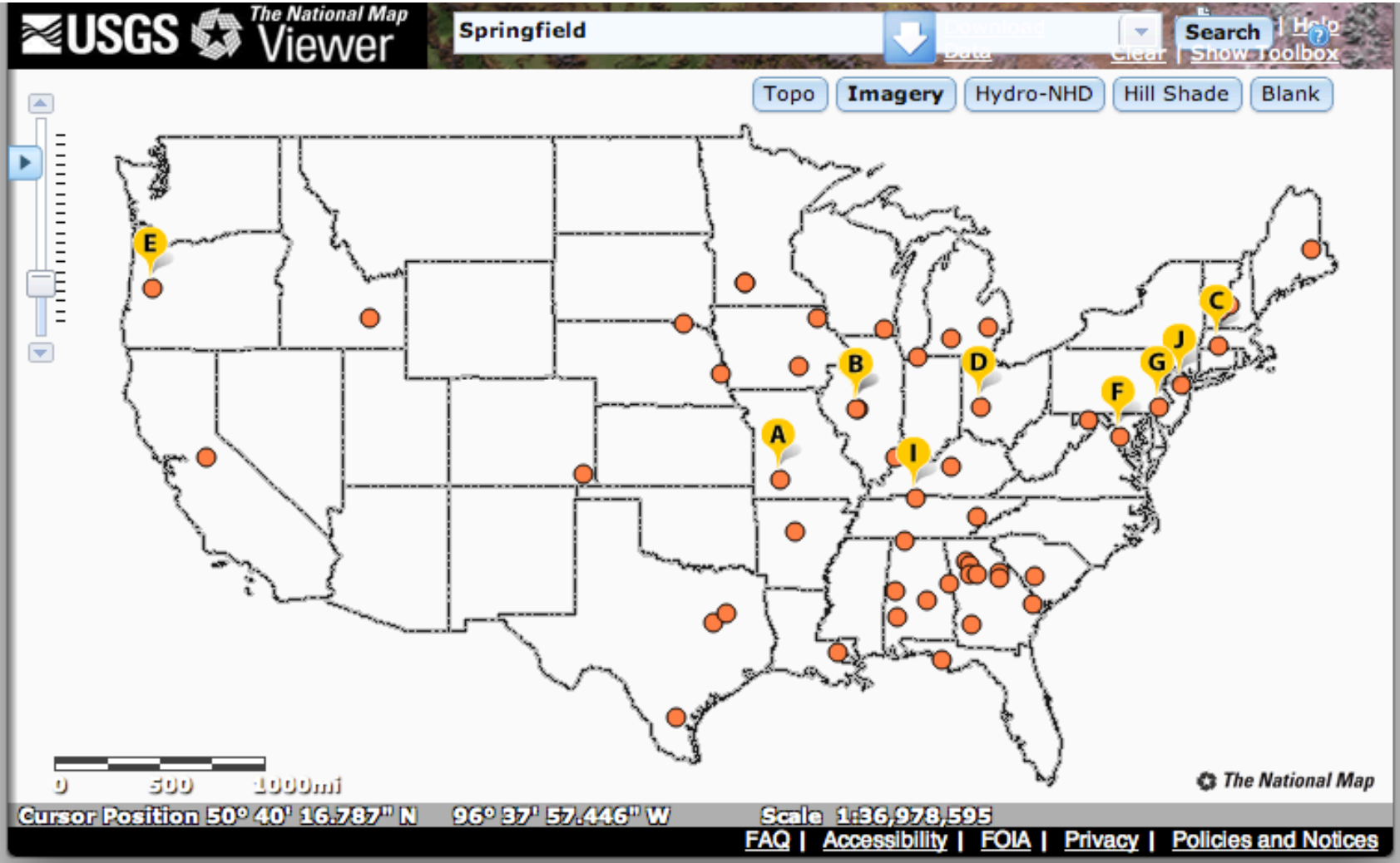
- **Use existing open source tools for Named Entity Recognition:**



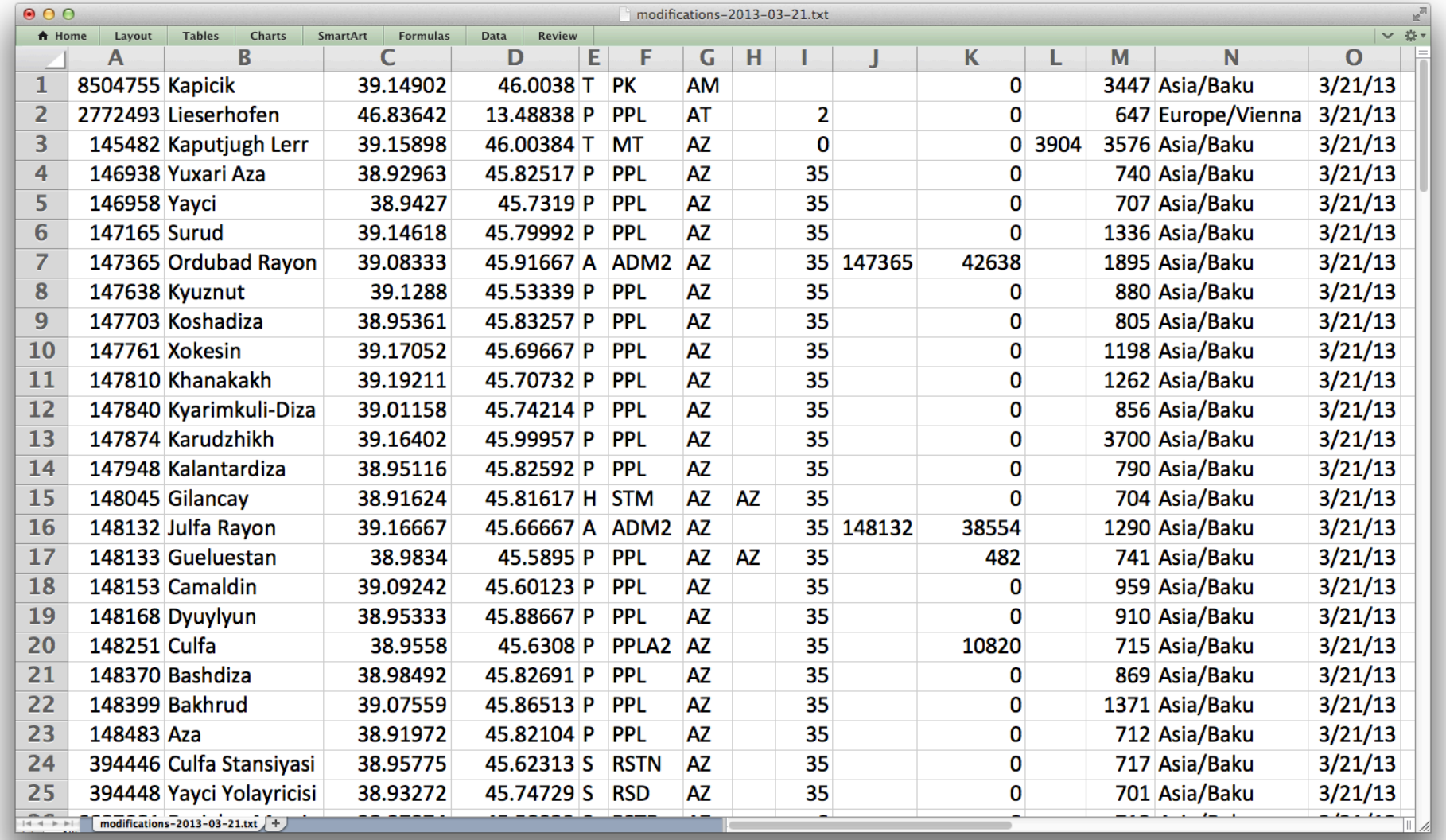
Disambiguate Place Names



"The Springfield Problem"



Enrich Text with Geo Data



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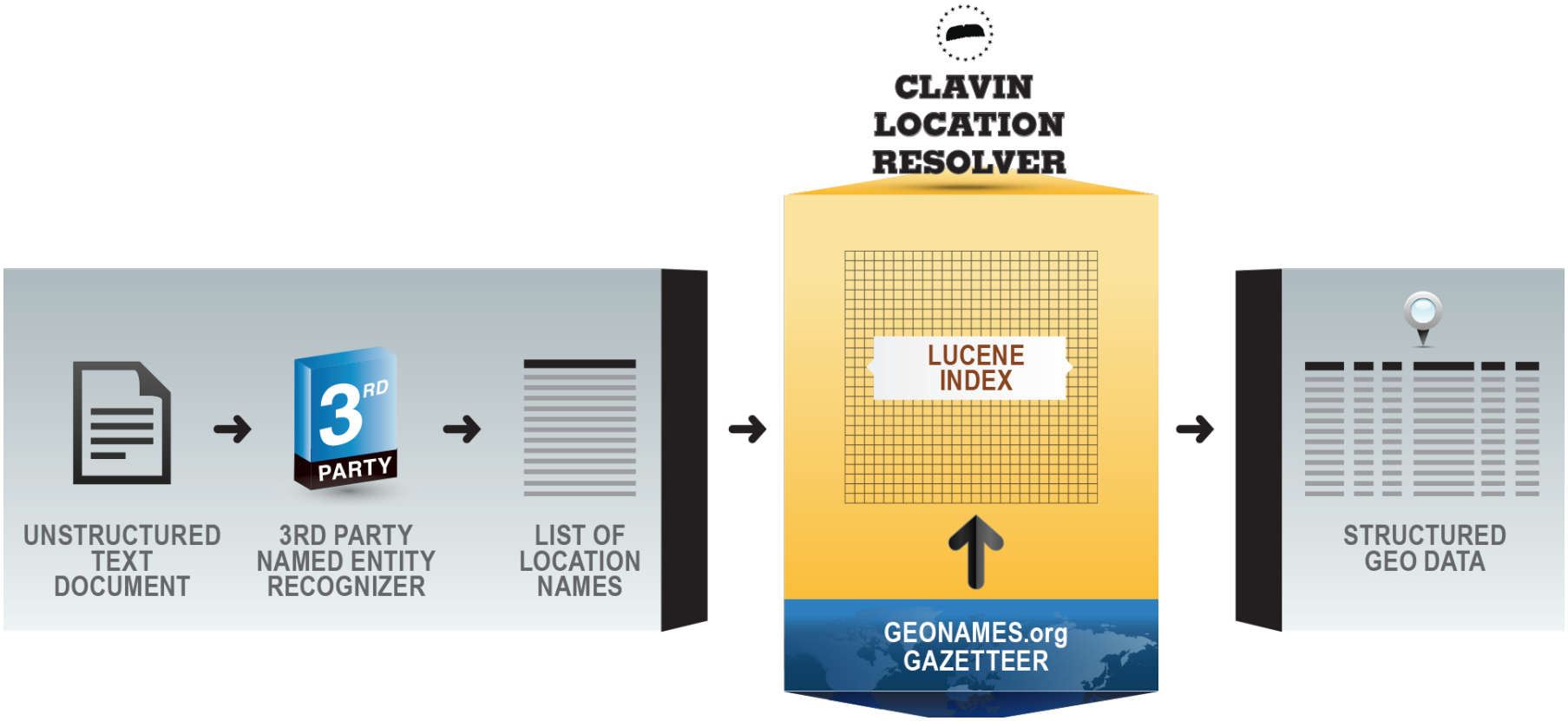
Dealing with Ambiguity

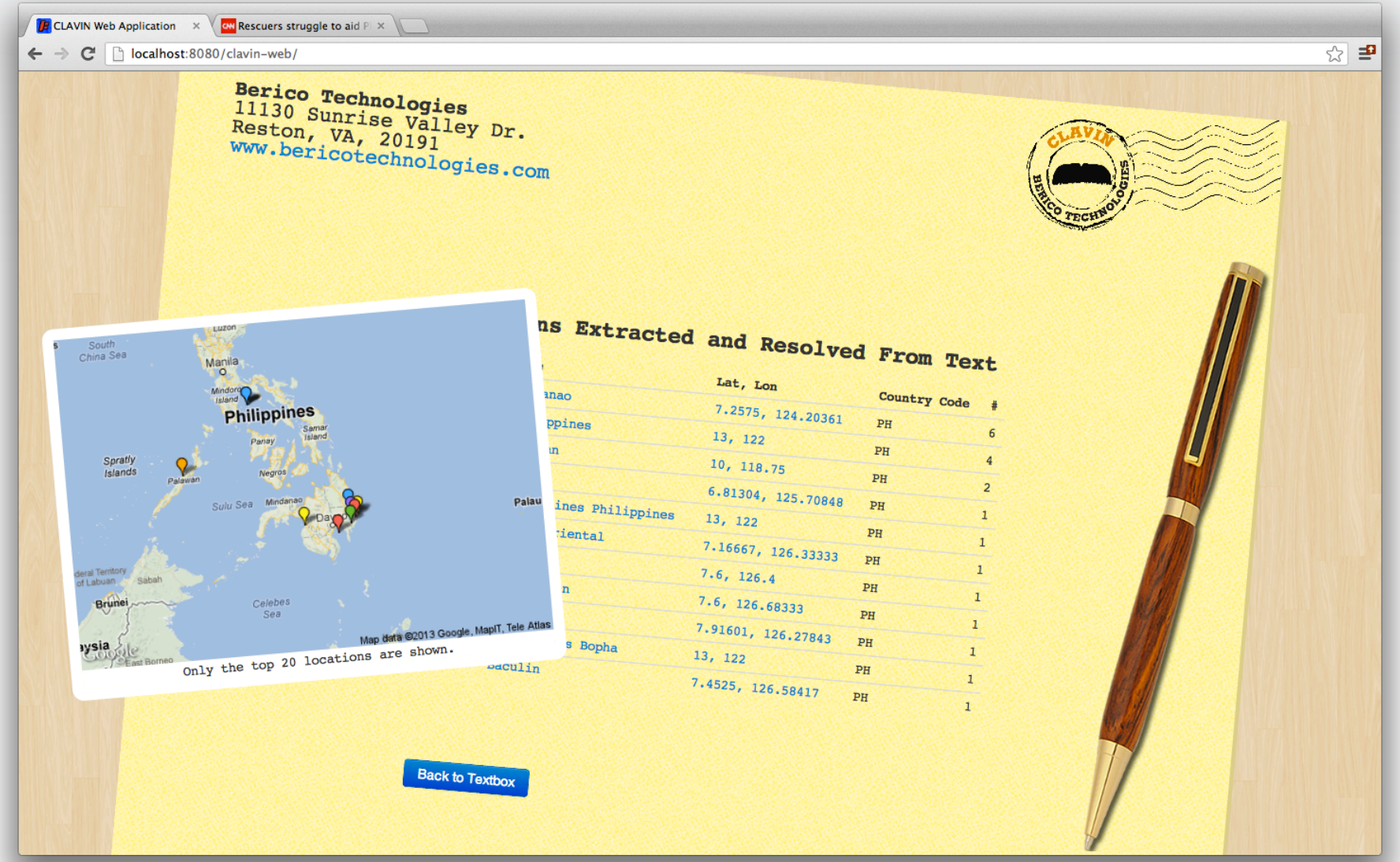
- **Intelligent Context-based Heuristics**
  - First: rank by population
  - Next: look for other locations mentioned in the same document
    - "Springfield" + "**Chicago**" = Illinois
    - "Springfield" + "**Boston**" = Massachusetts
  - Soon: calculate distance based on lat/lons
- **Resolve alternate names to same geospatial entity**
  - "Ivory Coast" = "Côte d'Ivoire"
- **Use fuzzy matching to capture misspelled place names**
  - Including both phonetic spelling & typographical errors

CLAVIN: an open source geoparser

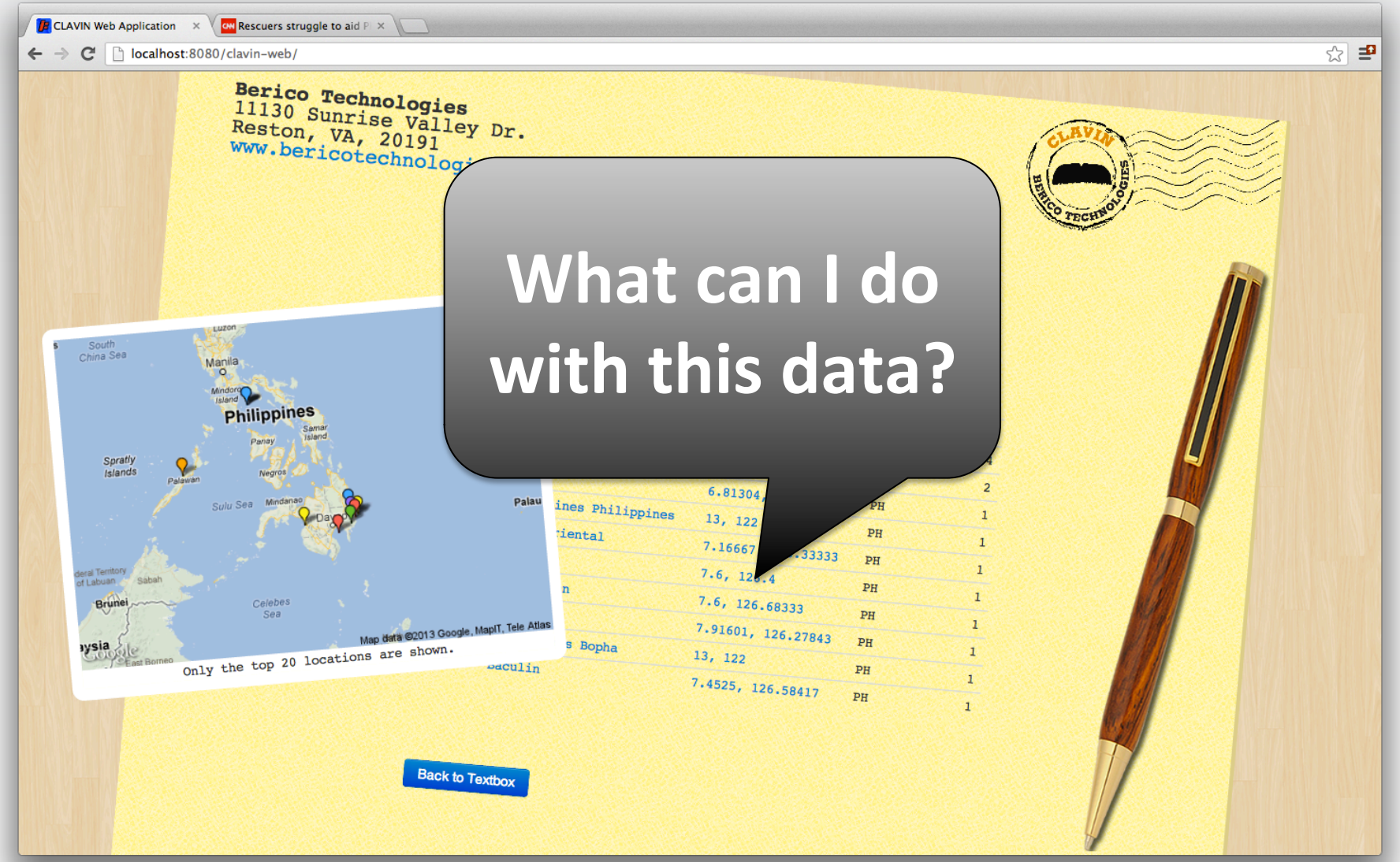
System Architecture



Live Demonstration

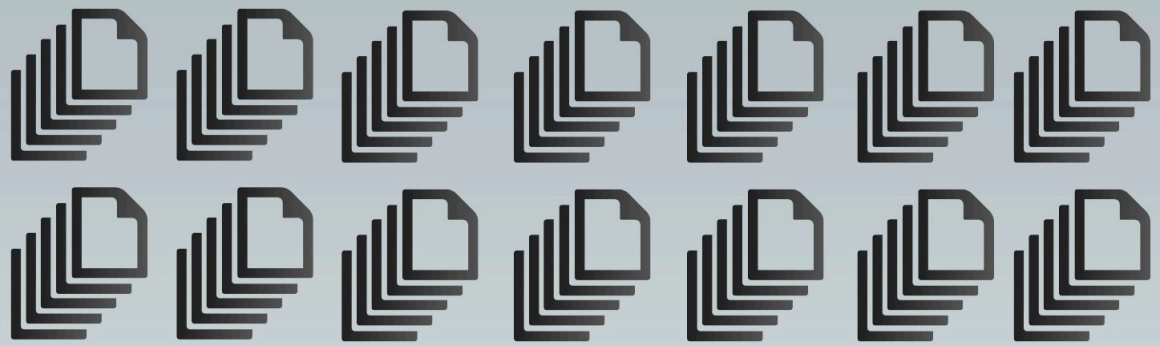


Live Demonstration



Map Visualizations

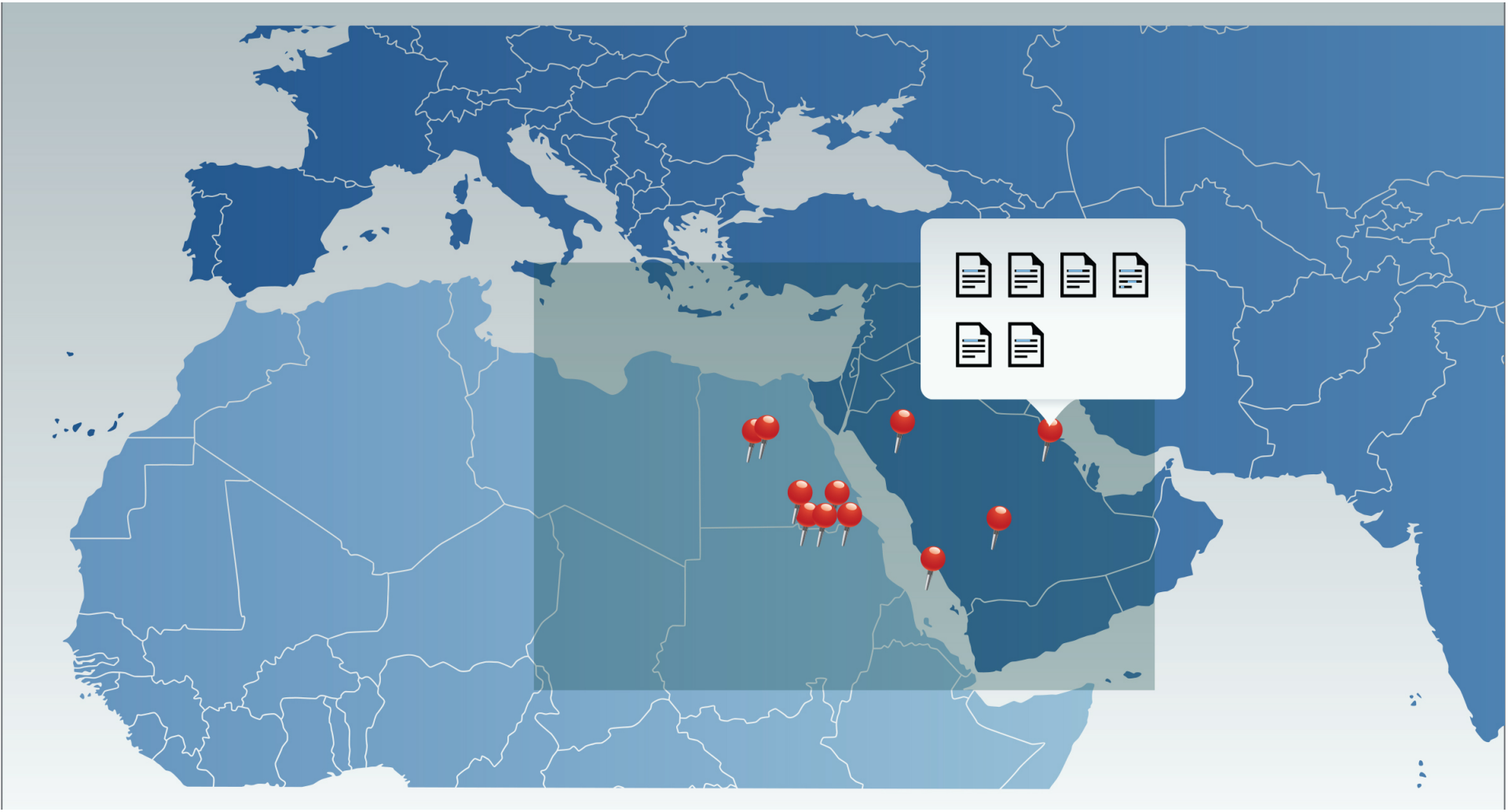
Hierarchical Geospatial Search



Virginia

Search Results: Reston Arlington

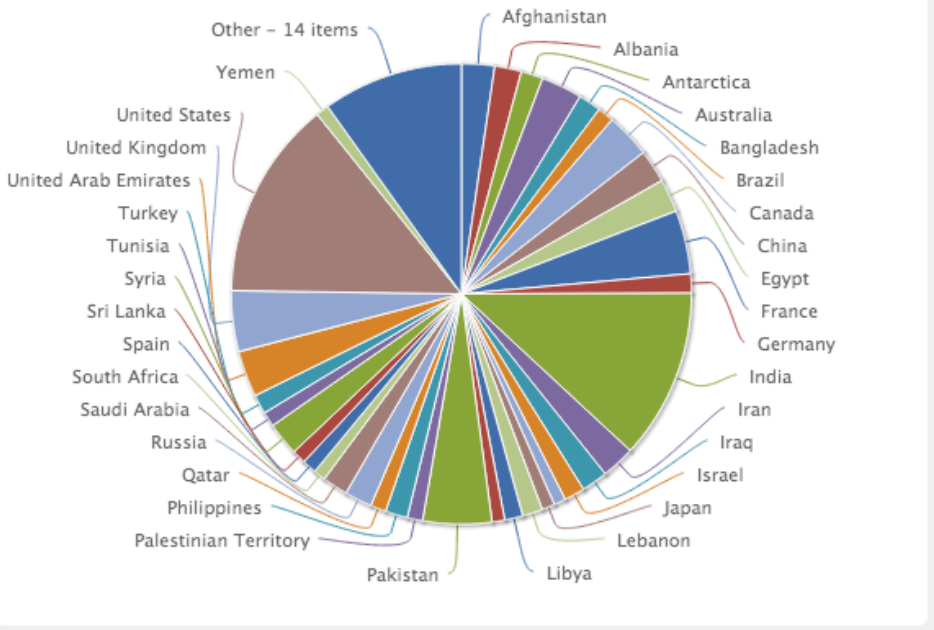
Geospatial Bounding Box Search



Geospatial Analytics on Unstructured Text

Roll up: COUNTRY

# of Values	Average	Maximum	Minimum	Midpoint
50	70997	496533 United States	20761 Sudan	46424 Libya and Turkey



Performance Metrics & Features

CLAVIN

Cartographic Location And Vicinity INdexer

- **Accurate**: 0.75 F-measure
- **Fast**: 100 locations per sec per cpu
- **Scalable**: processes 1M documents in 1 hour on a 9-node Hadoop cluster
- **Smart**: natural language processing, intelligent heuristics, & fuzzy matching
- **Easy to use**: simple Java-based API
- **Open source**: Apache License

clavin.bericotechnologies.com

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