

# Analyzing Events Through the Lens of Social Media

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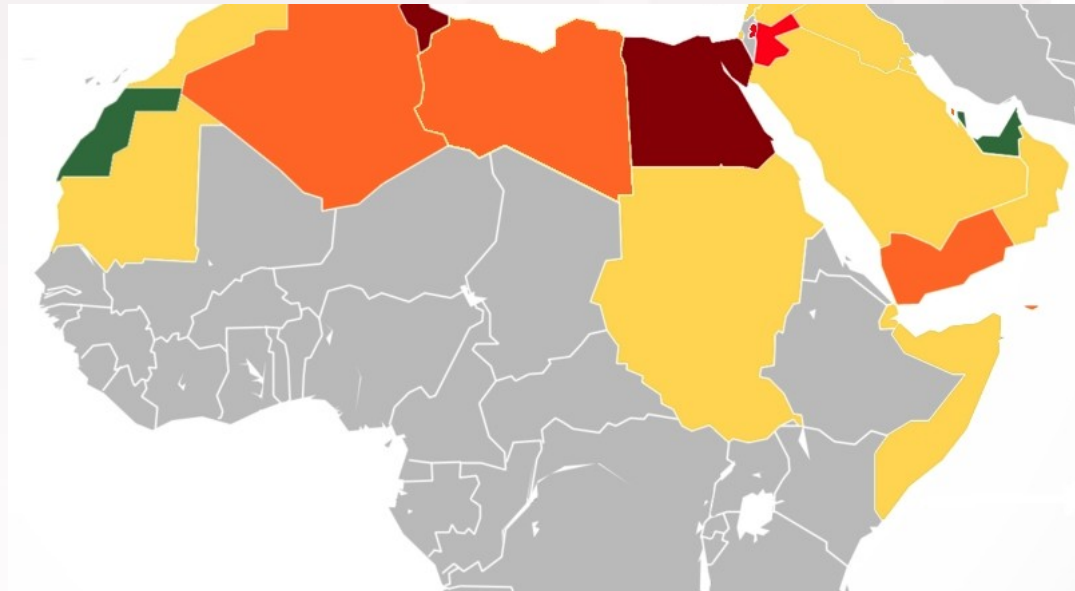
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# Outline

- Introduction
- Motivation
- Challenges
- Proposed Framework
- Data collection and processing
- Experiments- Results and Analysis
- Looking Ahead

# Introduction: Socio-Political Events

- Tunisia Revolution
- Egypt Revolution
- Bahrain Protest
- Libya Revolution
- Morocco Protest
- Algeria Protest
- Yemen Protest
- ..., among others.



# Introduction: Economic Events

- Spanish Indignants Movements (Spanish protests, 15-M)
- #Occupy worldwide

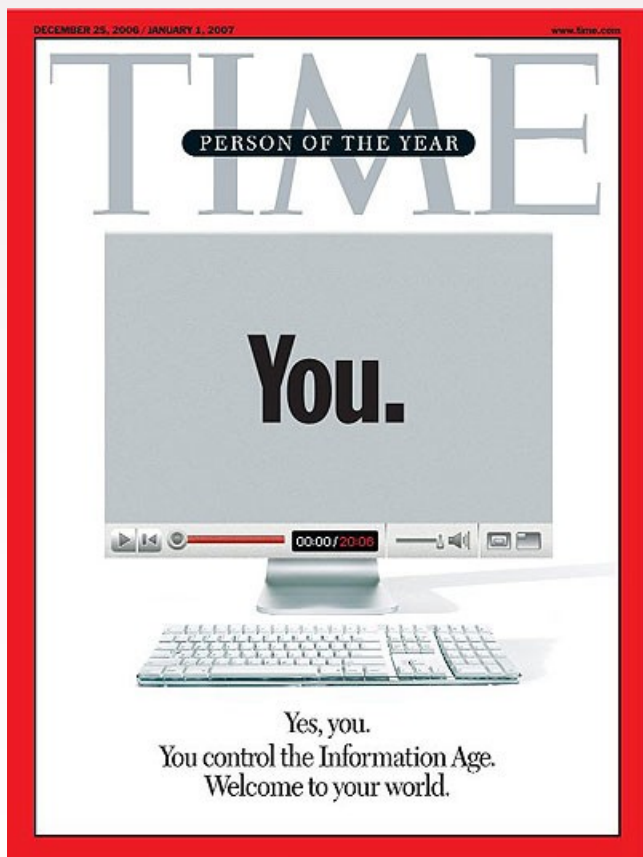


# Introduction: Disaster-related Events

- Japan Earthquake & Tsunami
- Southeast Asia Floods (crocodile alerts)
- Haiti Earthquake



# Social Media's Influence



2006



2011



# Social Media's Influence

- Social media played a phenomenal role in organizing these events
- Citizen journalism at its best



# Goals of the Research

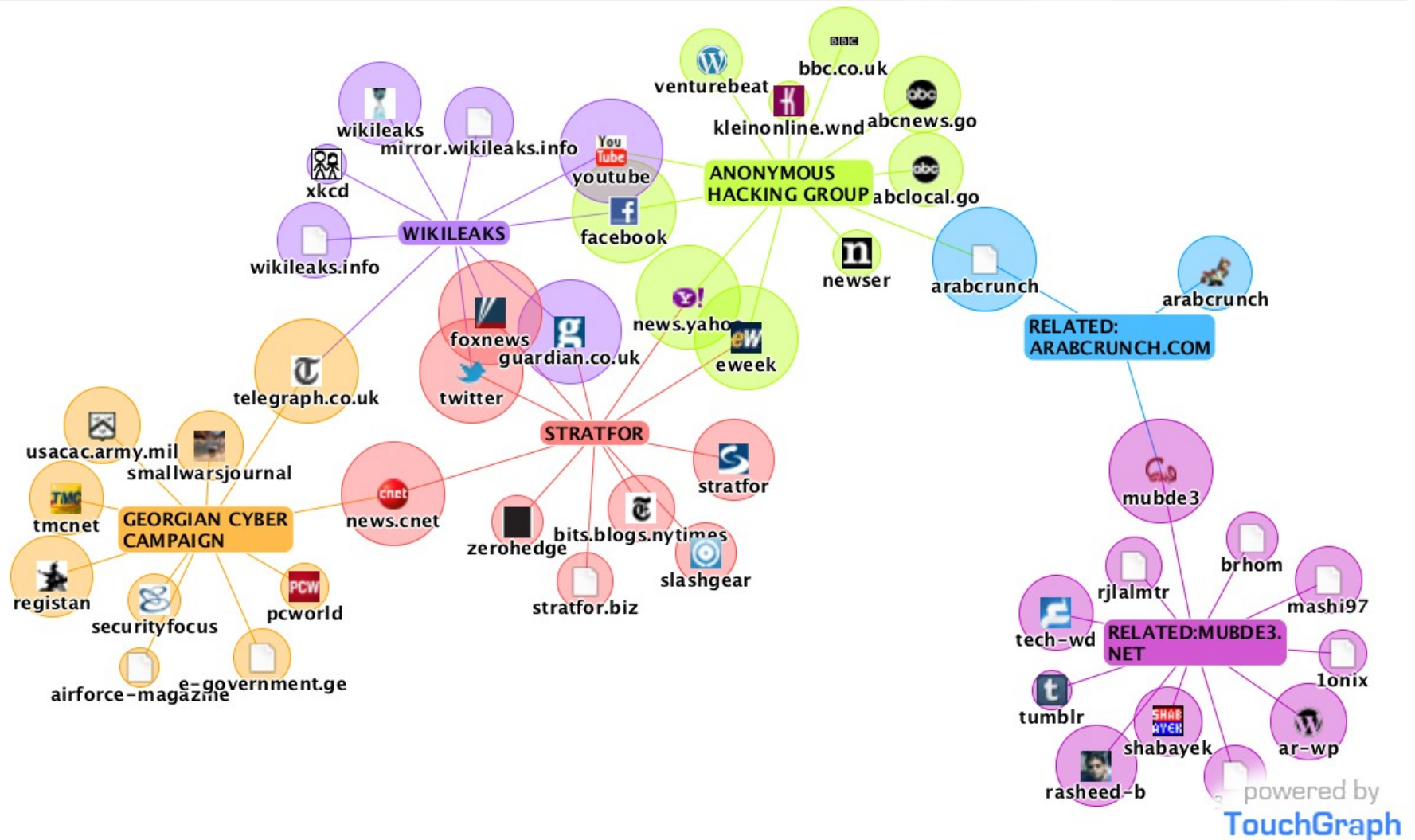
- We study how social media can be leveraged to analyze
  - Events and their characteristics
  - Coverage differences from mainstream media
  - Socio-demographic, socio-technical behavioral patterns
  - and explore further implications of the research



# Challenges

- Identifying the right social media sources
- Language barrier
- Colloquial usage, misspellings, sparse links
- Extracting relevant information from the sources
  - Entity extraction and resolution
- Evaluation due to lack of benchmark datasets.

# Challenges



# Proposed Methodology

- Identifying the right social media sources

Specificity ( $\kappa$ ) of a source 'S' for an event 'E'

$$IG(E, S) = H(E) - H(E | S)$$

$$= \sum_{e \in E} p(e) \log \left( \frac{1}{p(e)} \right) - \sum_{e \in E, s \in S} p(e, s) \log \left( \frac{p(s)}{p(e, s)} \right)$$

# Proposed Methodology

- Identifying the right social media sources

Closeness ( $\tau$ ) of a term/entity 'e' to a source 'E'

$$\tau = P(e, E) = P(E)P(e | E)$$

$$P(e | E) = ef iEf = ef(e, E) * iEf(e)$$

- Creating Event dictionaries

# Construction of Event Dictionaries

- Reference point to construct event vocabulary
- Independent of the sources
- Globalvoicesonline.org
- Extract entities from global voices online source
- Use closeness measure to order the entities based on relevance to the event
  - Event-specific dictionary
  - Event category-specific dictionary

Egyptian revolution specific dictionary	Tahrir Square, Egyptian government, Gigi Ibrahim, Alexandria, Wael Abbas, ...
Libyan revolution specific dictionary	Tripoli, Muammar Al Gaddafi, North Atlantic Treaty Organization, Chad, United Kingdom, ...
Tunisian revolution specific dictionary	Tunisian government, Lin Ben Mhenni, Samir Feriani, Kasbah Square, RCD, ...
Socio-political (global) event dictionary	Twitter, Iranian Government, Tear gas devices, Facebook, Big Social network, ...



## Top 5 entities in the event specific and Event category-specific dictionaries

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Global Voices is an international community of bloggers who report on blogs and citizen media from around the world. [Learn why »](#)



# Data collection

- Collected using Google Blog Search
- From blogspot.com

Event	Query Term	Number of Blogs	Dates
Egyptian Revolution	“egyptian revolution” OR “egypt protest”	579	25 <sup>th</sup> January, 2011 – 7 <sup>th</sup> December, 2011
Libyan Revolution	“libyan revolution” OR “libya protest”	600	15 <sup>th</sup> February, 2011 – 7 <sup>th</sup> December, 2011
Tunisian Revolution	“tunisian revolution” OR “tunisia protest”	484	17 <sup>th</sup> December, 2010 – 7 <sup>th</sup> December, 2011

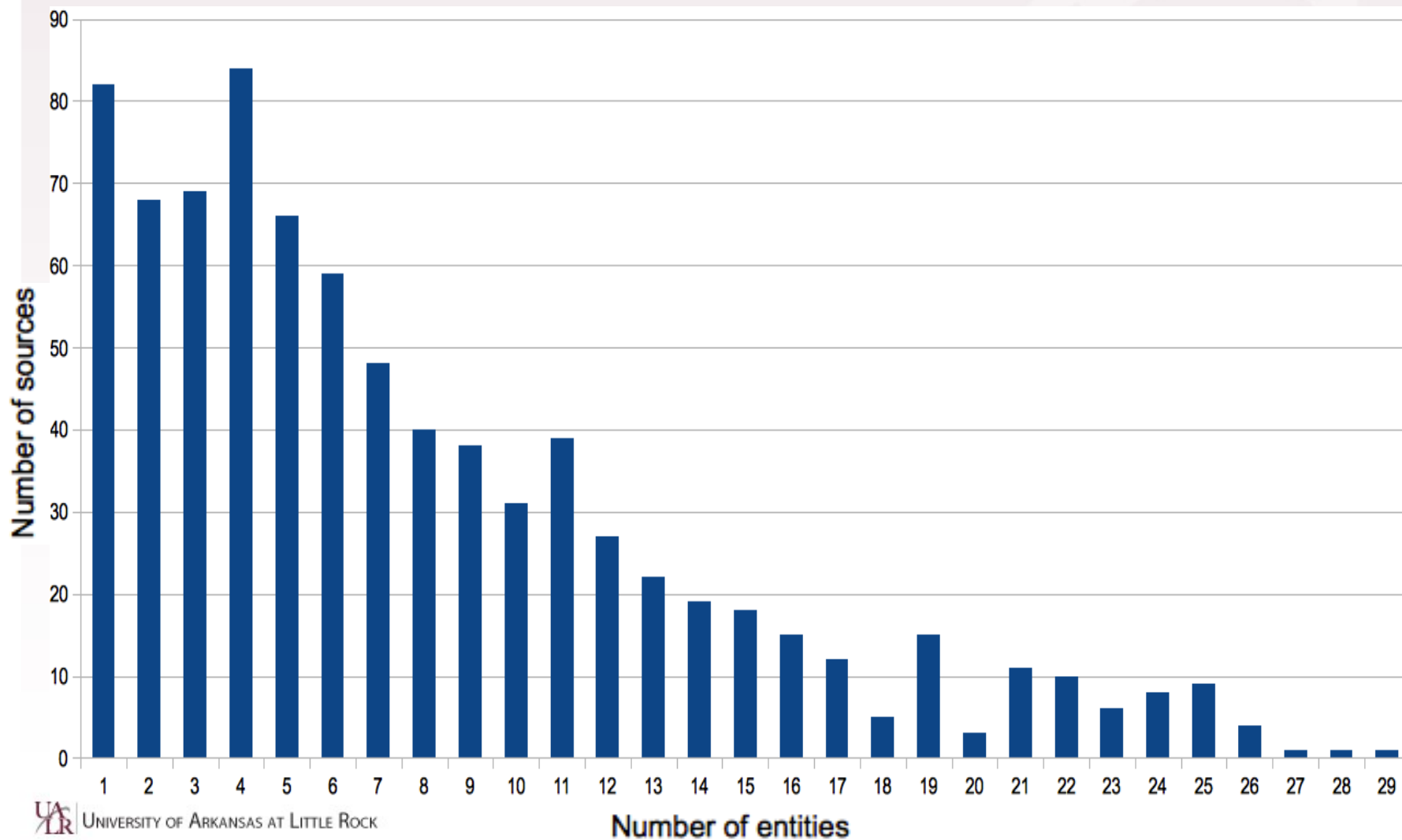
# Data Description

Blogger specific
URL
Work information
Gender
Blogs followed
Blogs owned

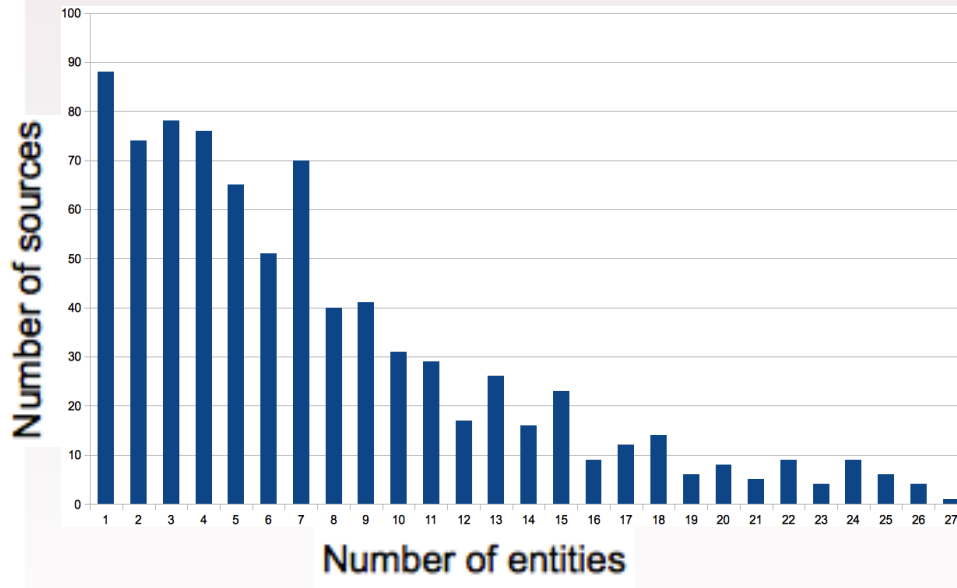
Blog specific
URL
Blogging tags

Blog post specific
URL
Timestamp
Text
Outlinks
Topic Category
Language

# Source-Entity Distribution: Egyptian Revolution

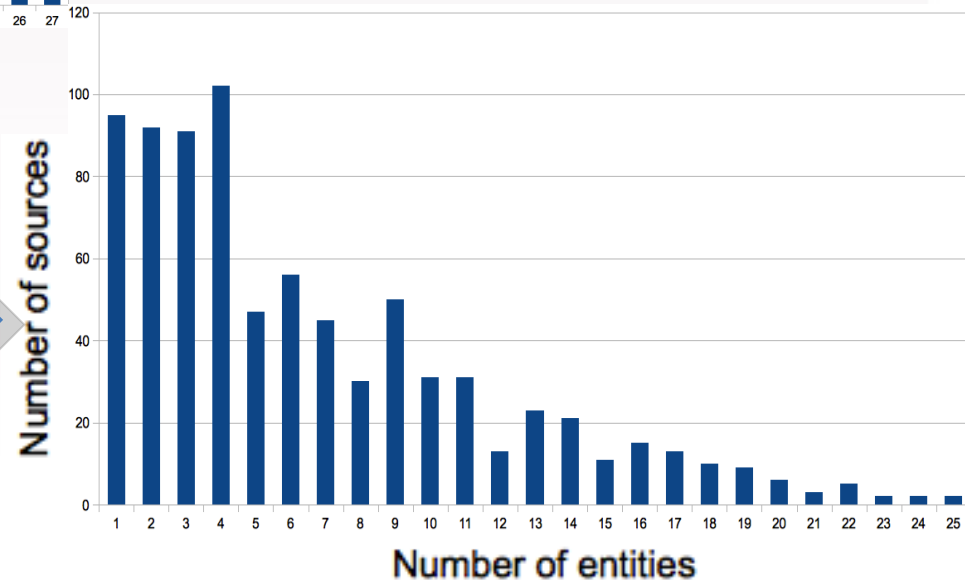


# Source-Entity Distribution

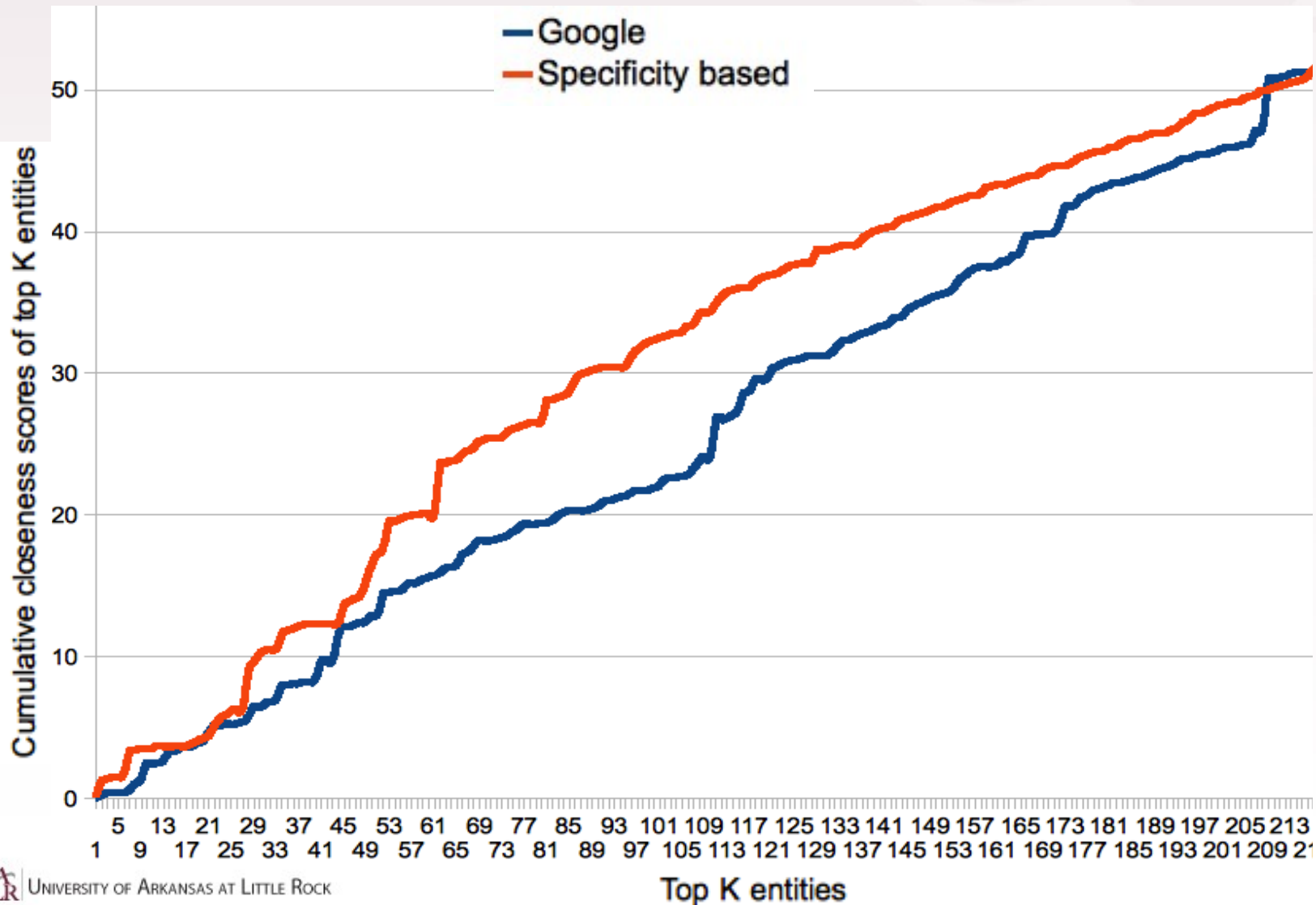


Libyan Revolution

Tunisian Revolution

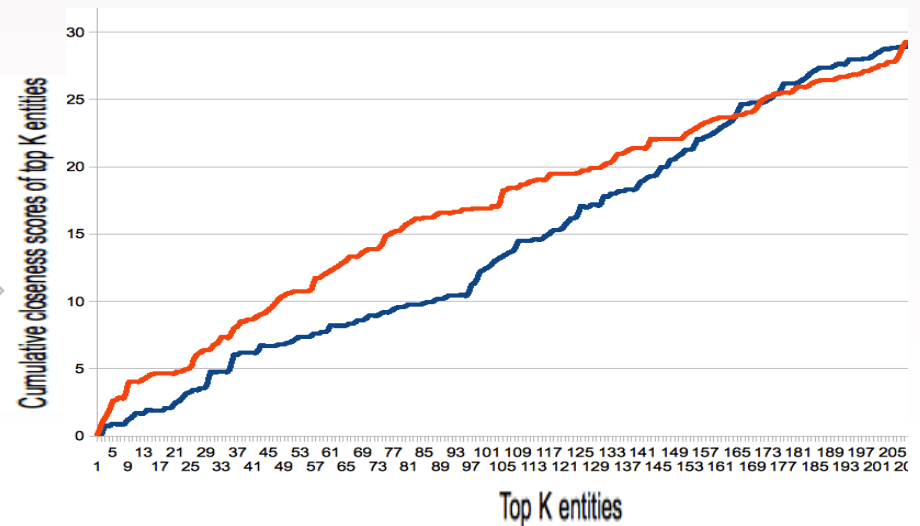
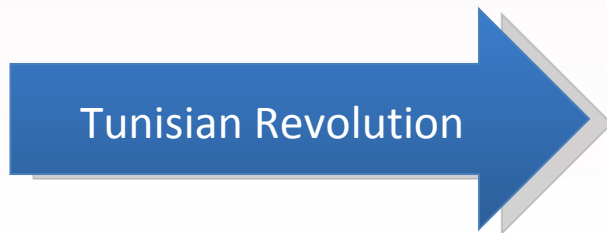
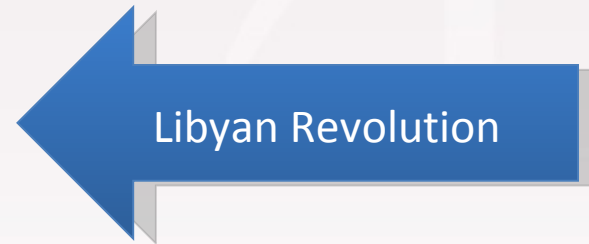
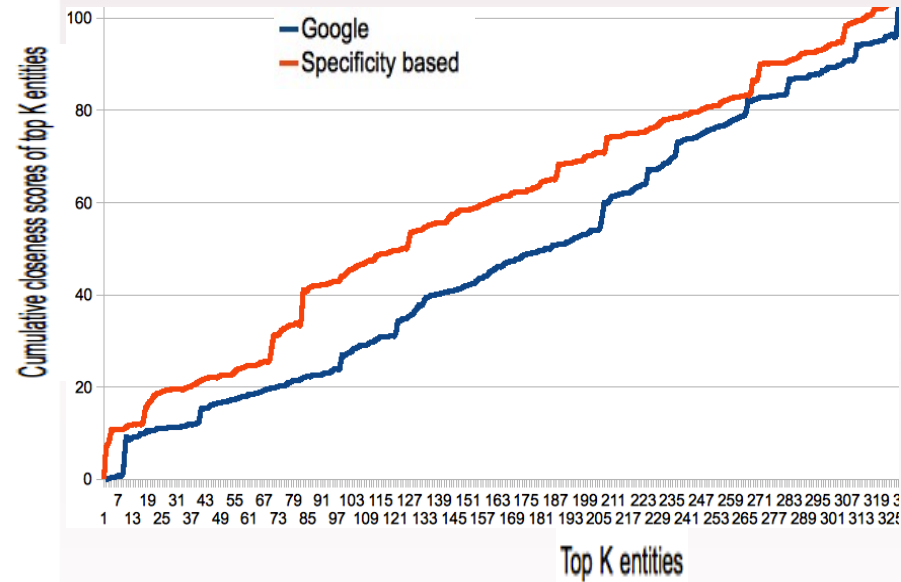


# Validation - Egyptian revolution





# Validation

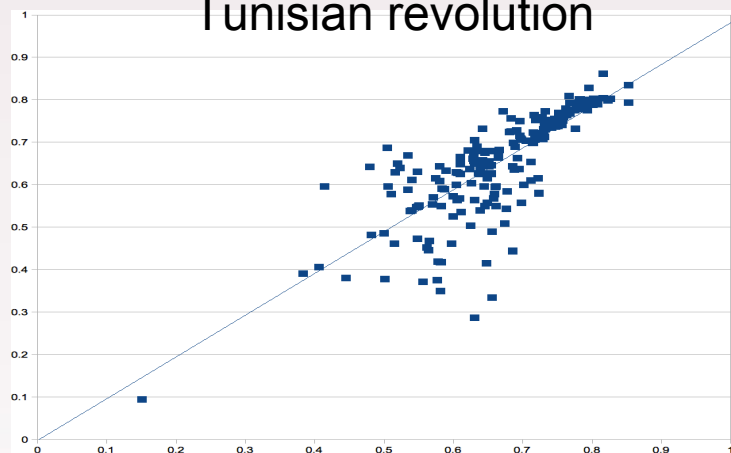


# Rank Comparison

Blog Post URL	Specificity based Ranking	Google Search Engine Ranking
<a href="http://chinamatters.blogspot.com/2011/03/counterpunch-on-egyptian-revolution.html">http://chinamatters.blogspot.com/2011/03/counterpunch-on-egyptian-revolution.html</a>	1	59
<a href="http://happyarabnewsservice.blogspot.com/2011/02/orange-county-womans-role-in-egyptian.html">http://happyarabnewsservice.blogspot.com/2011/02/orange-county-womans-role-in-egyptian.html</a>	2	286
<a href="http://travel-and-immigration101.blogspot.com/2011/03/travel-news-egypt-tourism-revival.html">http://travel-and-immigration101.blogspot.com/2011/03/travel-news-egypt-tourism-revival.html</a>	3	400
<a href="http://travel-and-immigration101.blogspot.com/2011/03/travel-news-egypt-tourism-revival.html">http://travel-and-immigration101.blogspot.com/2011/03/travel-news-egypt-tourism-revival.html</a>	4	277
<a href="http://geniusofinsanityworld.blogspot.com/2011/02/egyptian-revolution-vs-iraqi-regime.html">http://geniusofinsanityworld.blogspot.com/2011/02/egyptian-revolution-vs-iraqi-regime.html</a>	5	55
<a href="http://jewssansfrontieres.blogspot.com/2011/03/egyptian-revolution-and-palestine.html">http://jewssansfrontieres.blogspot.com/2011/03/egyptian-revolution-and-palestine.html</a>	6	202
<a href="http://uprootedpalestinians.blogspot.com/2011/01/live-from-egyptian-revolution.html">http://uprootedpalestinians.blogspot.com/2011/01/live-from-egyptian-revolution.html</a>	7	6
<a href="http://mespectator.blogspot.com/2011/10/egyptian-revolution-between-citizens.html">http://mespectator.blogspot.com/2011/10/egyptian-revolution-between-citizens.html</a>	8	9
<a href="http://yourheartsontheleft.blogspot.com/2011/06/egyptian-revolution-phase-one.html">http://yourheartsontheleft.blogspot.com/2011/06/egyptian-revolution-phase-one.html</a>	9	313
<a href="http://sohabayoumi.blogspot.com/2011/02/egyptian-revolution-tuesday-february-1.html">http://sohabayoumi.blogspot.com/2011/02/egyptian-revolution-tuesday-february-1.html</a>	10	374

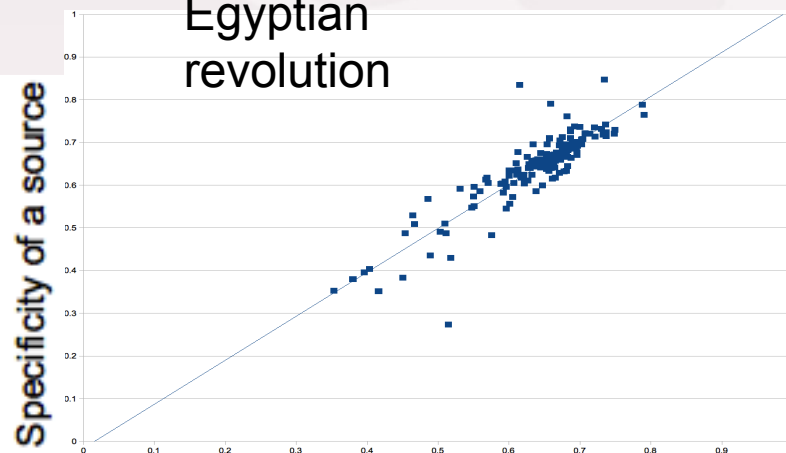
# Scatter plots

Tunisian revolution



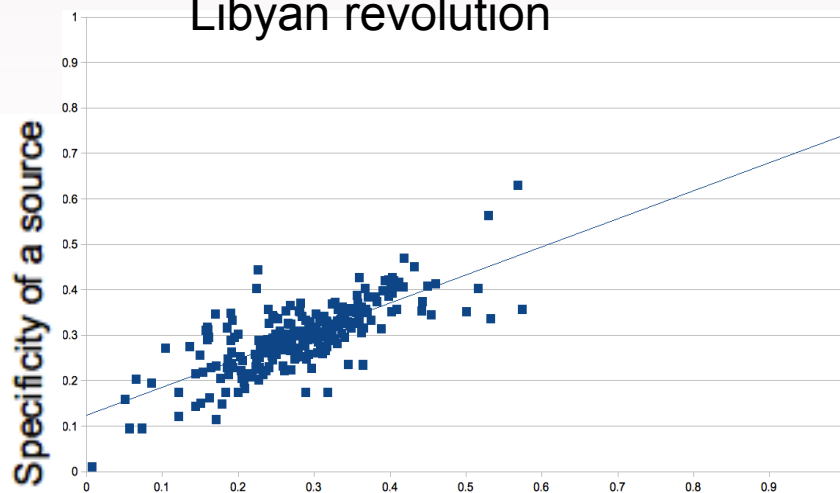
Average closeness measure of entities of a source

Egyptian revolution



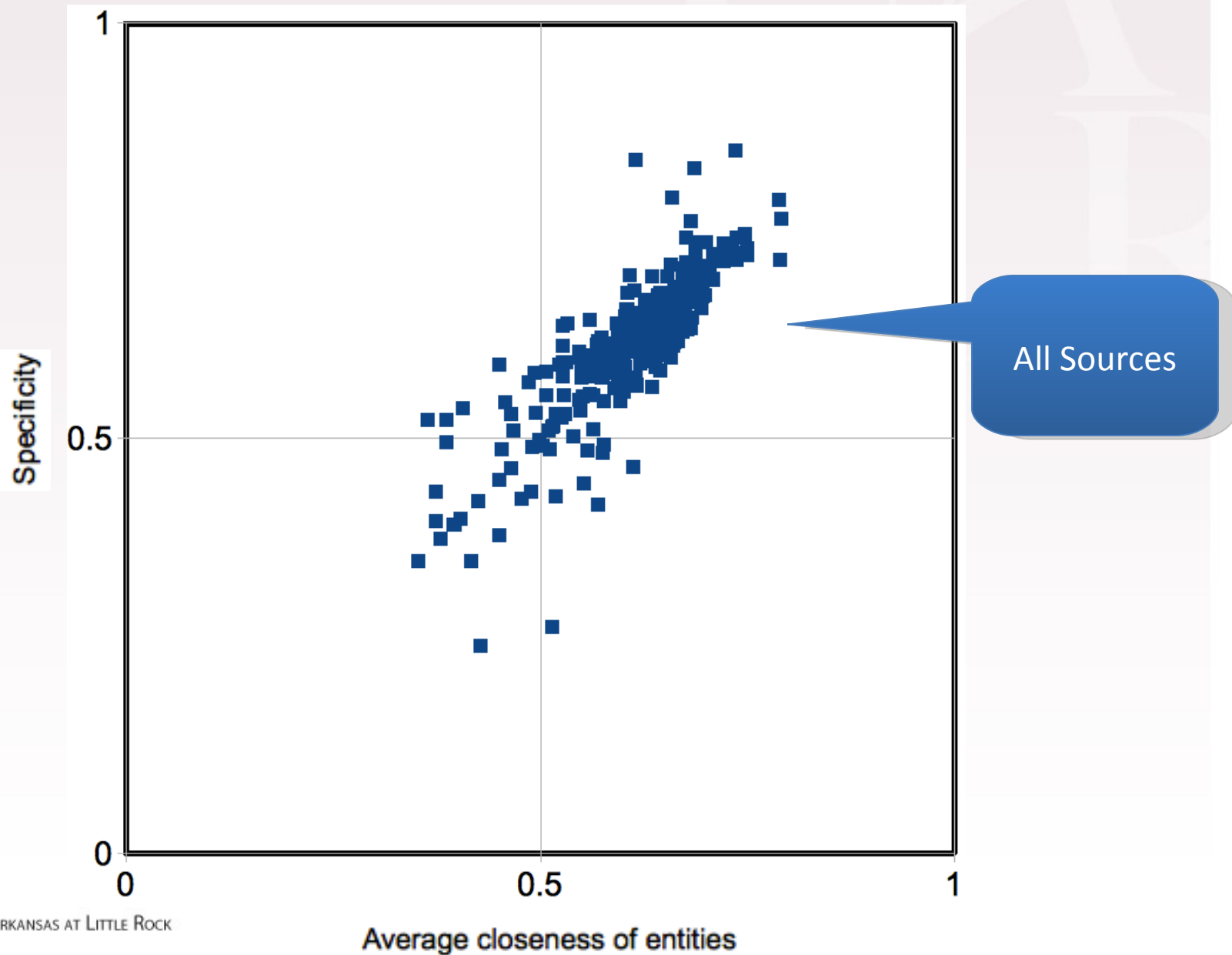
Average closeness measure of entities of a source

Libyan revolution

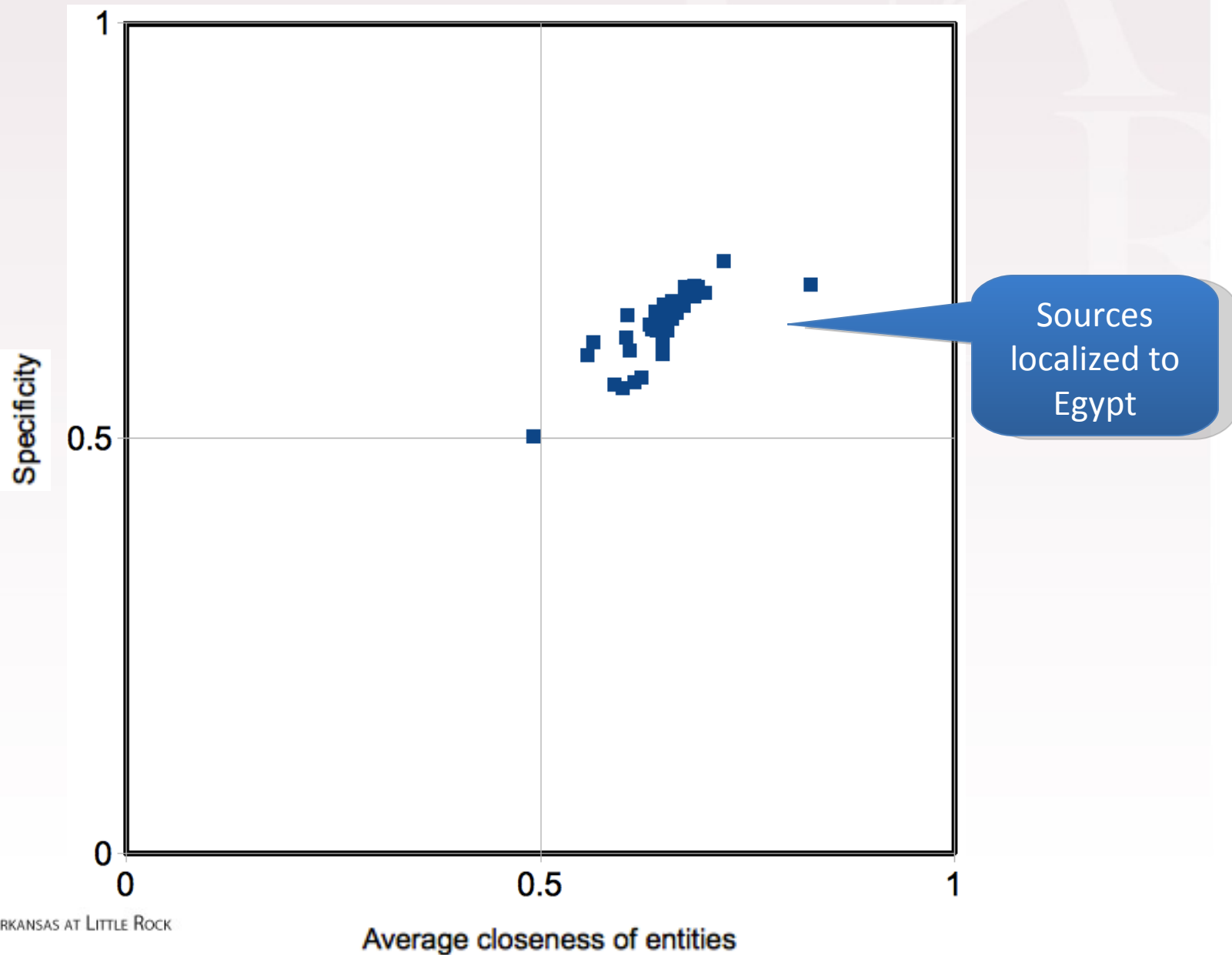


Average closeness measure of entities of a source

# Further Analysis: Source Specificity vs. Location



# Further Analysis: Source Specificity vs. Location





# Conclusions

- Relevance of social media in various events
- Methodology to analyze events via social media
- Associated challenges
- Proposed measures to identify specific sources with respect to atomic information units/entities
- Evaluation framework
- *Popular sources may not be specific*
- *Localized sources tend to be more specific*
- Expand the dataset, include more and various types of events
- Use as apparatus to analyze social movements, collective actions, marketing research, etc.

# Thank You

# Observation

- Socio-demographic
  - Location
  - Age
  - Gender
  - Profession (occupation, industry)
  - etc.
- Socio-technical
  - Links
  - Devices
  - Other social media profiles
- Network of bloggers from the extracted data

# Specificity

$$\kappa = IG(E_i, S_k) = H(E_i) - H(E_i, S_k)$$

$$\kappa = -H(E_i, S_k) = \sum_{i=1}^{i=n} f_i \tau_i / \sum_{i=1}^{i=n} f_i$$

Blog Post Url	Our Ranking	Google Search Engine Ranking
<a href="http://egyptianchronicles.blogspot.com/2011/08/libyan-revolution-mermaid-is-liberated.html">http://egyptianchronicles.blogspot.com/2011/08/libyan-revolution-mermaid-is-liberated.html</a>	1	13
<a href="http://myblog-angelin.blogspot.com/2011/02/citys-old-market-square-taken-over-by.html">http://myblog-angelin.blogspot.com/2011/02/citys-old-market-square-taken-over-by.html</a>	2	329
<a href="http://shadowlight9.blogspot.com/2011/10/revolution-and-democracy-xv-libyan 23.html">http://shadowlight9.blogspot.com/2011/10/revolution-and-democracy-xv-libyan 23.html</a>	3	9
<a href="http://libyanconflict.blogspot.com/2011/03/were-libyan-rebels-in-zawiyah-defeated.html">http://libyanconflict.blogspot.com/2011/03/were-libyan-rebels-in-zawiyah-defeated.html</a>	4	194
<a href="http://egyptianchronicles.blogspot.com/2011/08/libyan-revolution-they-are-just-like.html">http://egyptianchronicles.blogspot.com/2011/08/libyan-revolution-they-are-just-like.html</a>	5	24
<a href="http://realworldrants.blogspot.com/2011/03/middle-eastafrikan-revolutionprotest 21.html">http://realworldrants.blogspot.com/2011/03/middle-eastafrikan-revolutionprotest 21.html</a>	6	311
<a href="http://usahmadawang.blogspot.com/2011/03/libyas-first-lady-owns-20-tons-of-gold.html">http://usahmadawang.blogspot.com/2011/03/libyas-first-lady-owns-20-tons-of-gold.html</a>	7	364
<a href="http://sincerelyours1.blogspot.com/2011/03/meddling-in-libya.html">http://sincerelyours1.blogspot.com/2011/03/meddling-in-libya.html</a>	8	204
<a href="http://redrave.blogspot.com/2011/08/after-collapse-of-gaddafi-regime-where.html">http://redrave.blogspot.com/2011/08/after-collapse-of-gaddafi-regime-where.html</a>	9	374
<a href="http://simonlaub.blogspot.com/2011/02/libyan-revolution-february-2011-youtube.html">http://simonlaub.blogspot.com/2011/02/libyan-revolution-february-2011-youtube.html</a>	10	184



Blog Post Url	Our Ranking	Google Search Engine Ranking
<a href="http://mideasti.blogspot.com/2011/01/president-pm-quit-rcd-does-it-mean.html">http://mideasti.blogspot.com/2011/01/president-pm-quit-rcd-does-it-mean.html</a>	1	162
<a href="http://israelmatzav.blogspot.com/2011/01/surprise-plo-walks-back-support-of.html">http://israelmatzav.blogspot.com/2011/01/surprise-plo-walks-back-support-of.html</a>	2	40
<a href="http://boienwitkowski.blogspot.com/2011/01/part-14.html">http://boienwitkowski.blogspot.com/2011/01/part-14.html</a>	3	420
<a href="http://machonneuse.blogspot.com/">http://machonneuse.blogspot.com/</a>	4	459
<a href="http://thetunisianrevolution.blogspot.com/2011/02/situation-is-quite-fluid.html">http://thetunisianrevolution.blogspot.com/2011/02/situation-is-quite-fluid.html</a>	5	72
<a href="http://harakaproject.blogspot.com/2011/04/force-majeure-how-can-we-curate.html">http://harakaproject.blogspot.com/2011/04/force-majeure-how-can-we-curate.html</a>	6	181
<a href="http://youchefayla.blogspot.com/2011/10/1789-reloaded.html">http://youchefayla.blogspot.com/2011/10/1789-reloaded.html</a>	7	152
<a href="http://rose4hillary.blogspot.com/2011/02/hillary-clintonwheels-up-for-geneva.html">http://rose4hillary.blogspot.com/2011/02/hillary-clintonwheels-up-for-geneva.html</a>	8	440
<a href="http://ibloga.blogspot.com/2011/01/qa-radawi-hails-tunisian-revolution-says.html">http://ibloga.blogspot.com/2011/01/qa-radawi-hails-tunisian-revolution-says.html</a>	9	99
<a href="http://hassanposts.blogspot.com/2011_01_01_archive.html">http://hassanposts.blogspot.com/2011_01_01_archive.html</a>	10	174