
Evaluation of a Twitter expert search system: A case-study

Case-study

- From one of our research works, done in 2011-12
 - Evaluated a topical search system over Twitter
 - Disclaimer
 - Not claiming this is the only method of evaluation, not even claiming this is the best method of evaluation
 - Evaluation method we used was probably good
 - Paper was accepted in ACM SIGIR 2012
 - 240 citations till date
-

Utility of topical attributes of users

- Twitter increasingly being used to search for trending topics, real-time news, job search, etc
 - To implement topical search, first step is to identify topic experts
 - Problem: given a topic (query), identify users who are experts on that topic
-

Already existing systems

- There were several other topical expert search engines over Twitter
 - **Twitter's own Who-To-Follow system**
 - To infer the topics of expertise of a user, the other search systems used
 - Frequently occurring words from tweets posted by a user
 - Words from the Twitter account bio of a user
-

We proposed something different

- We utilize **social annotations** – how a user is described by other users
 - Relying on ‘wisdom of the Twitter crowd’
 - Social annotations gathered through the **Lists feature in Twitter**
-

Twitter Lists

- A feature to organize tweets received from the people whom a user is following
 - Create a List, add name & description, add Twitter users to the list
 - Tweets from all listed users will be available as a separate List stream
-



Pete Cashmore

@mashable NYC / SF

Breaking social media, tech and digital news and analysis from Mashable.com, the top resource and guide for all things web.

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<http://mashable.com>

Tweets

Favorites

Following ▾

Followers

Lists ▾

mashable's lists



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A curated list of news organization's Twitter accounts.



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Musicians on Twitter.



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nytimes The New York Times ✓

Where the Conversation Begins. Follow breaking news, NYTimes.com home page articles, special features and more.



BBCNews BBC News

The latest stories, features and updates from BBC News



WSJ Wall Street Journal

Breaking news, investigative reporting, business coverage and features from The Wall Street Journal.



cnnbrk CNN Breaking News ✓

CNN.com is among the world's leaders in online news and information delivery.



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101Cookbooks 101 Cookbooks

Heidi Swanson from 101Cookbooks.com - Healthy, vegetarian recipes made from natural foods and seasonal produce.



epicurious epicurious

Written by Tanya Steel and the Epicurious editorial staff



LATimesfood LA Times Food

News, recipes + reviews from the LA Times Food staff, test kitchen + Daily Dish blog, by @renelynych.



TylerFlorence Tyler Florence ✓

Chef, Restaurateur, Wine Maker, Cookbook Writer, Shop Keep, Product Designer, Dad.

Mining Lists to infer expertise

ashton kutcher 
@aplusk

Movies TV by Patty Holmes
59 members

Hollywood by mpc2000
1 members

Stars by Nadine Schultz
Meine Lieblingsstars
4 members

Entertainment by Al Royce
54 members

Celebrities by Ben Elcomb
142 members

Celebs by KING5 Photog Jim
126 members

Hollywood by Praesidian
17 members

- Collect **Lists containing a given user U**
- Merge List meta-data to get a 'topic document' T_U for U
- Identify U 's topics from T_U
 - Basic IR techniques: case-folding, remove domain-specific stopwords
 - Extract nouns and adjectives using part-of-speech tagger
 - Topics for U : the extracted words along with their frequencies

Mining Lists to infer expertise

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Lists work better than other features



ashton kutcher ✓

@aplusk

I make stuff, actually I make up stuff, stories mostly, collaborations of thoughts, dreams, and actions. Thats me.

Los Angeles, California · <http://www.facebook.com/Ashton>

Profile bio

love, daily, people, time, GUI, movie,
video, life, happy, game, cool

Most common
words from tweets

celeb, actor, famous, movie, stars,
comedy, music, Hollywood, pop culture

Most common
words from Lists

Search system for topic experts

- Given a query (topic)
 - Identify users related to the topic using Lists
 - Rank identified users

Ranking experts

- ❑ Used a ranking scheme solely based on Lists
- ❑ Two components of ranking user U w.r.t. query Q
 - ❑ Relevance of user to query – cover density ranking between topic document T_U of user and Q
 - ❑ Popularity of user – number of Lists including the user

$$\text{Topic relevance}(T_U, Q) \times \log(\# \text{Lists including } U)$$

Search system for topic experts

Cognos, a search system for topic experts

<http://twitter-app.mpi-sws.org/whom-to-follow/>

Location Filter :

Search results for "politics"

**BarackObama** : Barack Obama ✓

This account is run by #Obama2012 campaign staff. Tweets from the President are signed -BO.

**whitehouse** : The White House ✓

Official WH twitter account. Comments & messages received through official WH pages are subject to the PRA and may be archived. Learn more <http://wh.gov/privacy>

**algore** : Al Gore ✓**maddow** : Rachel Maddow MSNBC ✓

I see political people...

**billmaher** : Bill Maher ✓

The Official Bill Maher Twitter

**nprpolitics** : NPR Politics

Political coverage and conversation from @NPRnews

Cognos
results for
"politics"

stem cell



Search

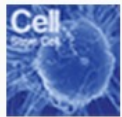
Location Filter : Worldwide

Search results for "stem cell"



StemCellTracker : Stem Cell Tracker

The #1 resource for up-to-date stem cell news.



CellStemCell : Cell Stem Cell

A monthly journal at the forefront of stem cell science and policy. Editor: Dr. Deborah Sweet



StemCellNetwork : Stem Cell Network

SCN supports cutting-edge projects that translate Canadian stem cell research discoveries into new and better treatments.



iPSCellNews : Stem Cell (iPS) News

Latest updates about reprogramming & induced pluripotent stem cell research. -Jordan Kho, PhD student at Baylor College of Medicine-



ATStemCell : All Things Stem Cell

Blog discusses stem cells in multifaceted manner: history, apps, probs, news, & more. Run by PhD stem cell grad student/science writer- Need something written?

Cognos
results for
"stem cell"

Evaluation of Cognos: Part I

Who will evaluate?

- ❑ Two standard choices
 - ❑ A small team of dedicated annotators
 - ❑ Crowd-sourcing

 - We took the second option
 - ❑ Evaluation crowd-sourced from the IITKGP community and the communities of other authors' institutes
 - ❑ Less controlled, but resembles actual deployment
 - ❑ Requirement: need to design an intuitive, easy-to-use interface for the evaluation
-

The interface, with sample queries

Location Filter :

Sample Queries

News : politics sports entertainment science technology business

Journalists : politics sports entertainment science technology business

Politics : conservative news liberal politicians USA / German / Brazilian / Indian politicians

Sports : F1 baseball soccer poker tennis NFL NBA Bundesliga LA Lakers

Entertainment : celebrities movie reviews theater music

Hobbies : hiking cooking chefs traveling photography

Lifestyle : wine dining book clubs health fashion

Science : biology astronomy computer science complex networks

Technology : iPhone mac linux cloud computing

Business : markets finance energy

User-evaluation of Cognos

Please rate the top 10 results for "science news"



bbcscitech : BBC SciTech

Set up by @mario, supported by backstage.bbc.co.uk

Relevant  



Reuters_Science : Reuters Science News



From newly charted astronomical anomalies at the far reaches of the universe to the rise of nanotechnology, nobody covers science like Reuters.com.

Relevant  



newscientist : New Scientist

New Scientist is the world's leading science and technology weekly

Relevant  



NatGeo : National Geographic

Since 1888, we've traveled the Earth, sharing its amazing stories with new generations. Official Twitter account of National Geographic.

Relevant  



science : science

Science news from ScienceNewsBlog.com.

Relevant  



NASA : NASA

Relevant  

Evaluation results

- ❑ Overall 2136 relevance judgments
 - ❑ 1680 said relevant (78.7%)
 - ❑ Large amount of **subjectivity in evaluations**
 - ❑ Same result for same query received both relevant and non-relevant judgments
 - ❑ E.g., for query “cloud computing”, Werner Vogels got 4 relevant judgments, 6 non-relevant judgments
 - Importance of using knowledgeable annotators for evaluation
-

Evaluation results

- ❑ Considered only the <query, result> tuples that were **evaluated at least twice**
 - ❑ Result said to be relevant if voted relevant in the majority of evaluations
 - ❑ Mean Average Precision considering top 10 results:
93.9 %
-

Evaluation of Cognos: Part II

A more ambitious evaluation

- Head-to-head comparison of
 - Cognos
 - Twitter Who-To-Follow (Twitter's own search system)
 - We designed an interface to show, for a given query, the top 10 results from both systems side-by-side
 - Asked which set of results is better, or if both are equally good or equally bad
-

Cognos vs. Twitter Who-To-Follow

Please compare the anonymized search results for "iphone"

☐ A is better ☐ B is better ☐ Both are equally good ☐ Both are equally bad

Search Engine A



iPhone_News : iPhone News

iPhone news and notes from around the web.



AppStore : App Store

Follow us for official App Store tweets including our featured apps, exclusive offers, and more.



iphone_dev : iphone_dev

The iPhone Dev Team. We liberate your iPhones!



freeiphoneapps : Free iPhone Apps

We're currently giving away the new iPad! We also give away lots of cool paid iPhone, iPad, and Mac applications on a daily basis. FOLLOW US.



iphonehackx : iPhone Hacks

Unlock the potential of your iPhone, iPad and iPod Touch

Search Engine B



p0sixninja : Joshua Hill

iPhone Hacker



iH8sn0w : iH8sn0w

I'm the guy that made f0recast, iREB, iFaith, and sn0wbreeze. I also make #pie and dj on the side.



chronicdevteam : Chronic Dev

Hax



MuscleNerd : MuscleNerd

iPhone hacker



iPhone_News : iPhone News

iPhone news and notes from around the web.

Caution


- ❑ Evaluation II much more subjective than Evaluation I
 - ❑ Direct comparison between 10 results from two systems
 - ❑ ... compared to judging relevance of a single result w.r.t. a query (Evaluation I)
 - ❑ Need to guard against **bias of annotators**, yet keep the task interesting
 - ❑ Annotators knew that one of the systems were designed by people from their institute
-

Cognos vs. Twitter Who-To-Follow


Please compare the anonymized search results for "iphone"

☐ A is better ☐ B is better ☐ Both are equally good ☐ Both are equally bad


Search Engine A


**iPhone_News** : iPhone News
iPhone news and notes from around the web.


Search Engine B


**p0sixninja** : Joshua Hill
iPhone Hacker


What steps did we take to guard against evaluator bias, yet keep the task interesting?


**iphone_dev** : iphone_dev
The iPhone Dev Team. We liberate your iPhones!

**freeiphoneapps** : Free iPhone Apps
We're currently giving away the new iPad! We also give away lots of cool paid iPhone, iPad, and Mac applications on a daily basis. FOLLOW US.

**iphonehackx** : iPhone Hacks
Unlock the potential of your iPhone, iPad and iPod Touch

**chronicdevteam** : Chronic Dev
Hax

**MuscleNerd** : MuscleNerd
iPhone hacker

**iPhone_News** : iPhone News
iPhone news and notes from around the web.

Results for query music

De-anonymized search results for "music"

Search Engine A : Our results



katyperry : Katy Perry

i kissed a girl AND diddled her skittle.

Search Engine B : Twitter results



iTunesMusic : iTunes Music

Official music updates for the U.S. iTunes Store including new releases, pre-orders, iTunes LP, exclusive offers and more.

Once the annotators completed the evaluation, they were shown non-anonymized results



jtimmerlake : Justin Timberlake

Official Justin Timberlake Twitter.



music news, concerts, performances, videos, and all the things that make us yodel!



Pink : P!nk

it`s all happening



SonyMusicGlobal : Sony Music Global

The home of Sony Music on Twitter!



CountryMusic : Country Music Associ

Official Tweet of the Country Music Association (CMA) managed by @bennett49r & @chappedman.

Cognos vs. Twitter Who-To-Follow

- ❑ Considering 27 distinct queries asked at least twice
 - ❑ Judgment by majority voting
 - ❑ Cognos judged better on 12 queries
 - ❑ Computer science, Linux, Mac, Apple, Ipad, Internet, Windows phone, photography, political journalist, ...
 - ❑ Twitter Who-To-Follow judged better on 11 queries
 - ❑ Music, Sachin Tendulkar, Anjelina Jolie, Harry Potter, metallica, cloud computing, IIT Kharagpur, ...
-

Insights

- Crowd-sourced evaluation, compared to using a fixed set of annotators
 - More realistic evaluation, resembling actual deployment
 - Evaluation over large diversity of queries and results
 - Less control, e.g., over what queries will be issued
 - Wide variation in the quality of annotators
 - In both cases
 - Need to guard against annotator bias
 - Need to keep the task interesting (or pay annotators)
-

More details

Cognos: Crowdsourcing Search for Topic Experts in Microblogs, ACM SIGIR 2012

<https://dl.acm.org/doi/10.1145/2348283.2348361>

Try the Cognos system:

<http://twitter-app.mpi-sws.org/whom-to-follow/>
