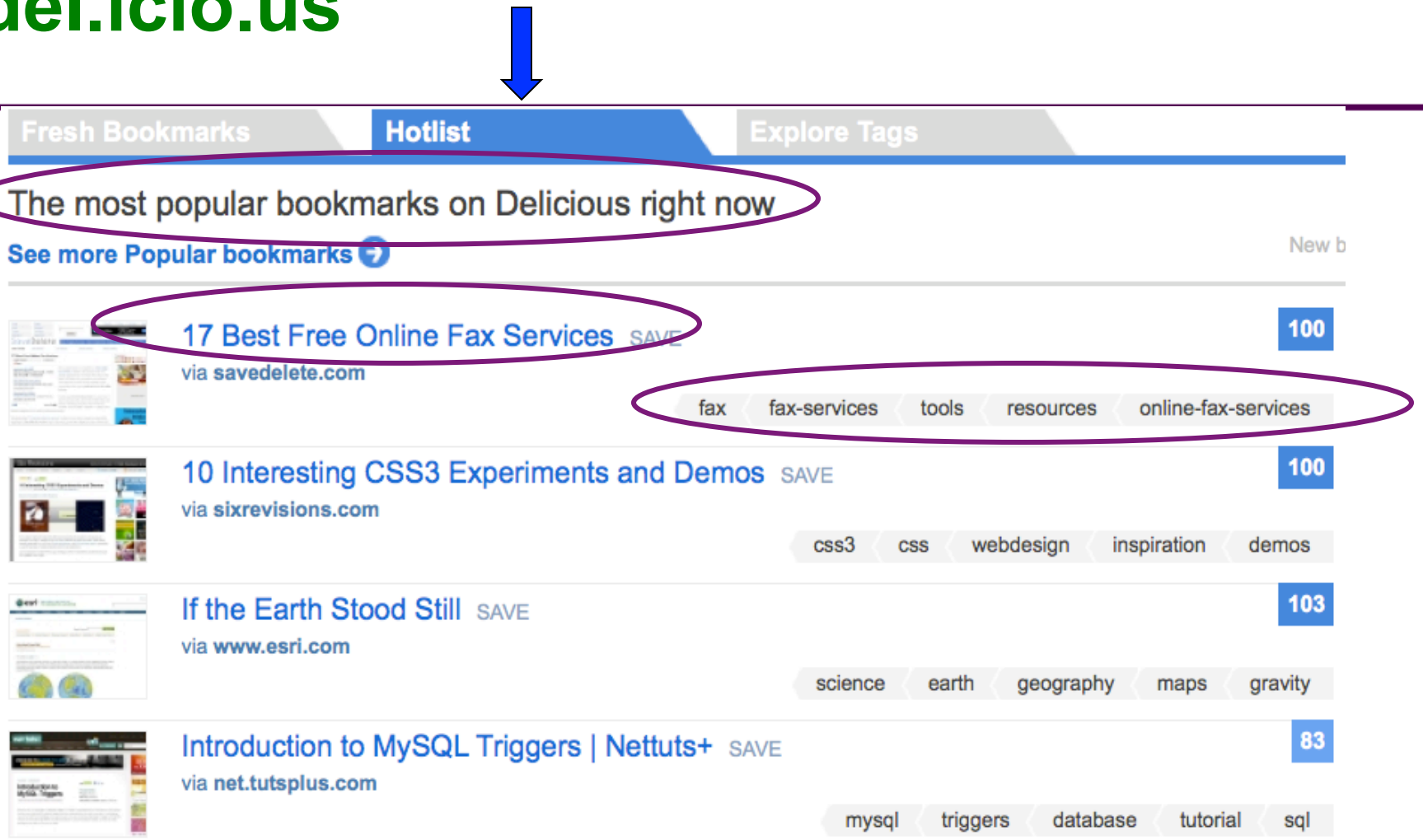
del.icio.us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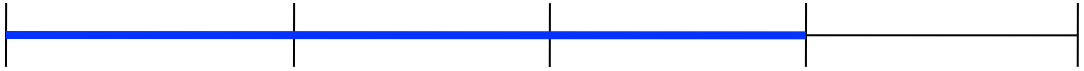
del.icio.us Hotlists Experiment

- **116,177 del.icio.us users**
  - who tagged 175,691 distinct URLs
  - using 903 tags
  - for a total of 2,322,458 tagging actions
  - for 1 month in 2006
- **Evaluate how networks predict user's interest**
  - *J. Stoyanovich, S. Amer-Yahia, C. Yu, C. Marlow: Leveraging Tagging Behavior to Model Users' Interest in del.icio.us (AAAI Workshop on Social Information Processing 2008)*



A/B testing: user behavior in first 3 weeks to predict 4th week

Data Model

- users $u \in U$, tags $t \in T$, items $i \in I$
- *friends(u)* directional

- *tags(u)*
- *items(u)* & *items(u,t)*

- *taggers(i)* & *taggers(i,t)*

Tagging data has a long tail

- we have to clean it for efficiency (relational processing)
- we removed unpopular tags (< 4 uses) & URLs (< 10 uses), reduced to 27% of original size

Global

10 URLs that are tagged most often over-all

Performance

coverage (`global`) = 3%

scope (`global`) = 100%

Global Top-10

Rank	URL	Votes
1	google.com	980
2	facebook.com	820
3	iTunes.com	729
4	twitter.com	720
5	jonasbrothers.com	680
6	cnn.com	678
7	amazon.com	620
8	yahoo.com	525
9	youtube.com	524
10	**techcrunch.com**	492

Items(Chris)

URL	Tag
jars.com	java
java.sun.com	java
techcrunch.com	news
devshed.com	tutorial

Items(Ben)

URL	Tag
bbc.co.uk	news
pbs.org	news
tomwaits.com	music
nick-cave.com	music
loureed.com	music

Tag-based

- **If a user tags with *sports*, he is interested in sports-related content**
  - interest(u,t) = |items(u,t)| / |items(u)|

Top-10 for "news"

Rank	URL	Votes
1	cnn.com	610
2	bbc.co.uk	503
3	npr.org	427
4	nytimes.com	414
5	slashdot.org	392
6	reuters.com	330
7	news.cnet.com	290
8	msnbc.msn.com	250
9	news.yahoo.com	180
10	digg.com	149

Top-10 for "music"

Rank	URL	Votes
1	iTunes.com	542
2	eMusic.com	420
3	pandora.com	350
4	thebeatles.com	330
5	jonasbrothers.com	215
6	madonna.com	175
7	rhapsody.com	148
8	rollingstones.com	133
9	lastfm.com	120
10	beyonce.com	107

Items(Ben)

URL	Tag
bbc.co.uk	news
pbs.org	news
tomwaits.com	music
nick-cave.com	music
rollingstones.com	music

Build one global hotlist per tag, use in one of two ways

- `best_tag`
  hotlist = top-10 for tag for which user has highest interest

- `dominant_tags`
  hotlist is a combination of up to 3 top-10 lists s.t. interest(u,t) ≥ 0.3 (user has *strong interest* for these tags)

Performance of Tag-based

`best_tag`

coverage = 9%

***scope* = 100%**

`dominant_tags`

1 tag	coverage = 10%	scope = 32%
2 tags	coverage = 14%	scope = 14%
3 tags	coverage = 18%	scope = 6%

Network-based

Choose 10 most popular URLs from those tagged by a user's friends.

coverage (`friends`) = 43%

scope (`friends`) = 31%

Common Interest Networks: URL-interest

Identify the seed -- a set of users who tag many of the same URLs as the user u ("agree with u"). Hotlist = 10 most popular URLs tagged by users in seed.

agr (u,*f*) = |items(*u*) ∩ items(*f*)| / |items(*u*)|

U_{scope}= {u ∈ U | ∃ f ∈ U, agr (*u*, *f*) > threshold}

U_{seed}= {f ∈ U | agr (*u*, *f*) > threshold}

thresh = 0.3	coverage = 61%	scope = 1.2%
thresh = 0.5	coverage = 71%	scope = 0.7%

Common Interest Networks: Tag-URL-Interest

Agreement across the board is rare, let's look at agreement per-tag: may agree with adviser on research, but with mom on cooking.

agr (*u*,*f*,*t*)=|items(*u*,*t*) ∩ items(*f*,*t*)| / |items(*u*,*t*)|

U_{scope}, U_{scope}defined as for `url-interest`, combined as in `dominant-tags`.

scope (`tag-url-interest`) = 7%

Tag/Interest-based Methods: a Comparison

Users in the intersection of `dominant-tags`, `url-interest` and `tag-url-interest`, with a strong interest in 2 tags, all thresholds = 0.3

	$\|U_{scope}\|$	avg ($\|U_{seed}\|$)	coverage
`dominant-tags`	1235	26,856	17%
`tag-url-interest`	1235	227	82%
`url-interest`	205	203	85%