SearchBuddies

Bringing Search Engines into the Conversation

Brent Hecht

Northwestern University

Jaime Teevan

Microsoft Research

Meredith Ringel Morris

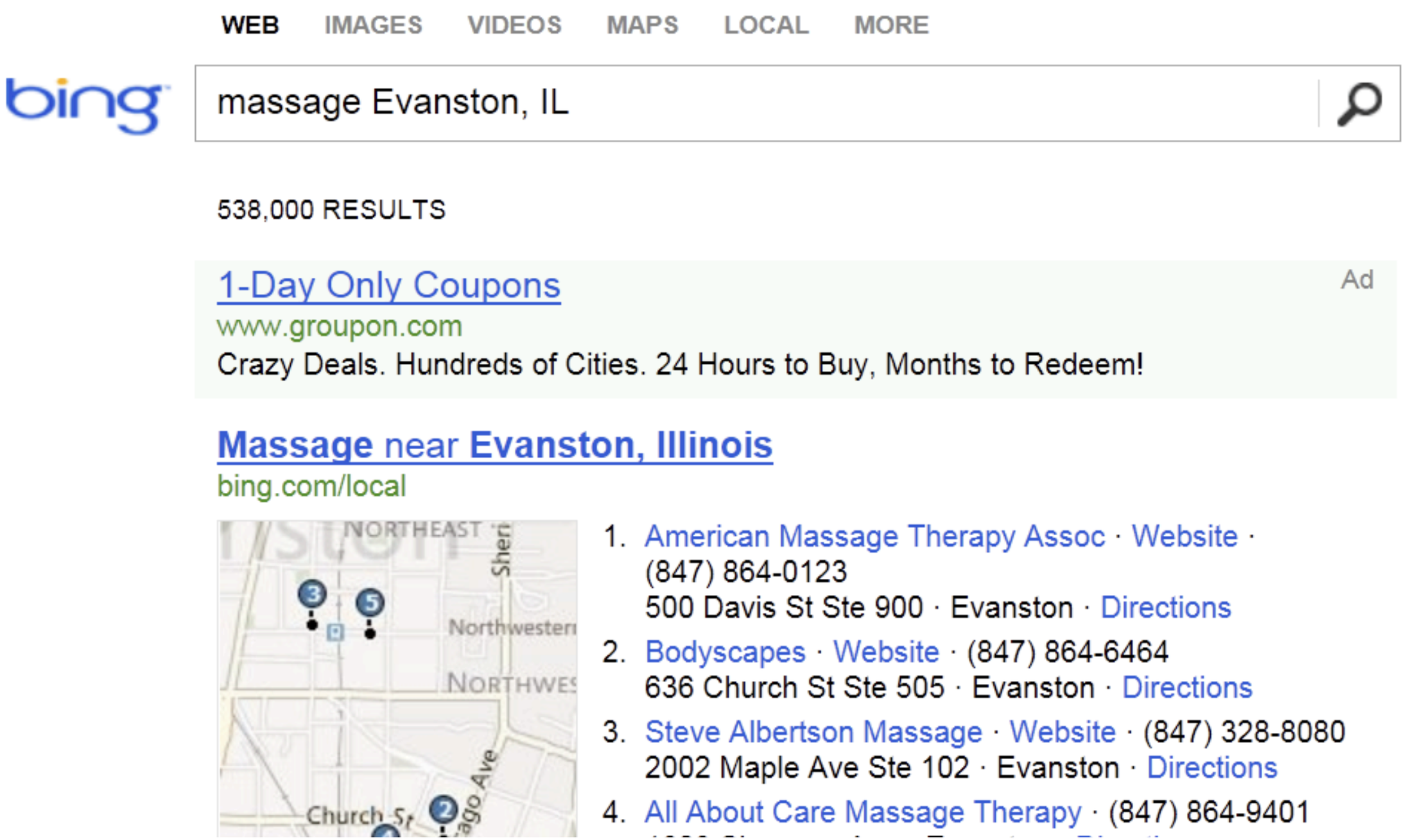
Microsoft Research

Daniel Liebling

Microsoft Research

It’s been a long conference.
I need a massage!

Use a **traditional search engine**...



Use a **traditional search engine**...

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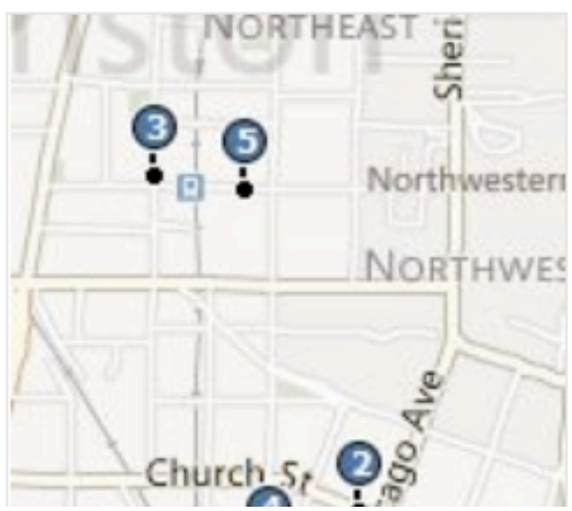

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   500 Davis St Ste 900 · Evanston · Directions
2. Bodyscapes · Website · (847) 864-6464
   636 Church St Ste 505 · Evanston · Directions
3. Steve Albertson Massage · Website · (847) 328-8080
   2002 Maple Ave Ste 102 · Evanston · Directions
4. All About Care Massage Therapy · (847) 864-9401

...ask a **status message question**.

Melia Tichenor
May 17 near Portland, OR

needs a massage like whoa. Any one have an affordable recommendation in town? I've been to a couple folks, but curious to hear of other good options.

Like · Comment

Tia Shows likes this.

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Status message questions are a **growing phenomenon**:

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(Morris et al. 2010)

of surveyed Microsoft employees had asked a status message question.

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of surveyed Microsoft employees had asked a status message question.

11%
(Thom et al. 2011)

of posts on an IBM SNS were status message questions.

Status Message Questions

Traditional Search

(Morris et al. 2010, 2011)

Status Message Questions

- Trusted answers

Traditional Search

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- Personalized answers

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- Build and maintain ties with friends

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Traditional Search

- Very fast

(Morris et al. 2010, 2011)

Status Message Questions

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Traditional Search

- Very fast
- Access billions of web pages

(Morris et al. 2010, 2011)

Status Message Questions

- Trusted answers
- Personalized answers
- Build and maintain ties with friends
- Natural language
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Traditional Search

- Very fast
- Access billions of web pages
- Privacy

(Morris et al. 2010, 2011)

Status Message Questions

- Trusted answers
- Personalized answers
- Build and maintain ties with friends
- Natural language
- No need to triage search results

Traditional Search

- Very fast
- Access billions of web pages
- Privacy
- Nearly always returns results

(Morris et al. 2010, 2011)

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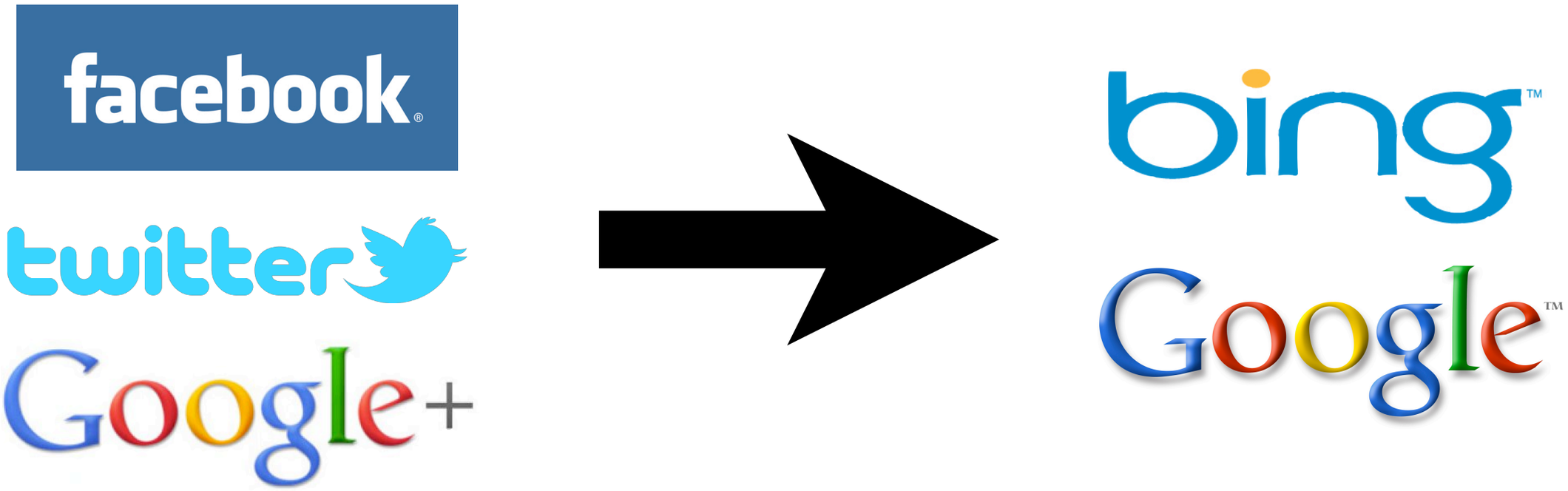
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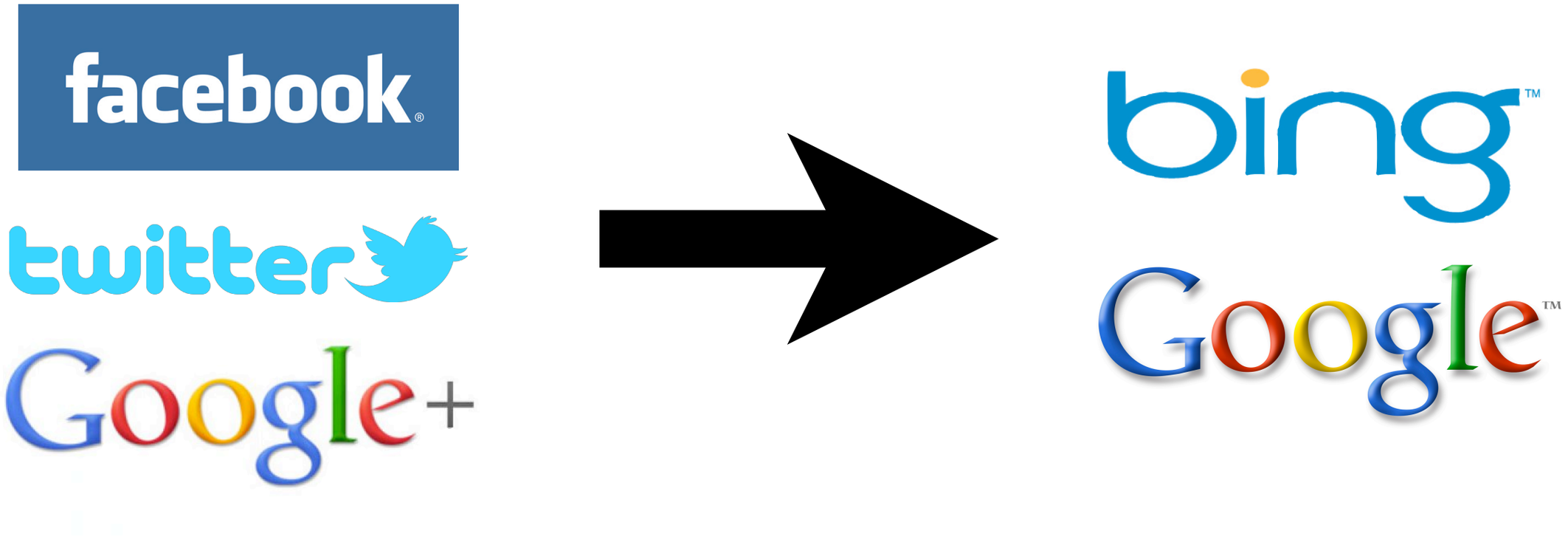
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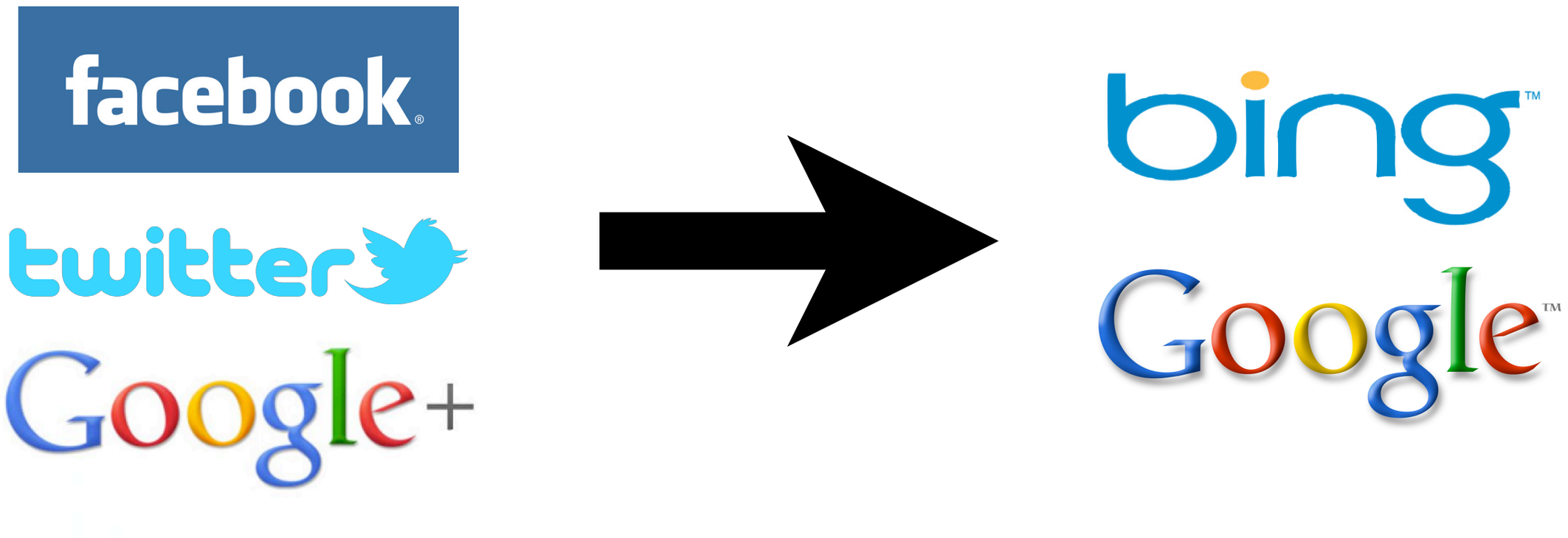
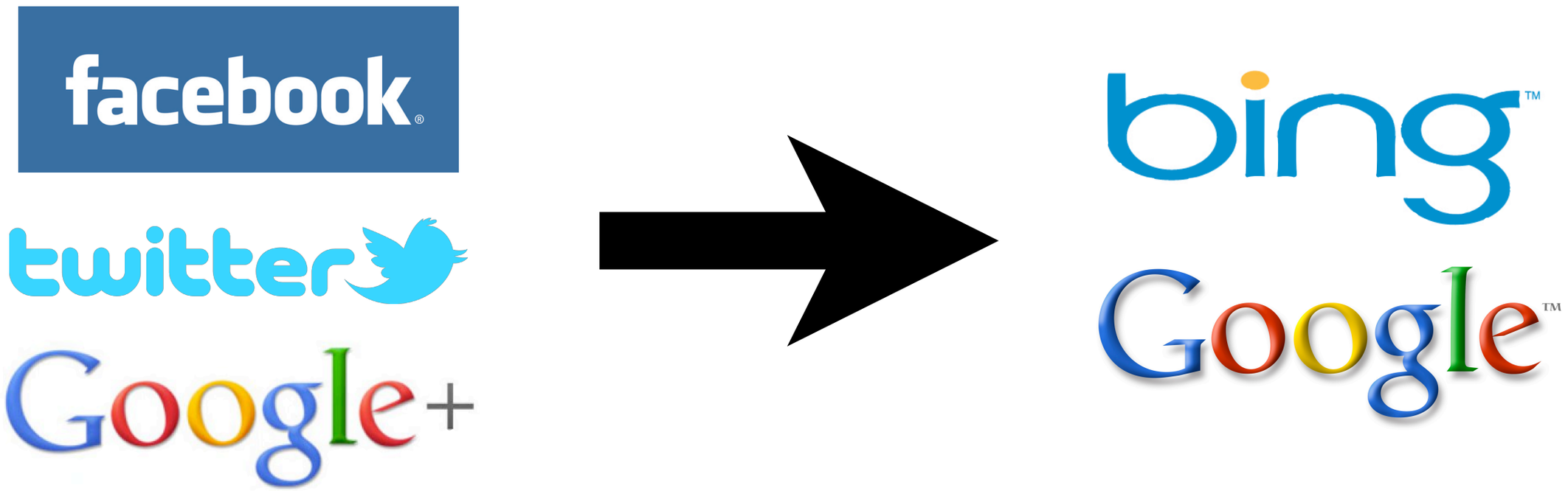
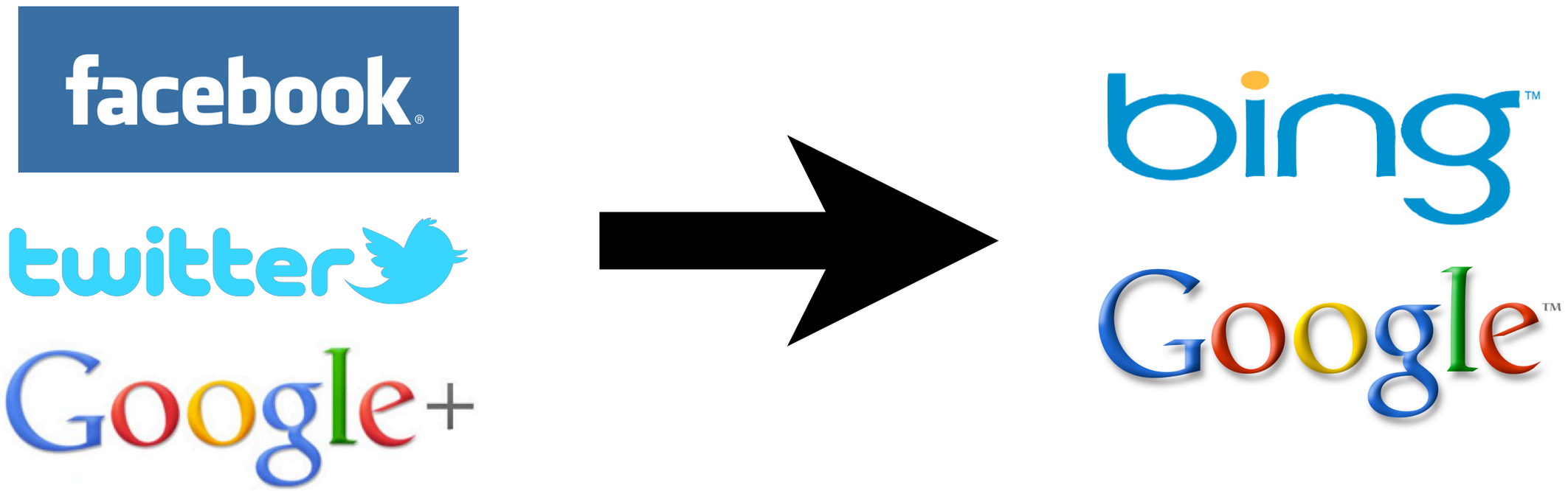


Does not support people's **natural behavior** with regard to status message questions.



Does not support people's **natural behavior** with regard to status message questions.

Does not preserve many of the benefits of status message question asking.



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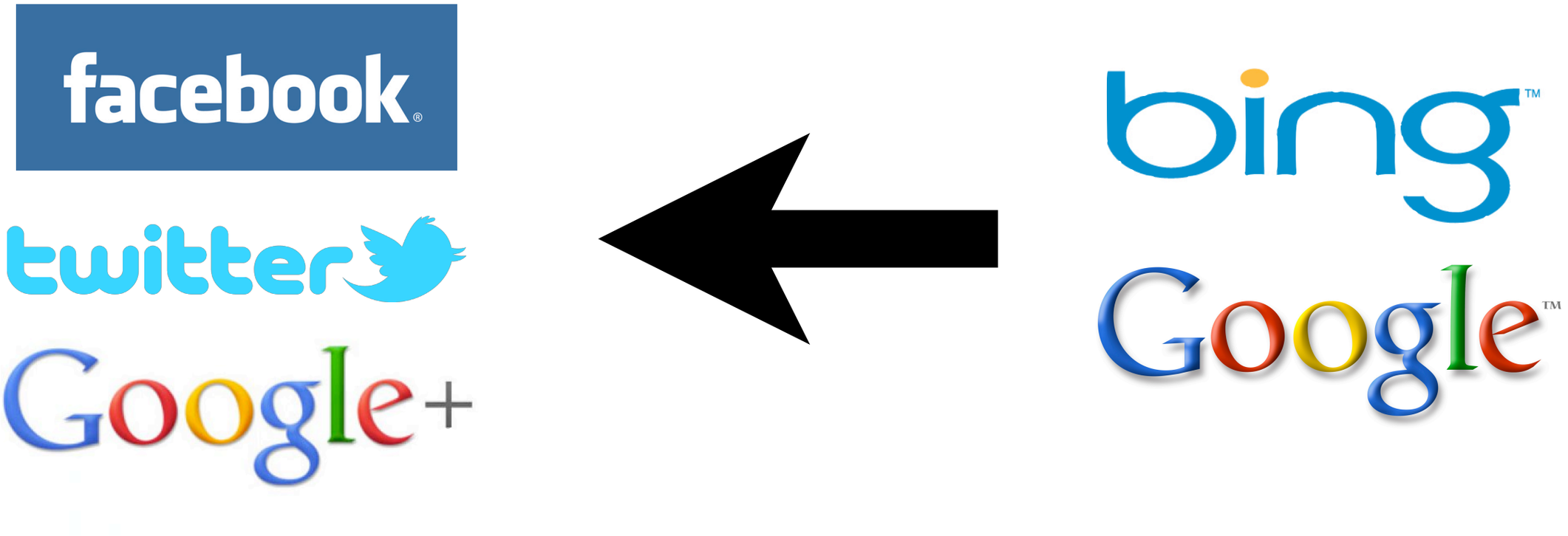
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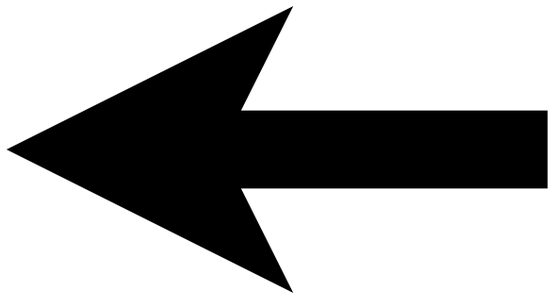

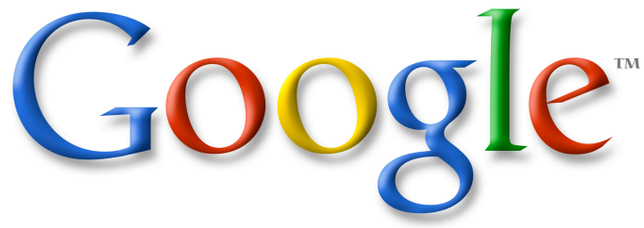

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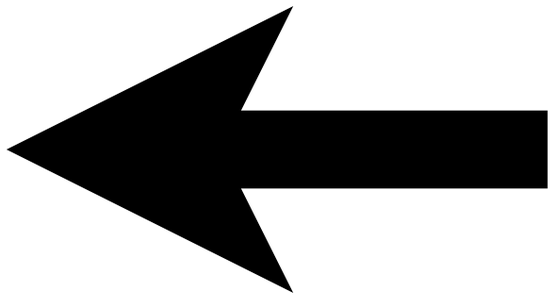

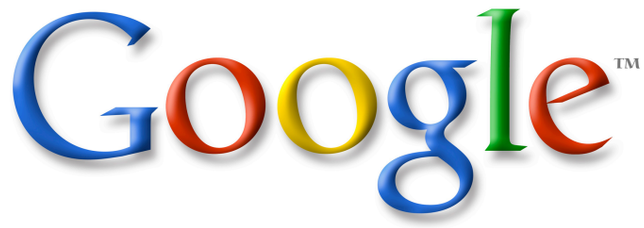

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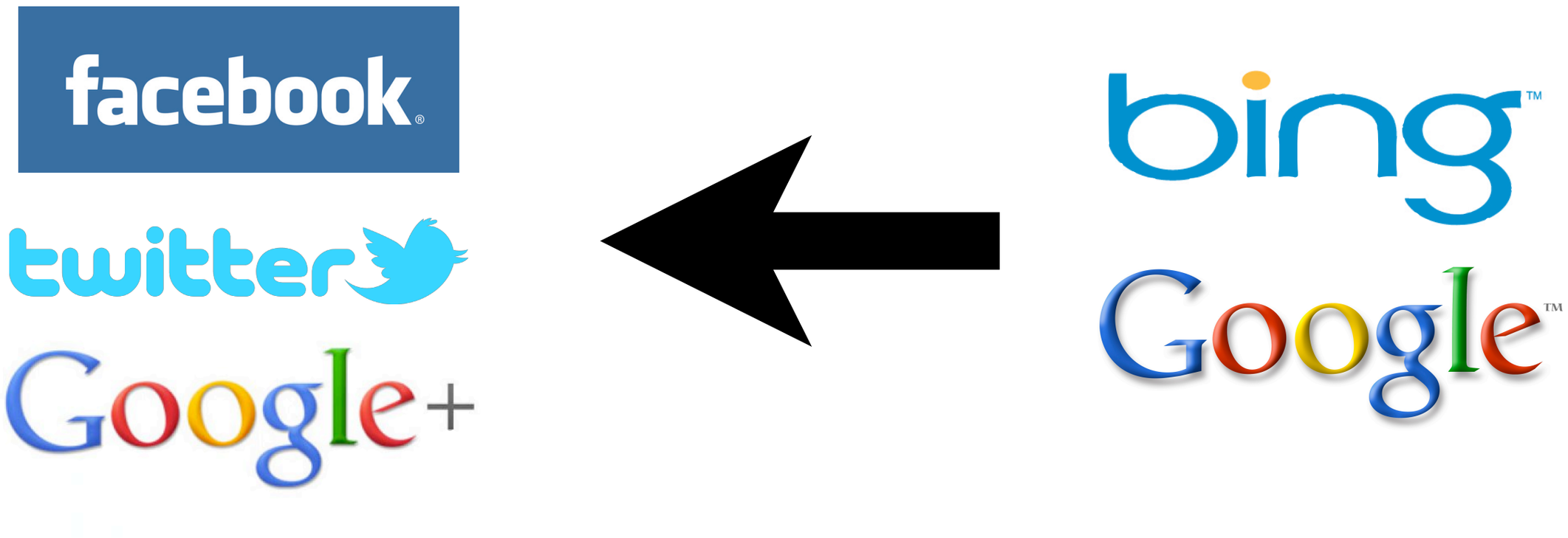
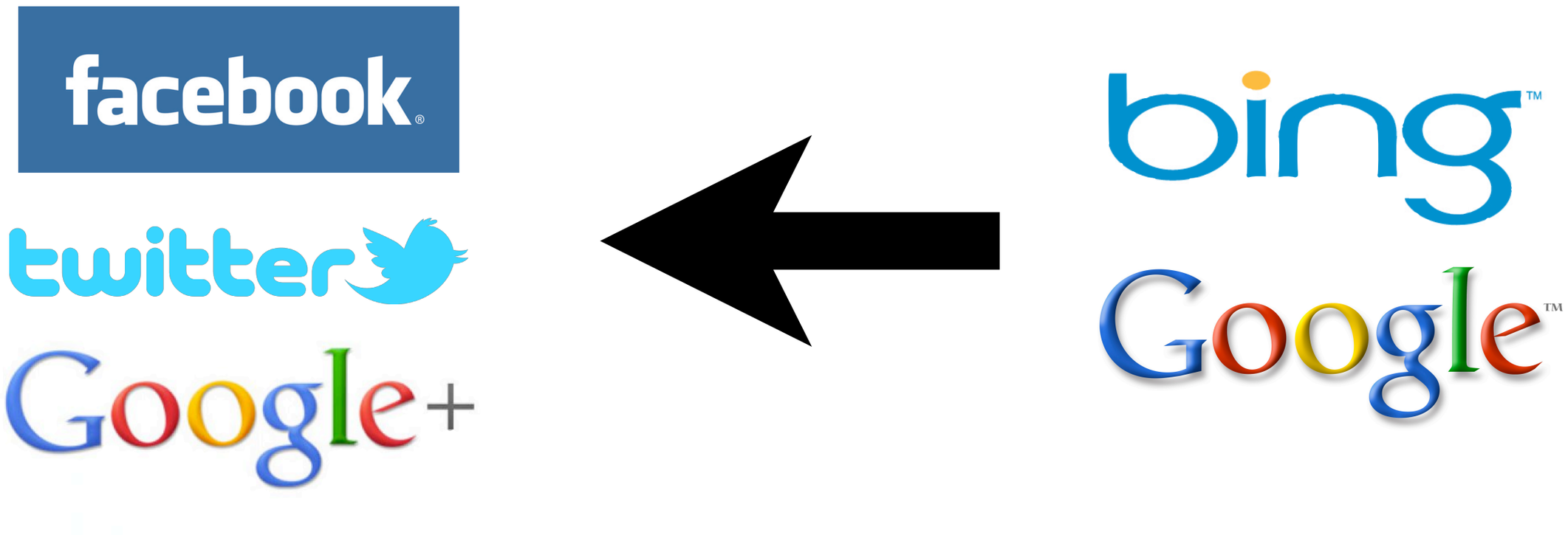


Support people's **natural status message question asking behavior.**

Socially-Embedded Search Engines



Support people's **natural status message question asking behavior.**

Preserve the benefits of status message question asking.

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a prototype socially-embedded search engine

Elise Clayton
On Verizon, will I have to pay roaming charges if I use my cell phone in Hawaii?

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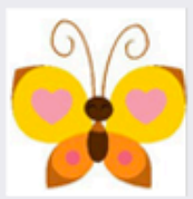

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Socially-Embedded Search Engines

Key exploratory research questions

Socially-Embedded Search Engines

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Interaction with algorithmic content in conversations?

Socially-Embedded Search Engines

Key exploratory research questions

Interaction with algorithmic content in conversations?

Reactions when **useful info** is provided?
When system **fails**?

Socially-Embedded Search Engines

Key exploratory research questions

Interaction with algorithmic content in conversations?

Reactions when **useful info** is provided?
When system **fails**?

Challenges involved with adapting search engines to social environments?
Opportunities?

Contributions

Contributions

1. A **prototype** socially-embedded search engine.

Contributions

1 A **prototype** socially-embedded search engine.

2 **Results** from a 122-user, 3-month deployment of our prototype

Contributions

1 A **prototype** socially-embedded search engine.

2 **Results** from a 122-user, 3-month deployment of our prototype

3 **Implications** for the design of future socially-embedded search engines

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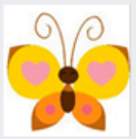

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When to respond?

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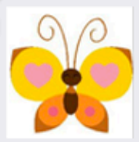

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Is married!
March 3 at 12:18pm · Like · Comment

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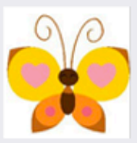

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When to respond?

What to say?

How to parti-cipate?

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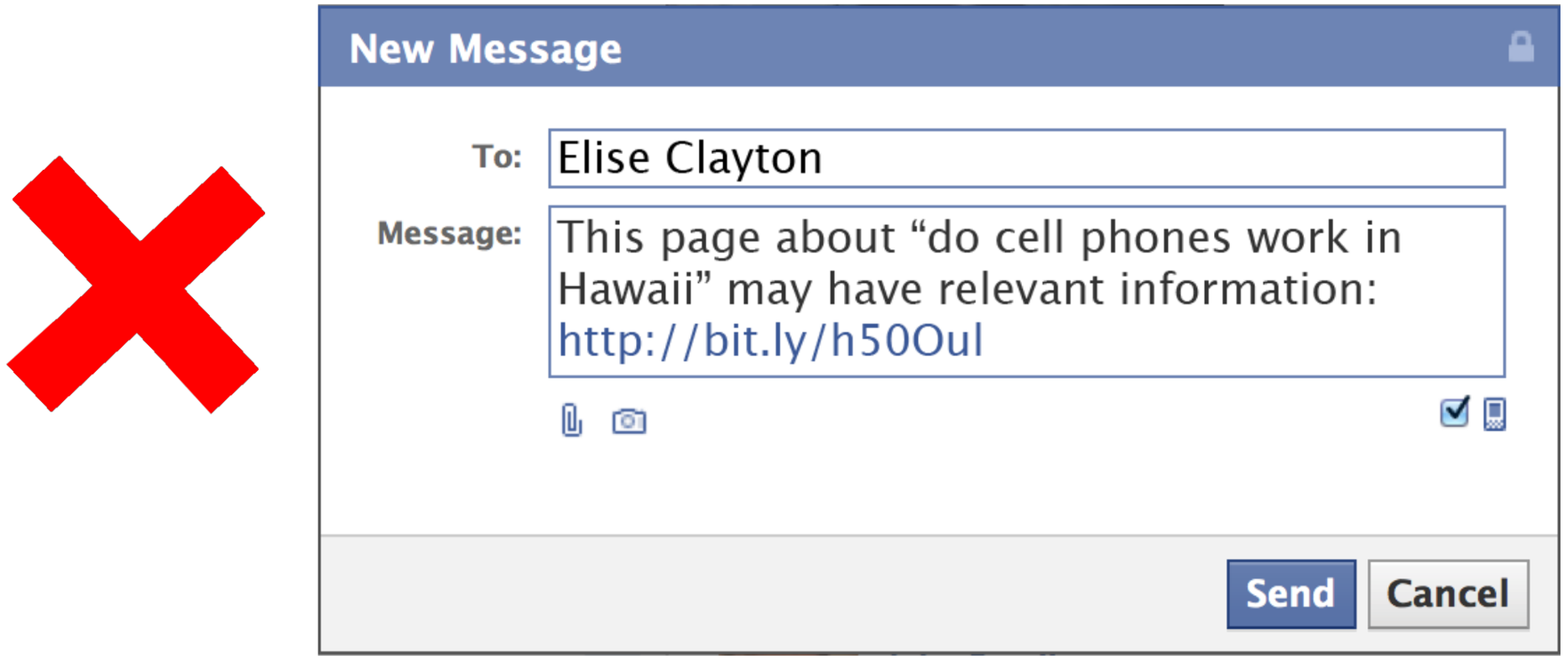
Cancel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To:
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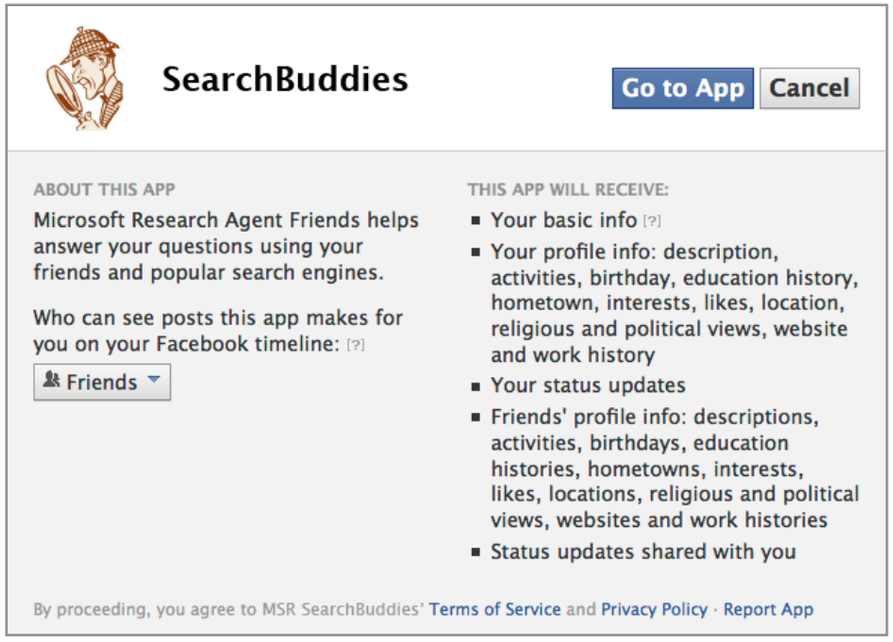

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SearchBuddies Soshul Butterflie These friends have lived in or near Hawaii: Bo Kent (http://on.fb.me/hXA) and Otis Overcash (http://on.fb.me/y77q2).
7 minutes ago · Like

What to say?

How to participate?

SearchBuddies
Investigator

Relevant Information

SearchBuddies
Social Butterfly

Relevant People

Major Open Challenges

Natural Language Question Answering

(e.g. Dumais et al. 2002; Ferrucci et al. 2010; Ramakrishnan 2004)

Expertise Finding

(e.g. Farrell 2007; Bernstein 2009)

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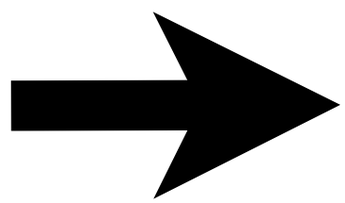

Satisficing Solutions

SearchBuddies Investigaetore

SearchBuddies Investigaetore

??? → bing™

Search API

SearchBuddies
Investigaetore

??? → bing™

Search API

- [x] cnet.com
- [x] en.wikipedia.org
- [x] yelp.com

Domain Whitelist

Ted Logan
since when did amazon VOD become free to Prime members? interesting...
14 hours ago · Like · Comment

SearchBuddies Investigaetore “Amazon to give Prime members Netflix” on news.cnet.com has some relevant info: http://cnet.co/faAet3
14 hours ago · Like · 1 person

Samantha Baker Last week
14 hours ago · Like

http://news.cnet.com/8301-17938_105-200300(Amazon to give Prime me...

CNET › News › Crave

Amazon to give Prime members Netflix-style streaming?

Engadget has posted screenshots from a tipster suggesting that Amazon is on the verge of bundling in an unlimited video-streaming option with its $79.99 Amazon Prime membership.

by David Carnoy | January 30, 2011 8:36 AM PST

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Andrew Tanner
Anyone know where to get good chinese food in charlotte?

8 minutes ago · Like · Comment

SearchBuddies Investigaetore This page about "Good Chinese Food in Charlotte" may have relevant information: http://bit.ly/i5lJZS

7 minutes ago · Like

Andrew Tanner So cool that this works.

6 minutes ago · Like

http://www.yelp.com/topic/charlotte-good-chinese-food-in-charlotte

Good Chinese Food in Char...

arch Talk in Charlotte

Search

New Convers

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Questions & Updates

er

ent Conversations

word association time...
hour ago

Good Chinese Food in Charlotte?

Category: Food

Get email updates about this conversation

Page

Elite '12
155
249

Annie "PYT" W. says:

5/2

I know I can look at the reviews and such, but I want to know from the experts: Is there good Chinese food in Charlotte? And if so, where do I find it?!

My bro is coming to town from Fort Bragg where there is only Chinese fast food (which we know is not really Chi food) and has been craving good food. I know I shouldn't be expecting anything close to Rowland Heights/SGV/Monterey Park level authenticity, but, a girl can dream, right?

And, this is probably asking way more than Charlotte has, but are there any Taiwanese food places, at all?? (Ta Express is not Taiwanese D:)

Thank you Yelp-tastic people.

130
281

Julia "A Jaundiced but Smiling Eye" S. says:

5/2

Fu Lin http://www.yelp.com/bi... ain't foolin' around. Dragon Court, in the Asian Corners Mall, is good, but th three veg friendly dishes to choose from. Supposedly they do dim dum on the weekends, also not veg frien Dim Sum, on central, is good, if you know what to ask for.

NO idea on Taiwanese - we haven't even graduated to using Szechuan pepper in good ol' Charlotte, which lame, lame lame.

Elite '12
110
711

Faith "Does what feels right" D. says:

5/2

I'm not sure about authentic, but here goes...The most recent one that was fast and good was Bei Jing in S End (brand new).

DragonFly on Park is pretty good, but last time I was there they turned me away. I'm boycotting until I get c it. :)

I also got a menu in my door from Lotus II (they deliver within 5 miles). I haven't tried it, but I may order out

Soshul Butterflie

Soshul Butterflie

Elise Clayton
On Verizon will I have to pay roaming charges if I use my cell phone in Hawaii?
8 minutes ago · Like · Comment

Ensemble Entity Extractor

Soshul Butterflie

Elise Clayton
On Verizon will I have to pay roaming charges if I use my cell phone in Hawaii?
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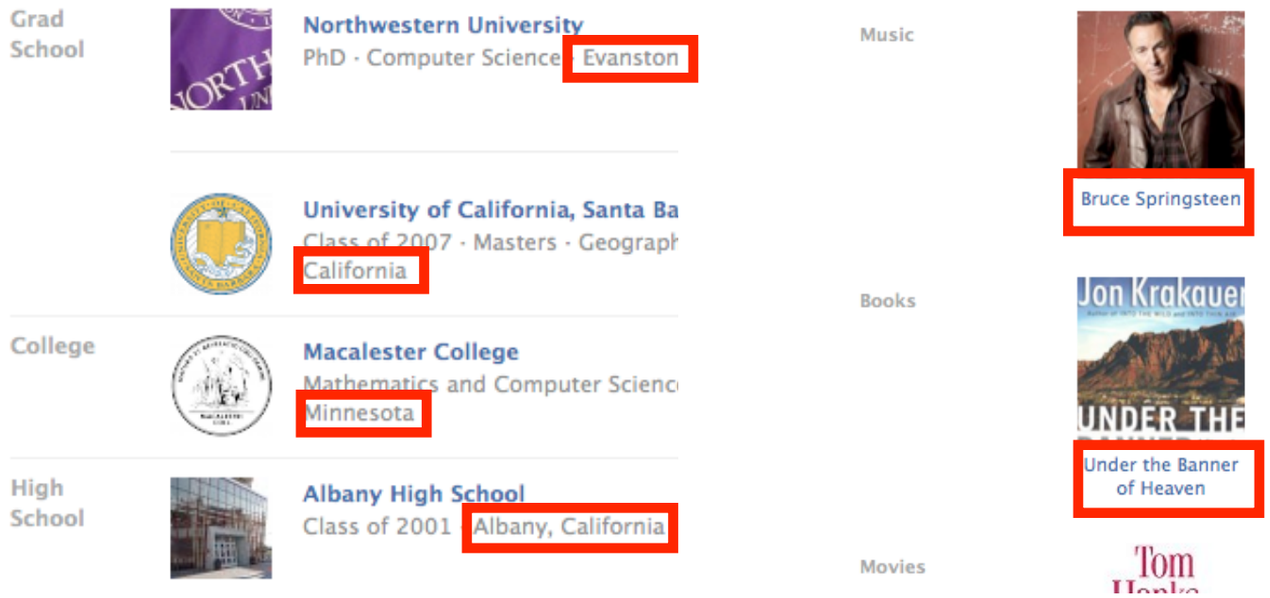
Ensemble Entity Extractor



Friends' Interests and Places

Samantha Baker

Any recommendation for a fun place to go dancing in Seattle on Saturday night?

11 hours ago · Like · Comment

Samantha Baker
Any recommendation for a fun place to go dancing in Seattle on Saturday night?

11 hours ago · Like · Comment

SearchBuddies Soshul Butterflie Robbie Gould (http://on.fb.me/AeR472Q) and Elise Clayton (http://on.fb.me/Tr42z) are fans of dancing.

11 hours ago · Like

Robbie Gould :)

11 hours ago · Like

Robbie Gould Depends on the type of dance. So what kind of dancing were you thinking about? Also, Happy Birthday!

about an hour ago · Like

Elise Clayton
Suggestions for a restaurant in San Francisco?
17 minutes ago · Like · Comment

SearchBuddies Investigaetore This page about "Restaurant Suggestions" may have relevant information: http://bit.ly/gyJBxn
16 minutes ago · Like

SearchBuddies Soshul Butterflie These friends have lived in or near San Francisco: Bobby Finstock (http://on.fb.me/6qZp92), Lisa Marconi (http://on.fb.me/y887pQ), Mick Macalester (http://on.fb.me/fmXsoQ), and Kirk Lolley (http://on.fb.me/Z7qqW2)
14 minutes ago · Like

Contributions

1 A **prototype** socially-embedded search engine.

2 **Results** from a 122-user, 3-month deployment of our prototype

3 **Implications** for the design of future socially-embedded search engines

122 **participants** signed up

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3 month-long **deployment**

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82% of participants were recruited via **snowball sampling**

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18% were recruited via a **Facebook advertisement**

122 **participants** signed up

3 month-long **deployment**

82% of participants were recruited via **snowball sampling**

18% were recruited via a **Facebook advertisement**

278 was the **median number of friends** for our participants

262 questions

(15.4% of status messages)

262 questions

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Answered 58 (22%)

262 questions

(15.4% of status messages)

Answered 58 (22%)

Answered 70 (27%)

Results from deployment:

> SearchBuddies provided useful, complimentary info

> Distinct patterns for handling bad responses

> Social context and norms vital in success or failure

Results from deployment:

SearchBuddies provided useful, complimentary info

Distinct patterns for handling bad responses

Social context and norms vital in success or failure

Otto Jedermann Yes, that's what I was looking for!

7 minutes ago · Like

Otto Jedermann Yes, that's what I was looking for!

7 minutes ago · Like

Bobby Finstock Thanks, Butterflie. [Friend] might be be interested.

3 minutes ago · Like

Katherine Kleinfelder

Can "poop" qualify as a character in a book?

about 9 hours ago · Like · Comment

Katherine Kleinfelder
Can "poop" qualify as a character in a book?
about 9 hours ago · Like · Comment

SearchBuddies Investigaetore “Amazon” on www.amazon.com has some relevant information: http://amzn.to/eCrBJP
about 9 hours ago · Like

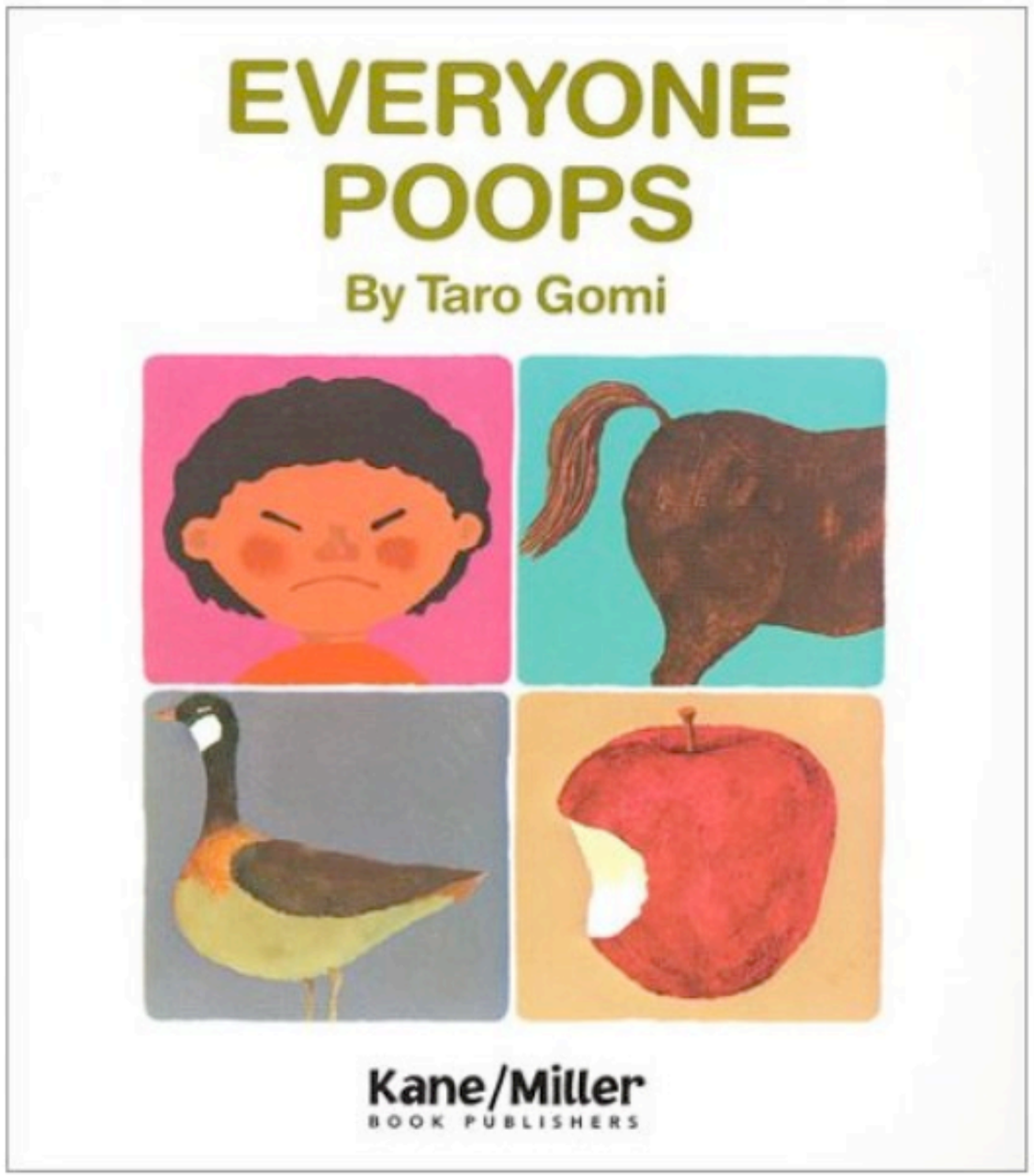
Amazon.com: Everyone Poops (My Body Science Series) (9781929132140): Taro Gomi, Amanda Mayer St - Windows Internet Explorer

http://www.amazon.com/gp/product/images/192913214X/ref=dp_image_0?ie=UTF8&n=283155&s=books

amazon.com

Close window

Everyone Poops (My Body Science Series)



125%

Katherine Kleinfelder
Can "poop" qualify as a character in a book?
about 9 hours ago · Like · Comment

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about 9 hours ago · Like

Katherine Kleinfelder Well, hello, Emmessaarr! What a surprise to hear from you on this topic!
about 9 hours ago · Like

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Dalia Deerfield I have the Everybody Poops book in my collection. It’s a delight...
about 1 hour ago · Like

4

4

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Distinct patterns for handling bad responses

Social context and norms vital in success or failure

bad responses: **deleting**

11 (19%) of posts deleted

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↑

low relevance

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more social context needed

bad responses: **(harsh) commenting**

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Robert Jones Smith No! Investigator! Unrelated!

9 minutes ago · Like

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9 minutes ago · Like

Robin Lefler "...I might need to do something about [Social Butterfly], it's acting like the annoying friend you silently delete."

5 minutes ago · Like

bad responses: **(harsh) commenting**

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9 minutes ago · Like

Robin Lefler "...I might need to do something about [Social Butterfly], it's acting like the annoying friend you silently delete."

5 minutes ago · Like

Alyssa Ogawa Oh, hell. Die bot.

3 minutes ago · Like

bad responses: **joking :-)**

4

Susan Nicoletti
Oh agent and non-agent friends: What's a good bike repair shop near Queen Anne in Seattle?
about 7 hours ago · Like · Comment

SearchBuddies Soshul Butterflie
Some of your friends like “queen”: Katherine Kleinfelder (http://on.fb.me/7qRST1) and Elise Clayton (http://on.fb.me/44qT55y).
about 7 hours ago 1 person

bad responses: **ignoring**

SearchBuddies Investigaetore 'IPHONE' on pogue.blogs.nytimes.com has some relevant info: http://pogue.blogs.nytimes.com/tag/iphone/.

3 minutes ago · Like

Results from deployment:

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↑

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more social context needed

“I don't like that [Social Butterfly] posts names of some of my Facebook friends on my wall as an answer to my restaurant query. ***I don't know them that well*** *and feel they* ***may not appreciate their names up there.*** *I will probably take that comment down to get their names off my wall.”*

- SearchBuddies user

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- SearchBuddies user

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Design Implications:

Challenges **Opportunities**

Design Implications: **Challenges**

Design Implications: **Challenges**

CHALLENGE #1 New metrics for search result quality are needed

$$\boldsymbol{MAP(Q)} = \frac{1}{|Q|}\sum_{j=1}^{|Q|}\frac{1}{m_j}\sum_{k=1}^{m_j} Precision(R_{jk})$$

$$\boldsymbol{NDCG} = \frac{DCG}{iDCG}$$

Relevance quality metrics

bing™ Google™

“I don't know them that well…”

“…may not appreciate their names up there…”

Relevance not a consideration at all!

Socially-Embedded Search Engines

$$\boldsymbol{MAP(Q)} = \frac{1}{|Q|}\sum_{j=1}^{|Q|}\frac{1}{m_j}\sum_{k=1}^{m_j} Precision(R_{jk})$$

$$\boldsymbol{NDCG} = \frac{DCG}{iDCG}$$

Relevance quality metrics

Socially-Embedded Search Engines

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$$\boldsymbol{NDCG} = \frac{DCG}{iDCG}$$

+

Relevance quality metrics

Social context and norms metrics

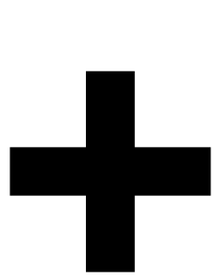
Socially-Embedded Search Engines

Conformance Metrics

Conformance Metrics

"...measure the extent to which an algorithmic response conforms to the social norms and context of the questioner, the questioner's social circle, and the social network."

$$\boldsymbol{NDCG} = \frac{DCG}{iDCG}$$

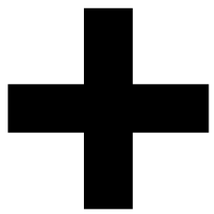


Relevance

Conformance

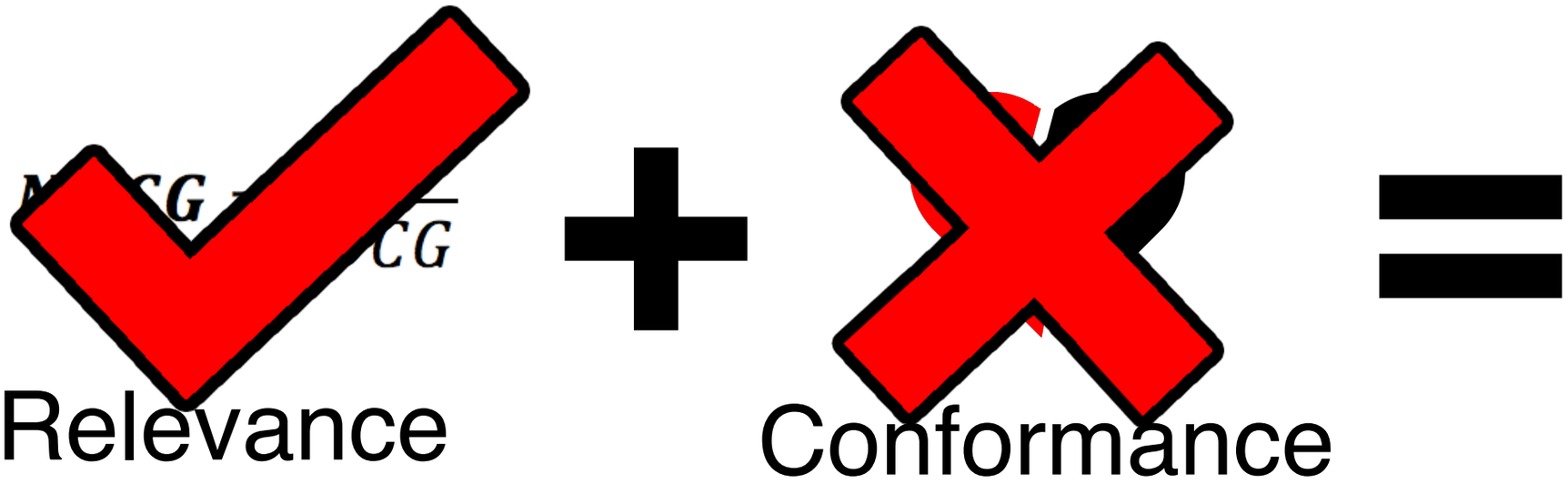
Socially-Embedded Search Engines

Relevance



Conformance

Socially-Embedded Search Engines



Socially-Embedded Search Engines

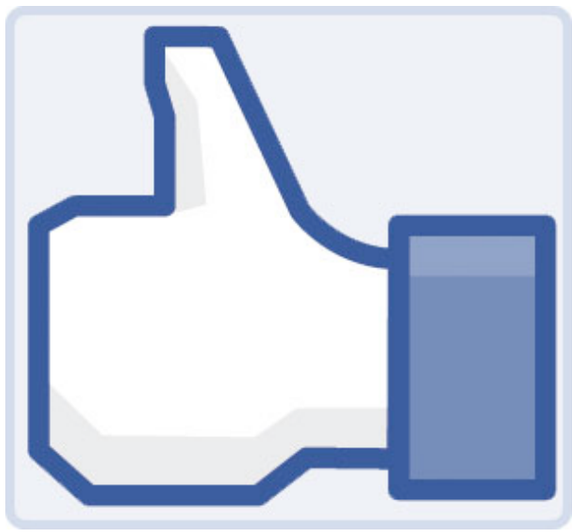
Relevance

Conformance

Socially-Embedded Search Engines

Relevance

Conformance

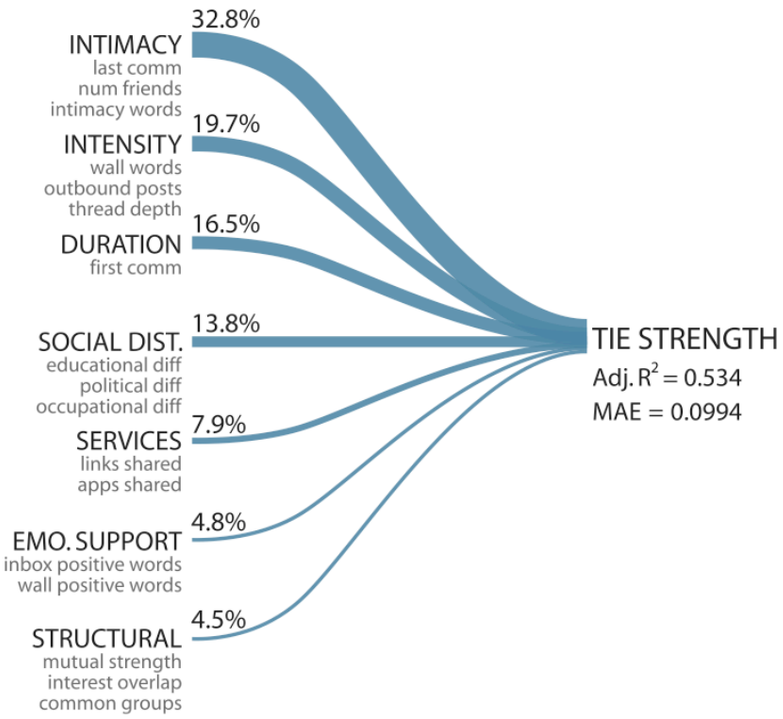


Socially-Embedded Search Engines

Towards workable conformance...

*bold indicates image from that paper

Towards workable conformance...

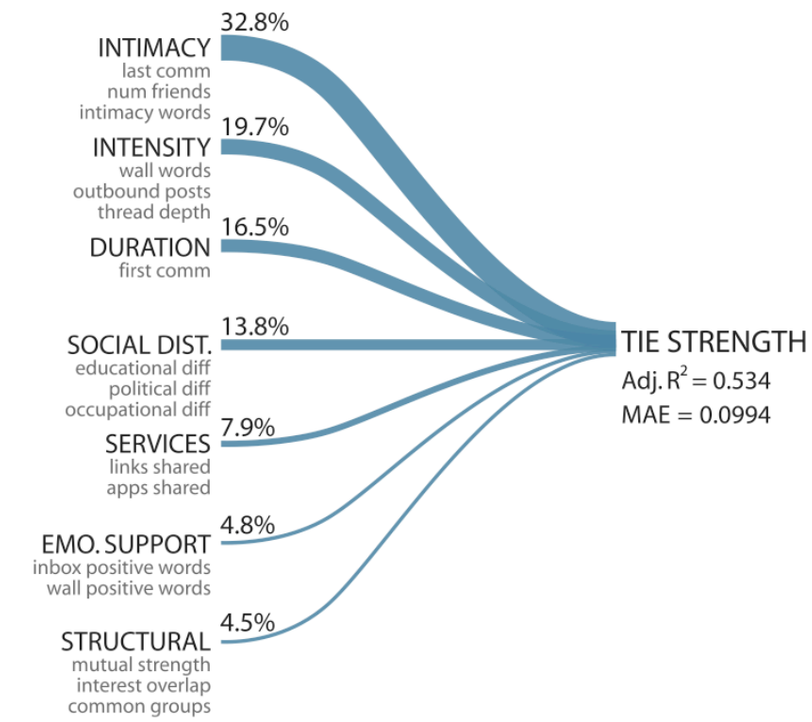


Tie Strength Prediction

(e.g. **Gilbert and Karahalios 2009**; Paek et al. 2010; Gilbert 2012)

*bold indicates image from that paper

Towards workable conformance...



Tie Strength Prediction

(e.g. **Gilbert and Karahalios 2009**; Paek et al. 2010; Gilbert 2012)

Automated Group Creation

(e.g. **MacLean et al. 2011**; Amershi et al. 2012)

*bold indicates image from that paper

Design Implications: **Challenges**

CHALLENGE

#2 Higher relevance thresholds needed

Alyssa Ogawa Oh, hell. Die bot.

3 minutes ago · Like

“When in doubt, leave it out!”

Socially-Embedded Search Engines

Always return something!

Google™ bing™

Traditional Search Engines

Design Implications: **Opportunities**

Design Implications: **Opportunities**

OPPORTUNITY

#1

Ability to **frame** the discussion

Katherine Kleinfelder
Can "poop" qualify as a character in a book?
about 9 hours ago · Like · Comment

SearchBuddies Investigaetore “Amazon” on www.amazon.com has some relevant information: http://amzn.to/eCrBJP
about 9 hours ago · Like

Katherine Kleinfelder Well, hello, Emmessaarr! What a surprise to hear from you on this topic!
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Barbara F. Gross I have the Everybody Poops book in my collection. It’s a delight...
about 1 hour ago · Like

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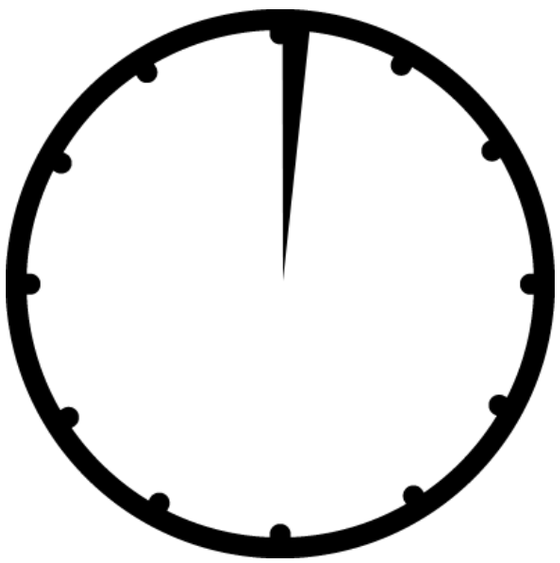
Design Implications: **Opportunities**

OPPORTUNITY

#2

New modes of interaction have benefits for search

Time available to return results...



Google™ bing™

Traditional Search Engines

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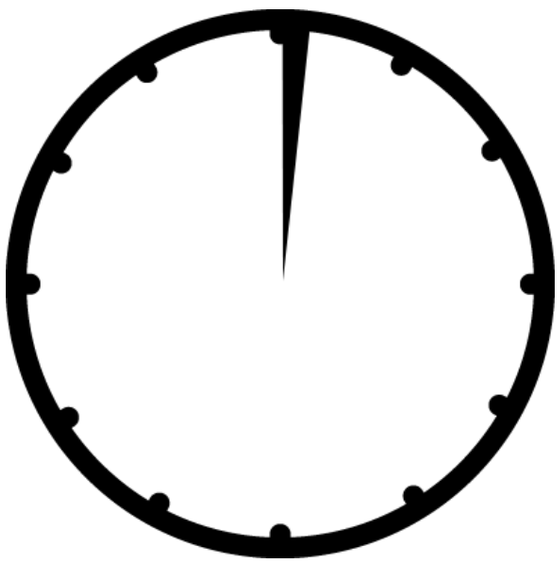
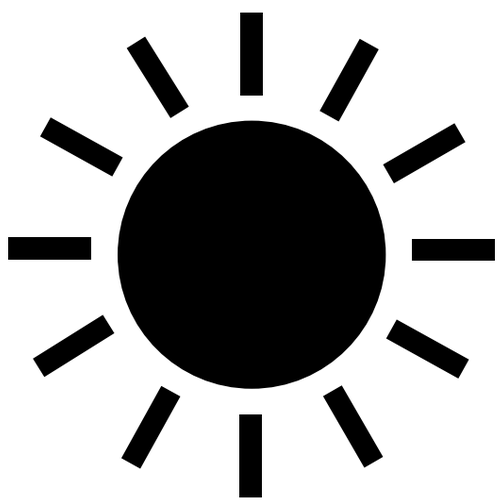
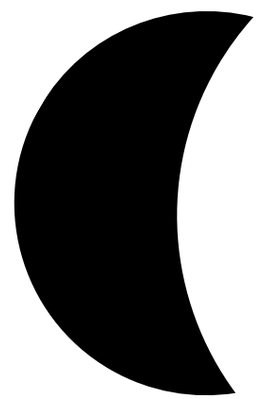


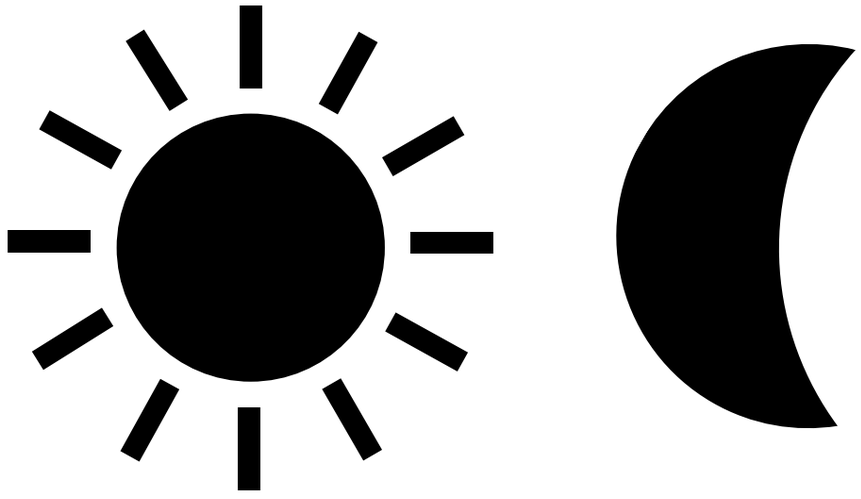
Google™ bing™

Traditional Search Engines

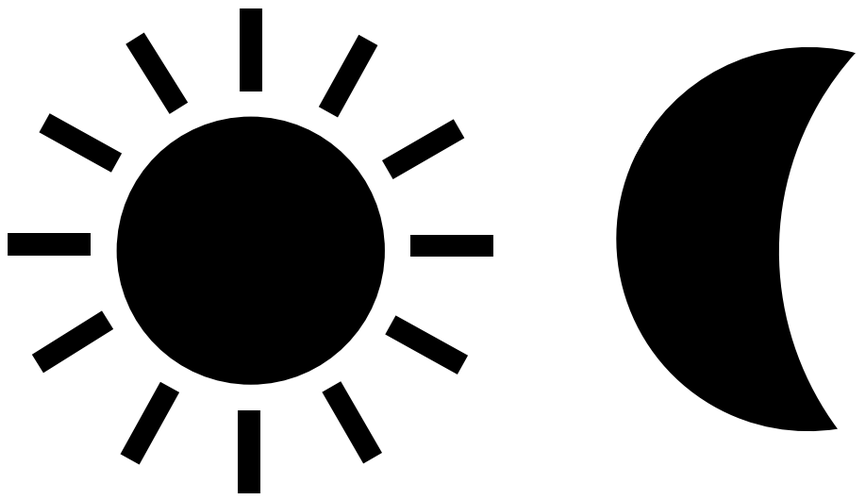




Socially-Embedded Search Engines

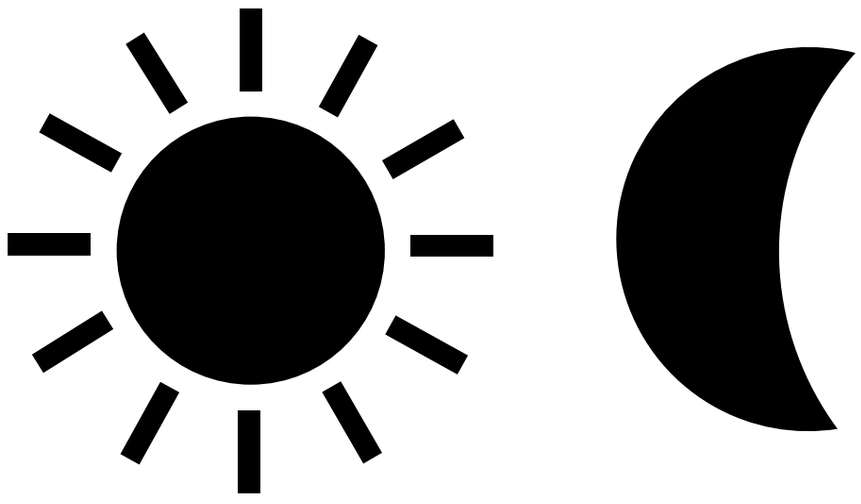


Slow Search



Slow Search

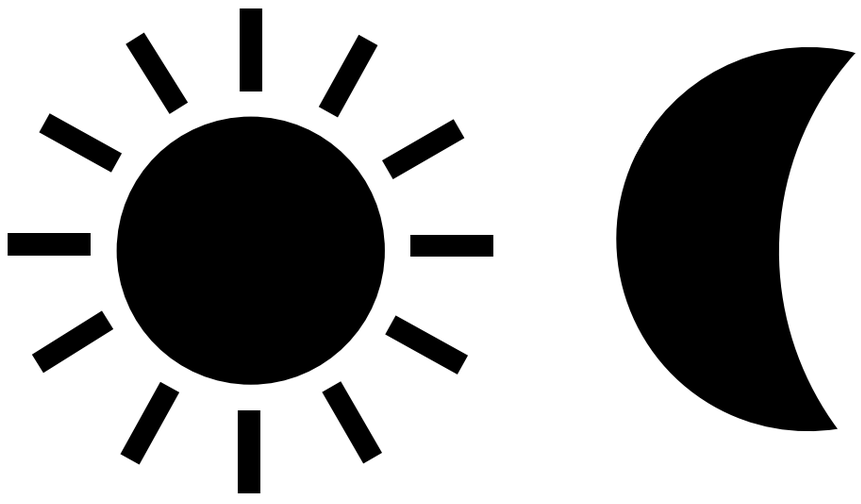
Use much slower algorithms



Slow Search

Use much slower algorithms

Leverage crowdsourcing

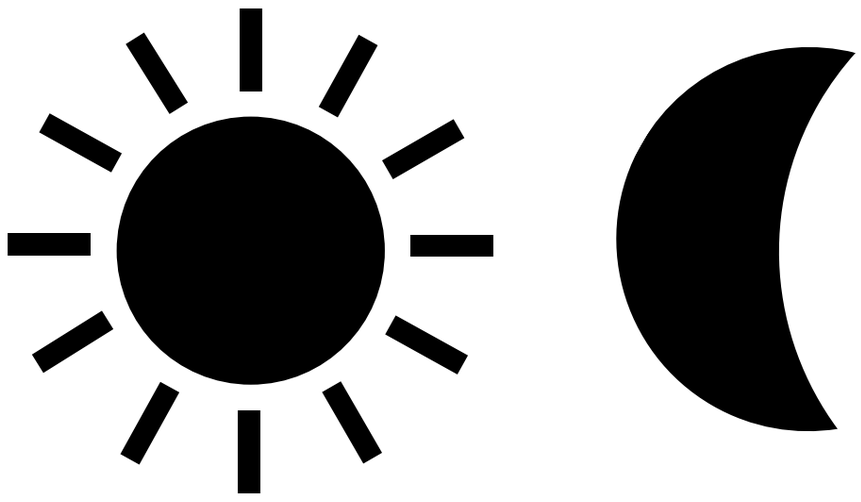


Slow Search

Use much slower algorithms

Leverage crowdsourcing

Crawl new web content



Slow Search

Use much slower algorithms

Leverage crowdsourcing

Crawl new web content

Poll friends

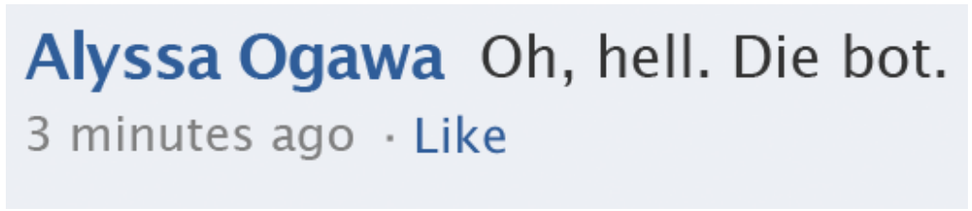
Design Implications: **Opportunities**

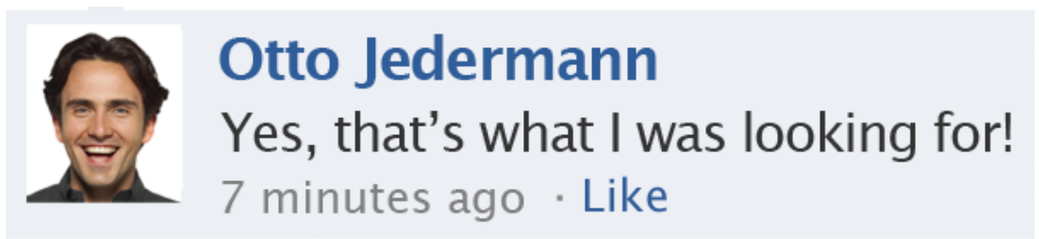
OPPORTUNITY

#3 New, rich feedback mechanisms

Otto Jedermann
Yes, that’s what I was looking for!
7 minutes ago · Like

Positive Feedback





Positive Feedback

Negative Feedback

Future work

Otto Jedermann Yes, that's what I was looking for!
7 minutes ago · Like

Bobby Finstock Thanks, Butterflie. [Friend] might be be interested.
3 minutes ago · Like

Katherine Kleinfelder By golly, that's a great recommendation!
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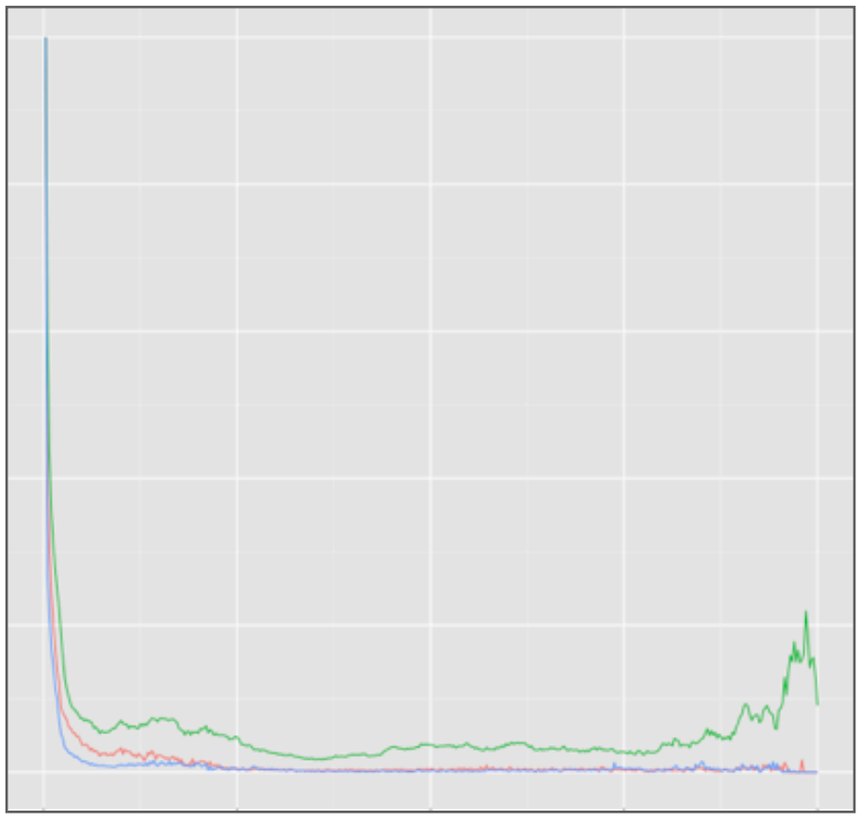


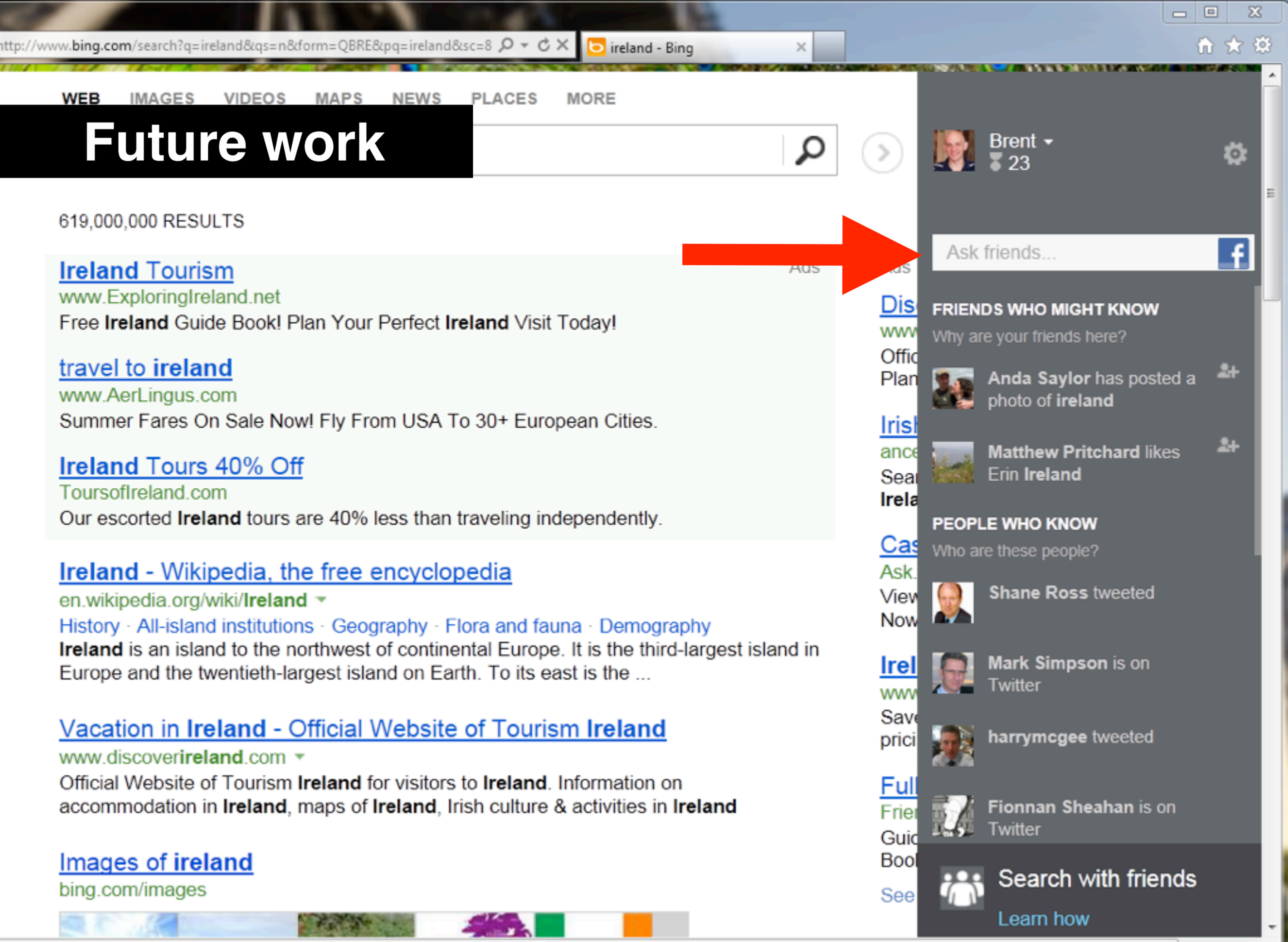
small data

qualitative approach

BIG DATA

quantitative approach

Future work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Matthew Pritchard likes Erin Ireland
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Improving Q&A algorithms

Wizard-of-Oz study

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Wizard-of-Oz study

Other social networks

Contributions

1 A **prototype** socially-embedded search engine.

2 **Results** from a 122-user, 3-month deployment of our prototype

3 **Implications** for the design of future socially-embedded search engines

A big thank you to...

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Some slide elements and design by **Patti Bao** (@pattib)
“Worker”, by Bart Laugs from The Noun Project
“Check Mark”, by Hrag Chanchanian, from The Noun Project
“Broken Heart”, by Arjun Mahanti from The Noun Project