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...

[Search results for massages in Evanston, IL]

1. American Massage Therapy Assoc · Website · (847) 864-0123
   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.

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

51% of surveyed Microsoft employees had asked a status message question.

(Morris et al. 2010)
Status message questions are a growing phenomenon:

51% of surveyed Microsoft employees had asked a status message question.  
(Morris et al. 2010)

11% of posts on an IBM SNS were status message questions.  
(Thom et al. 2011)
Status Message Questions  Traditional Search

(Morris et al. 2010, 2011)
Status Message Questions

- Trusted answers

(Morris et al. 2010, 2011)
Status Message Questions

- Trusted answers
- Personalized answers

Traditional Search

(Morris et al. 2010, 2011)
Status Message Questions

- Trusted answers
- Personalized answers
- Build and maintain ties with friends

(Morris et al. 2010, 2011)
Status Message Questions

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

(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

(Morris et al. 2010, 2011)
<table>
<thead>
<tr>
<th>Status Message Questions</th>
<th>Traditional Search</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Trusted answers</td>
<td>• Very fast</td>
</tr>
<tr>
<td>• Personalized answers</td>
<td></td>
</tr>
<tr>
<td>• Build and maintain ties with friends</td>
<td></td>
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(Morris et al. 2010, 2011)
Status Message Questions

• Trusted answers
• Personalized answers
• Build and maintain ties with friends
• Natural language
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(Morris et al. 2010, 2011)
Status Message Questions

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

- Very fast
- Access billions of web pages
- Privacy

(Morris et al. 2010, 2011)
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<td>• Build and maintain ties with friends</td>
<td>• Privacy</td>
</tr>
<tr>
<td>• Natural language</td>
<td>• Nearly always returns results</td>
</tr>
<tr>
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<td></td>
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(Morris et al. 2010, 2011)
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.
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.
Socially-Embedded Search Engines
Socially-Embedded Search Engines
Socially-Embedded Search Engines

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.
SearchBuddies

*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?

8 minutes ago · Like · Comment

* All participant pictures and names, and those of their friends, have been altered for this presentation
SearchBuddies

*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?

8 minutes ago · Like · Comment

**SearchBuddies Investigaetore** This page about “do cell phones work in Hawaii” may have relevant information: [http://bit.ly/h50Ou1](http://bit.ly/h50Ou1)

7 minutes ago · Like · 1 person
SearchBuddies
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7 minutes ago · Like · 1 person

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

* All participant pictures and names, and those of their friends, have been altered for this presentation
Socially-Embedded Search Engines

*Key exploratory research questions*
Socially-Embedded Search Engines

*Key exploratory research questions*

**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

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2. **Results** from a 122-user, 3-month deployment of our prototype
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When to respond?
Elise Clayton
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7 minutes ago · Like
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SearchBuddies Soshul Butterflie
These friends have lived in or near Hawaii: Bo Kent (http://on.fb.me/hXAl) and Otis Overcash (http://on.fb.me/y77q2).
7 minutes ago · Like

How to participate?

What to say?

When to respond?
Elise Clayton
On Verizon, will I have to pay roaming charges if I use my cell phones in Hawaii?
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SearchBuddies Investigaetore This page about “do cell phones work in Hawaii” may have relevant information: http://bit.ly/h5O0ul
7 minutes ago · Like · 1 person

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7 minutes ago · Like
Sam Baines
Is married!
March 3 at 12:18pm · Like · Comment
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Is married!
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Elise Clayton
On Verizon, will I have to pay roaming charges if I use my cell phone in Hawaii?
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7 minutes ago · Like · 1 person

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How to participate?

What to say?

When to respond?
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7 minutes ago · Like · 1 person
Facebook App

Facebook Accounts
Elise Clayton
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When to respond?
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)
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)

Satisficing Solutions
SearchBuddies

Investigaetore

??? → bing™

Search API
SearchBuddies
Investigaetore

Search API

Domain Whitelist

- cnet.com
- en.wikipedia.org
- yelp.com
Ted Logan
since when did amazon VOD become free to Prime members?
interesting...

14 hours ago · Like · Comment

SearchBuddies Investigatore “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
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
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/i5IJZS

7 minutes ago · Like

Andrew Tanner So cool that this works.

6 minutes ago · Like
Good Chinese Food in Charlotte?

Category: Food

Get email updates about this conversation

Elite ‘12
155
249

Annie "PYT" W. says:

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 Chinese food) and has been craving good food. I know I shouldn’t be expecting anything close to Rowland Heights/SVG/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 places, at all?? (Taiwan Express is not Taiwanese D :)

Thank you Yelp-tastic people.

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

130
281

Fu Lin http://www.yelp.com/biz... ain't foolin' around. Dragon Court, in the Asian Corners Mall, is good, but they have three veg friendly dishes to choose from. Supposedly they do dim sum on the weekends, also not veg friendly.

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 is lame, lame lame.

Elite ‘12
110
711

Faith "Does what feels right" D. says:

I'm not sure about authentic, but here goes...The most recent one that was fast and good was Bei Jing in South 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 out of 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
On Verizon, will I have to pay roaming charges if I use my cell phone in Hawaii?
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

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

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122 participants signed up
122 participants signed up

3 month-long deployment
122 participants signed up

3 month-long deployment

82% of participants were recruited via snowball sampling
122 participants signed up

3 month-long deployment

82% of participants were recruited via snowball sampling

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
(15.4% of status messages)

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 interested.
3 minutes ago  · Like
Katherine Kleinfelder
Can "poop" qualify as a character in a book?
about 9 hours ago · Like · Comment
Katherine Kleinfeldler
Can "poop" qualify as a character in a book?

SearchBuddies Investigatore “Amazon” on www.amazon.com has some relevant information: http://amzn.to/eCrBJP

about 9 hours ago · Like
Everyone Poops (My Body Science Series)

EVERYONE POOPS

By Taro Gomi

Kane/Miller
BOOK PUBLISHERS
Katherine Kleinfelder
Can "poop" qualify as a character in a book?
about 9 hours ago · Like · Comment

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

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Katherine Kleinfeldler By golly, that’s a great recommendation!
about 7 hours ago · Like

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

- SearchBuddies provided useful, complimentary info
- Distinct patterns for handling bad responses
- Social context and norms vital in success or failure
bad responses: deleting

11 (19%) of posts deleted
bad responses: deleting

11 (19%) of posts deleted

low relevance
bad responses: deleting

11 (19%) of posts deleted

17 (24%) of posts deleted

low relevance
bad responses: deleting

11 (19%) of posts deleted

↑

low relevance

17 (24%) of posts deleted

↑

more social context needed
bad responses: (harsh) commenting
bad responses: (harsh) commenting

Robert Jones Smith  No! Investigator! Unrelated!
9 minutes ago  ·  Like
bad responses: (harsh) commenting

Robert Jones Smith  No! Investigator! Unrelated!
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

Robert Jones Smith  No! Investigator! Unrelated!
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 :-)
bad responses: ignoring

3 minutes ago · Like
Results from deployment:

- SearchBuddies provided useful, complimentary info
- Distinct patterns for handling bad responses
- Social context and norms vital in success or failure
bad responses: deleting

11 (19%) of posts deleted

low relevance

17 (24%) of posts deleted

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
“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
Contributions

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Design Implications:

Challenges  Opportunities
Design Implications: Challenges
Design Implications: Challenges

CHALLENGE 

#1 New metrics for search result quality are needed
\[ MAP(Q) = \frac{1}{|Q|} \sum_{j=1}^{m_j} \frac{1}{m_j} \sum_{k=1}^{m_j} \text{Precision}(R_{jk}) \]

\[ NDCG = \frac{DCG}{iDCG} \]

Relevance quality metrics
“I don't know them that well...”

“...may not appreciate their names up there...”

Relevance not a consideration at all!
Socially-Embedded Search Engines
Relevance quality metrics

\[ MAP(Q) = \frac{1}{|Q|} \sum_{j=1}^{|Q|} \frac{1}{m_j} \sum_{k=1}^{m_j} \text{Precision}(R_{jk}) \]

\[ NDCG = \frac{DCG}{iDCG} \]

Socially-Embedded Search Engines
Relevance quality metrics

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

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

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.”
\[ NDCG = \frac{DCG}{iDCG} \]

Relevance + Conformance = Socially-Embedded Search Engines
Relevance + Conformance = Socially-Embedded Search Engines
Relevance + Conformance = Socially-Embedded Search Engines
Relevance + Conformance = Socially-Embedded Search Engines
Relevance $\times$ Conformance = Socially-Embedded Search Engines
Towards workable conformance...
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!

Traditional Search Engines
Design Implications: Opportunities
Design Implications: **Opportunities**

**OPPORTUNITY #1**

Ability to **frame** the discussion
Katherine Kleinfeldler  
Can "poop" qualify as a character in a book?

about 9 hours ago  ·  Like  ·  Comment

SearchBuddies Investigaetore  
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Barbara F. Gross  
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about 1 hour ago  ·  Like
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about 7 hours ago · Like

Barbara F. Gross
I have the Everybody Poops book in my collection. It’s a delight...
about 1 hour ago · Like
Design Implications: Opportunities

OPPORTUNITY

#2

New modes of interaction have benefits for search
Time available to return results...

Traditional Search Engines
Time available to return results...

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
Positive Feedback

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

Alyssa Ogawa  Oh, hell. Die bot.
3 minutes ago  ·  Like

Negative Feedback

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

small data
qualitative approach

BIG DATA
quantitative approach
Future work
Future work

Improving Q&A algorithms

Alyssa Ogawa  Oh, hell. Die bot.
3 minutes ago  ·  Like
Future work

Improving Q&A algorithms

Wizard-of-Oz study
Future work

Improving Q&A algorithms

Wizard-of-Oz study

Other social networks
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SearchBuddies  Thanks! Any questions?
seconds ago  
Like  
1 person

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