Bing Dialog Model:

*Intent, Knowledge, and User Interaction*

Harry Shum, PhD
Corporate Vice President
Microsoft Corporation

www.bing.com
The Journey to Bing
Our challenges at the launch of Bing
And Google’s not just a brand; it’s a habit

- Tough Love for Microsoft Search: Danny Sullivan
  - Dec. 30, 2008
Growing Momentum since the launch of Bing
But ... Still a Long Way to Go

<table>
<thead>
<tr>
<th>EXPlicit Core Share</th>
<th>U.S. Unique Users</th>
<th>U.S. Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft</td>
<td>94.1M</td>
<td>12.0%</td>
</tr>
<tr>
<td>Google</td>
<td>71.7m</td>
<td>50%</td>
</tr>
<tr>
<td>Yahoo!</td>
<td></td>
<td>68%</td>
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<td>37%</td>
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Unaided Awareness
Perception Bing is a ‘Decision Engine’
There are three elements of Search Quality

**Relevance**
- Ensuring that best results rank at top
- Completeness
- Freshness

**Speed**
- How fast do result pages render?

**Ease of Use**
- Simple interface
- Query & click
Their semantic impacts on Search Quality

**Relevance**
- Selection and ranking based on meaning and concepts, not keywords
- Direct answers

**Speed**
- Reduce efforts to *task completion*
- Direct answers
- Fewer clicks

**Ease of Use**
- Intuitive queries
  - *Simplified tasks*
- Information aggregation & classification
Relevance is hard – {attorney tom brady}

Source: Google vs. Bing: the Fallacy of the Superior Search Engine – searchengineland.com
Amos Lee Tickets
www.TicketsNow.com - Purchase Amos Lee Tickets. All Orders Guaranteed.

Amos Lee
amoslee.com - Official site
Check it out ... Mission Bell on 180 gram vinyl LP;...

Songs
- Colors
- Keep It Loose, Keep It T...
- Sweet Pea
- Arms Of a Woman

Images

Amos Lee | Free Music, Tour Dates, Photos, Videos
Amos Lee's official profile including the latest music, albums, songs, music videos and more updates.
www.myspace.com/amoslee - Mark as spam

Amos Lee - Wikipedia, the free encyclopedia
Amos Lee (born 1978) is an American singer-songwriter and guitarist from Philadelphia, Pennsylvania. His musical style encompasses folk, soul, and jazz.
en.wikipedia.org/wiki/Amos_Lee - Mark as spam

People on Facebook: amos lee

Amos Lee
1 mutual friend
Add as friend · Send a message
facebook.com

Entertainment News: amos lee
Amos Lee Tops Billboard Chart in One of Industry’s Worst Weeks for Album Sales
Citigroup has barely owned EMI for a day, but it has already achieved a dubious distinction: a No. 1 album with notably low sales – even in a season of painfully low sales for the music industry. Amos Lee, a...
New York Times Blogs · 7 days ago
Quickspin: Amos Lee, Britney, Bieber, Stones, tough love for Elton & Billy
Google: Bing Is Cheating, Copying Our Search Results
Google has run a sting operation that it says proves Bing has been watching what people search for on Google, the sites they select from Google’s results, then uses that...
searchengineland.com/google-bing-is-cheating-copying-our-search-results-62914 · Mark as spam

Official Google Blog: Microsoft’s Bing uses Google search ...
Feb 01, 2011 · By now, you may have read Danny Sullivan’s recent post: “Google: Bing is Cheating, Copying Our Search Results” and heard Microsoft’s response, “We do not copy...
googleblog.blogspot.com/2011/02/microsofts-bing-uses-google-search.html · Mark as spam

Bing
Bing is a search engine that finds and organizes the answers you need so you can make faster, more informed decisions.
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News: google bing
Bing up, Google down in latest search rankings
Though Google is still king of the search engine arena, Bing is creeping up, according to a report released yesterday by market researcher Experian Hitwise. Looking at the global search engine market in January, Google...
CNET News · 21 hours ago

Bing Exposed in Google Sting: Tech Edge Street.Com
Will Bing Be the Death of Google? Motley Fool

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Michael Schecht, Steve Macbeth and Paul Ray liked this.

On Google’s Bing Sting
Feb 02, 2011 · Google says it caught Microsoft copying its search results and incorporating them into its own Bing service, in a move reminiscent of some earlier Microsoft tactics.
pogue.blogs.nytimes.com/2011/02/02/on-gogles-bing-sting · Mark as spam

Why Google Should Thank Bing for ‘Cheating’
People on Facebook: kuansan wang

Kuansan Wang - Microsoft Research
Researcher/Senior Researcher. I came to Microsoft Research in March 1998, first as a Researcher in the speech technology group working on the areas of spoken language understanding ...
research.microsoft.com/en-us/people/kuansanw · Mark as spam

DBLP: Kuansan Wang
Colors in the list of coauthors
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portal.acm.org/author_page.cfm?id=81451565141 · Mark as spam

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Kuansan Wang - Microsoft Academic Search
View Kuansan Wang's professional profile. Publications: 38 | Citations: 234 | G-Index: 14 | H-Index: 8. Interest: Natural Language & Speech, Human-Computer Interaction ...
academic.research.microsoft.com/Author/363605.aspx · Mark as spam

Publications of Kuansan Wang - Microsoft Academic Search
Internet searchers are becoming more Task Centric

**Decision Making**

Q: In the past six months have you used a search engine to help inform your decisions for the following tasks?

- **Product Purchase**: 75%
- **Local Activity**: 62%
- **Flight or Hotel**: 45%
- **Healthcare Research**: 43%

66% of people are using search more frequently to make decisions

**Top 200 Search Tasks Analysis**

- **Frequency**:
  - Entertainment
  - Health
  - Shopping
  - Technology
  - News
  - Weather
  - Personal Finance

- **Importance**:
  - Games
  - Travel
  - Directions
  - Jobs
  - Real Estate
  - Recipes
  - Local Biz

**Satisfaction**
And their tasks are More Sophisticated then ever

LENGTHY TASKS

50% of time spent on long queries

COMPLEX SESSIONS

36% of sessions have multiple queries

67% of queries are in multi-query sessions
The traditional 10 Blue Links style is no longer sufficient.
Los Links Episode Uno
A Search Paradigm Shift is Happening

**SEARCH HIT OR MISS MODEL**

- Understanding query
- Relevance of 10 blue links
- Minimizing time of URL/query matching

**BING DIALOG MODEL**

- Understanding intent
- Whole page to whole session
- Minimizing efforts to completing tasks
Bing Dialog Model
Using BMR Framework

- Applying Bayesian Minimum Risk (BMR) Framework
  - Intent Model: \( I_t = \arg\max_I P(I | U_t, I_{t-1}, K) \)
  - Interaction Model: \( A_t = \arg\min_A E[\text{Cost}(A, I_t)] \)

- Considering productization feasibility
  - Local optimum vs. theoretical optimum

- Leveraging rich presentation capability
  - Infer multiple intent candidates
  - Generate dialog actions at multiple levels
Bing Dialog Model Implementation

$I_t = \text{argmax}_i \ P(I | U_t, I_{t-1} ; K)$

$A_t = \text{argmin}_A \ E[\text{Cost}(A, I_t)]$

When applied to Autosuggest:

$U_t$ is key stroke

$I_t$ is closest intent queries

$A_t$ is list of suggested queries

Cost() is selection efforts
Bing Dialog Model Examples
Simple & Explicit Query-Level Dialog

Were you looking for: **ebony**

**Ebony Magazine Online**
*Ebony* magazine is one of the oldest African American magazines and most successful. It provides business, health, fashion, sports, entertainment and general news about African ...
www.ebony.com · Cached page

**Ebony - Wikipedia, the free encyclopedia**
*Ebony* is a general name for very dense black wood. In the strictest sense it is yielded by several species in the genus Diospyros, but other heavy, black (or dark colored ... en.wikipedia.org/wiki/Ebony · Cached page

Results for evony

**Evony-Free forever**
Welcome, your Majesty. Evony ®: Age II is an empire building game played by 18 Million Players in over 167 countries. It's a free browser game and takes only 5 minutes to ...
www.evony.com · Cached page

**Evony - Wikipedia, the free encyclopedia**
Gameplay · Critical reception · Controversy · Sequel
*Evony* (formerly known as Civony) is a browser-based multiplayer online game with graphic elements reminiscent of Civilization. The game is set in medieval times where a player ... en.wikipedia.org/wiki/Evony · Cached page
Turn-taking Query-Level Dialog for Tasks
Page-level Dialog

Quick Tabs for relevant Bing Verticals, Domains, Answers

All Bing Vertical Services

Query Suggestion

Search History

Sponsored Ads

Entity-based result summary

Algorithmic Search Results
Session-Level Dialog
Bing: The Decision Engine

- Driving the Search Evolution from topical directory to site finder to task completion
- Acquiring and computing knowledge
- Understanding user intent and designing user interaction
- Minimizing Cost() i.e. the user efforts to accomplish a task

SEARCH
HIT OR MISS MODEL
- Understanding query
- Relevance of 10 blue links
- Minimizing time of URL/query matching

BING
DIALOG MODEL
- Understanding intent
- Whole page to whole session
- Minimizing efforts to completing tasks
Thank you