

Web Search Basics

Introduction to Information Retrieval

INF 141/ CS 121

Donald J. Patterson

Content adapted from Hinrich Schütze

<http://www.informationretrieval.org>



Overview

- Introduction
- Classic Information Retrieval
- Web IR
- Sponsored Search
- Web Search Basics
 - Size of the Web
- Web Users
- Spam



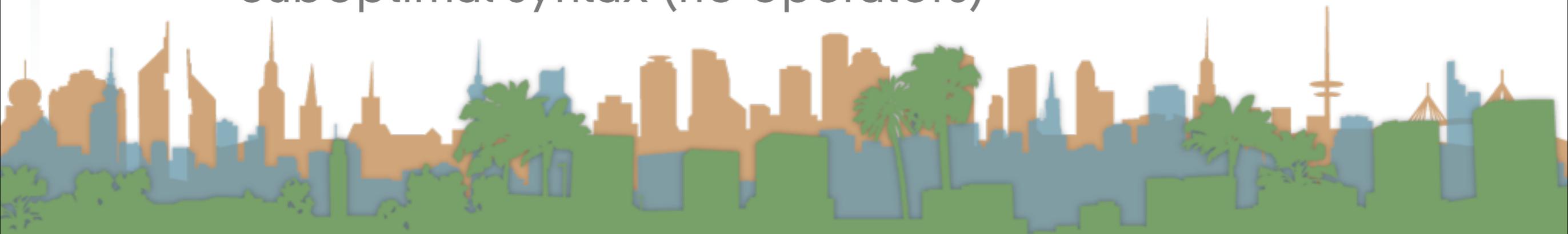
User Search Needs in Brod02/RL04

- Informational
 - Want to learn about something (~40%/65%)
- Navigational
 - Want to go to that page (~25%/15%)
- Transactional
 - Want to do something (~35%/20%)
 - Access a service, download, shop
- Others?
 - Exploration, social, etc...



Web Users

- Make ill defined queries
- Short
 - Reported in 2012: ~3.5 (Dan Russell personal conv.)
 - Allegedly in 2009: 3-4 terms (lots of nuance)
 - Average in 2001: 2.54 terms (80% < 3 words)
 - Average in 1998: 2.35 terms (88% < 3 words) [Silv98]
- Imprecise terms
- Suboptimal syntax (no operators)



Web Users

- Wide Variance in
 - Needs
 - Expectations
 - Knowledge
 - Bandwidth



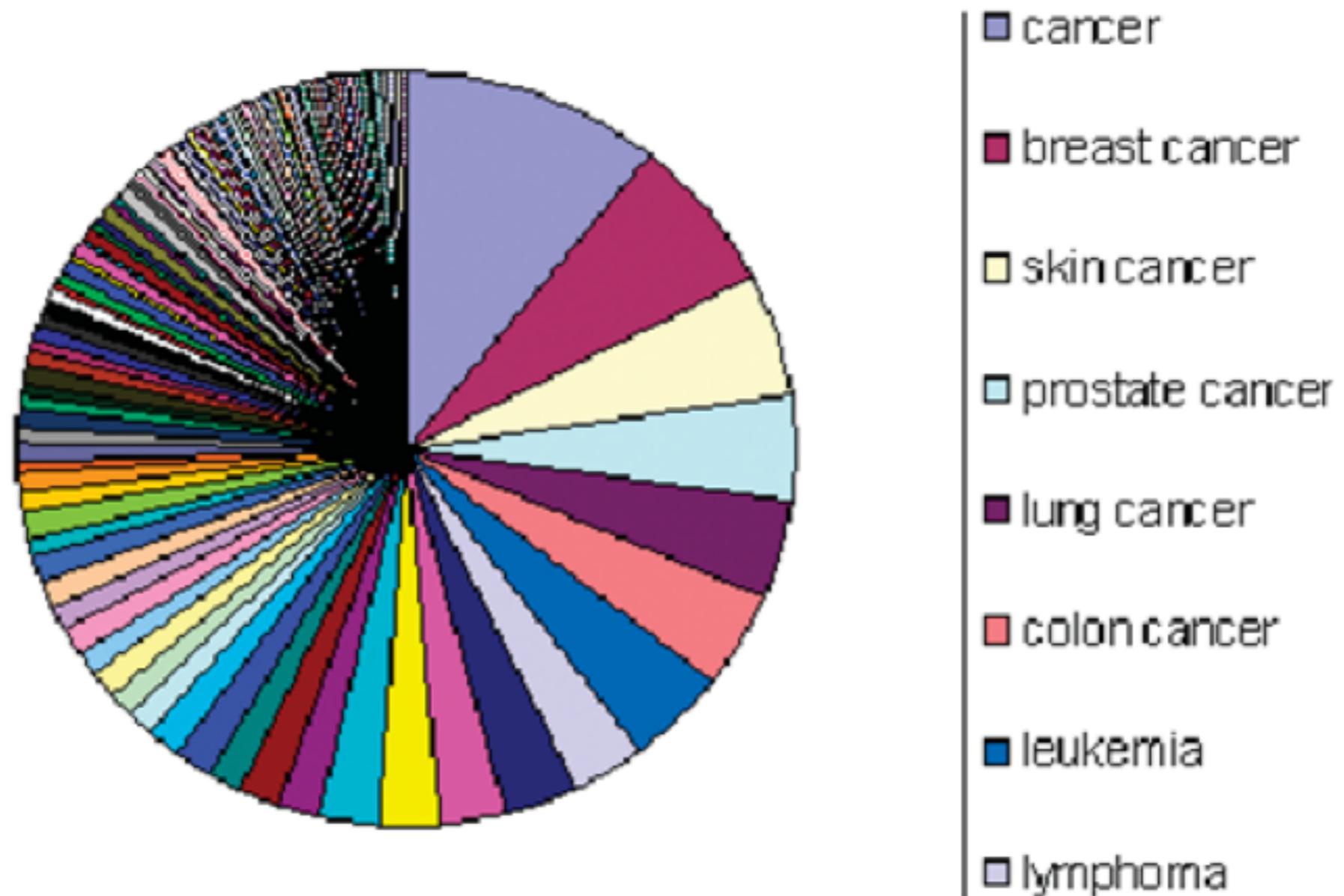
Web Users

- Behavior
 - 85% look over one result screen only
 - 78% of queries are not modified
 - Follow links (“the scent of information”)



Power law

- Few popular broad queries
- Many rare specific queries



Top queries

- Most are related to sex
- 2008 Who What How (Google)

Who is...

1. who is obama
2. who is mccain
3. who is palin
4. who is lil wayne
5. who is miley cyrus
6. who is dolla
7. who is jonas brothers
8. who is chris brown
9. who is biden
10. who is martin luther

What is...

1. what is love
2. what is life
3. what is java
4. what is sap
5. what is rss
6. what is scientology
7. what is autism
8. what is lupus
9. what is 3g
10. what is art

How to...

1. how to draw
2. how to kiss
3. how to write
4. how to cook
5. how to tie
6. how to hack
7. how to run
8. how to cite
9. how to paint
10. how to spell

- <http://www.google.com/intl/en/press/zeitgeist2008/mind.html>

Top queries

- Differences today
- 01/2014 Who What How (Google)

who is|

who is

who is **red john**

who is **banksy**

who is **gossip girl**

Press Enter to search.

what is|

what is **my ip**

what is **obamacare**

what is **bitcoin**

what is **my ip address**

Press Enter to search.

how to|

how to **tie a tie**

how to **take a screenshot on a mac**

how to **make french toast**

how to **get rid of acne**

Press Enter to search.



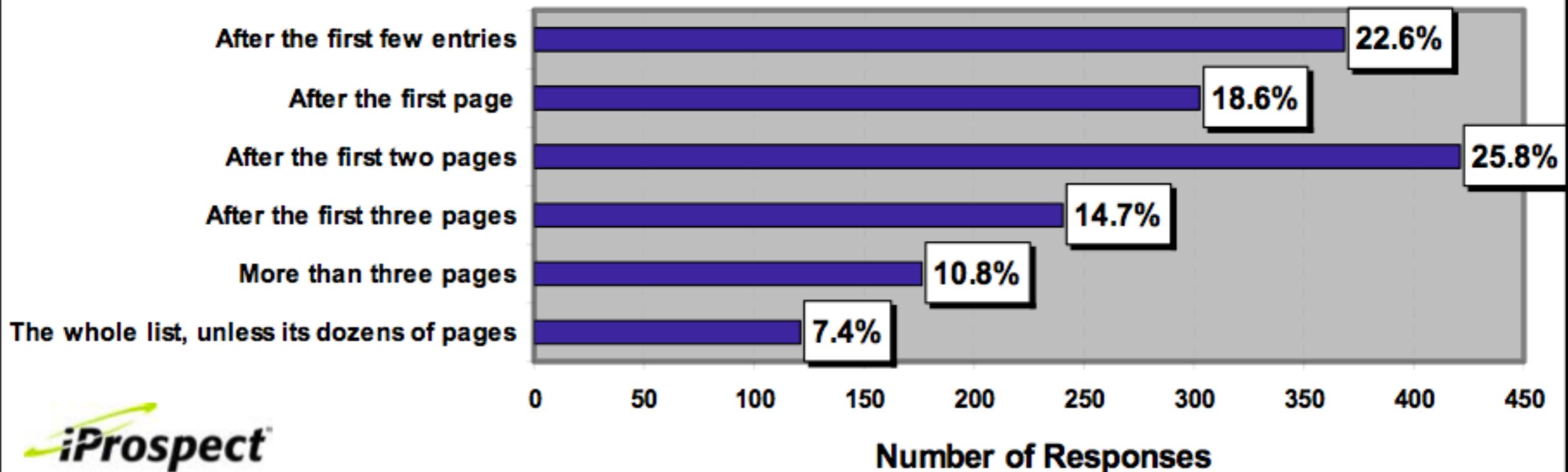
Top queries

- Live demo - WARNING this is not very safe....
- "Is it safe to"
- "Is it legal to"
- "why does"
- "why doesn't"
- "why is there"
- "why isn't"
- "americans are"

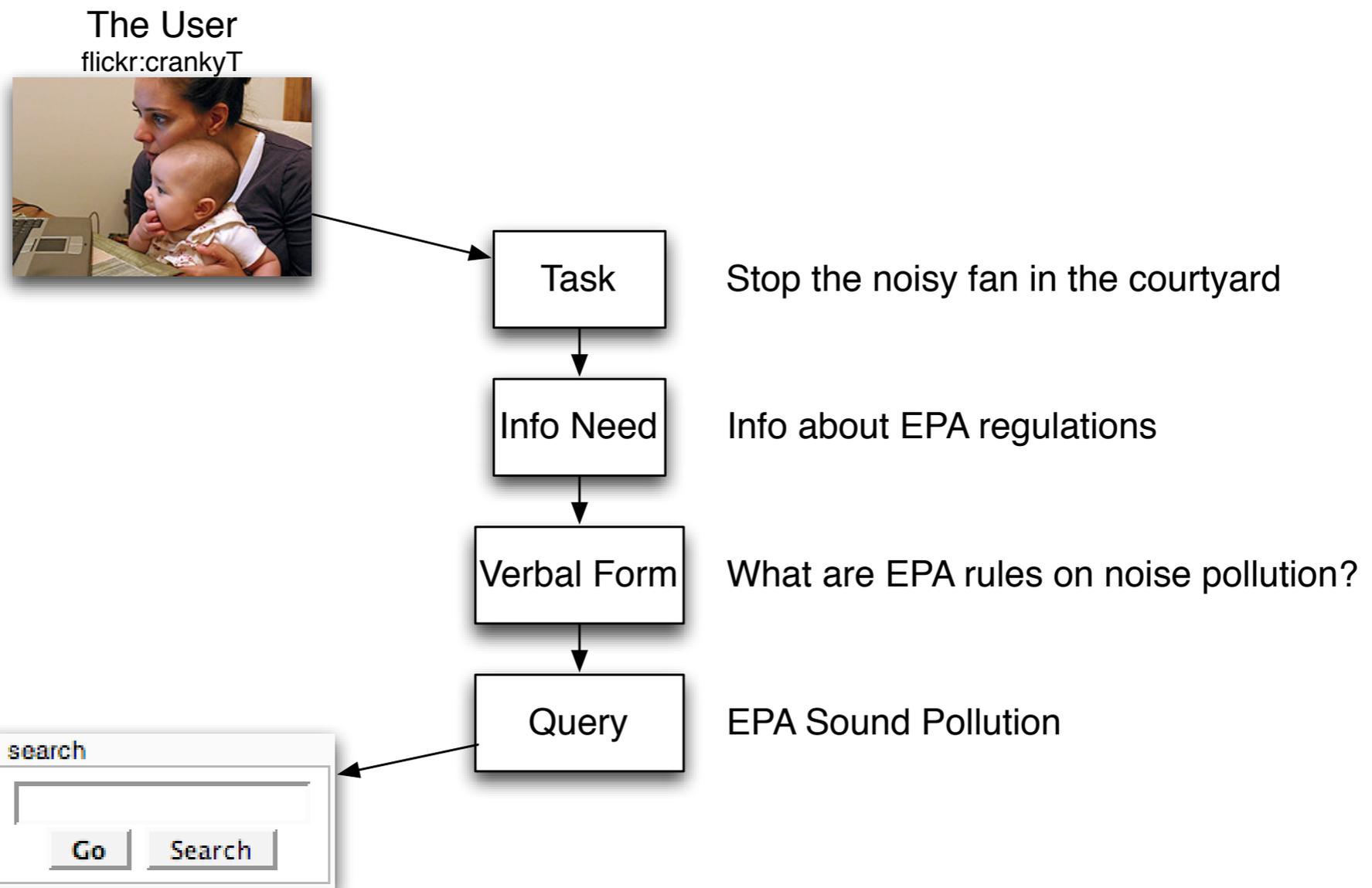


How far do people look for results?

If you don't find what you are looking for, at what point do you move on either to another search engine or to another search on the same engine?



True Example *



“To Google or to GoTo” Business Week Online 9/28/2001

How do users evaluate search engines?

- Quality of pages
 - Classic IR relevance
 - Also important:
 - Trust
 - Duplicate elimination
 - Readability
 - Fast Access
 - No pop-ups



How do users evaluate search engines?

- Precision is more important than recall
 - Precision:
 - How precise is a portal in locating relevant results?
 - Recall
 - How thorough is the coverage of available relevant results?
- Precision with 1 result, 10 results, 2-3 pages of results.
- When is recall important?



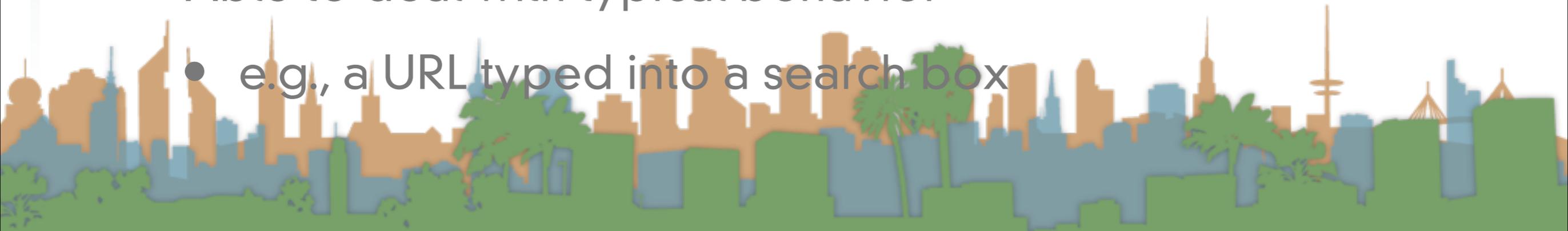
How do users evaluate search engines?

- Recall is sometimes important:
 - Googling for a new doctor
 - Googling a prospective employee
 - Googling your date



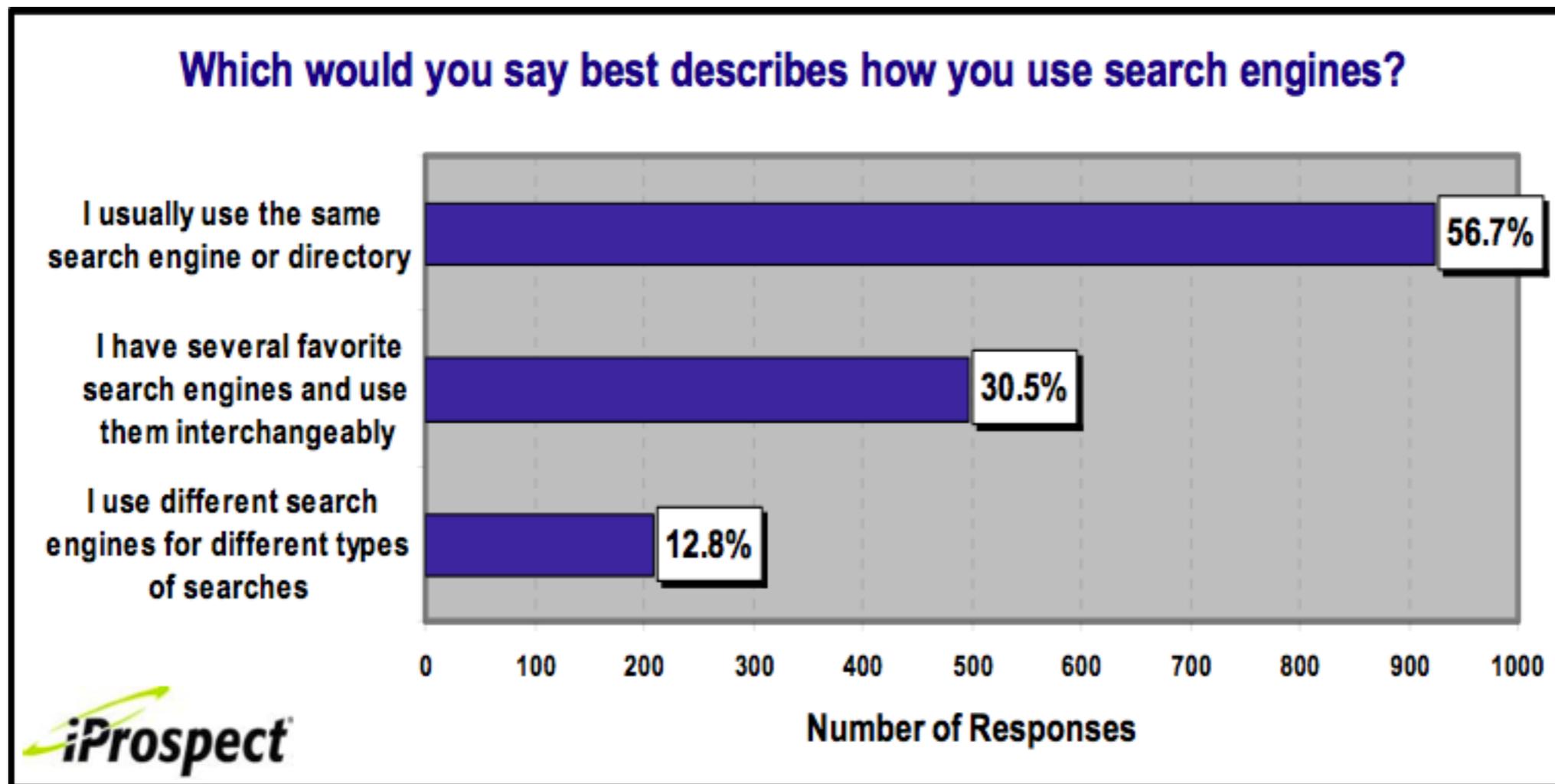
How do users evaluate search engines?

- Good U/I
 - Simple
 - No Clutter
- Pre and post processing tools
 - Spell check (“Did you mean?”)
 - Suggested alternative searches
 - Links to resources (maps, images, stock quotes)
- Able to deal with typical behavior
 - e.g., a URL typed into a search box



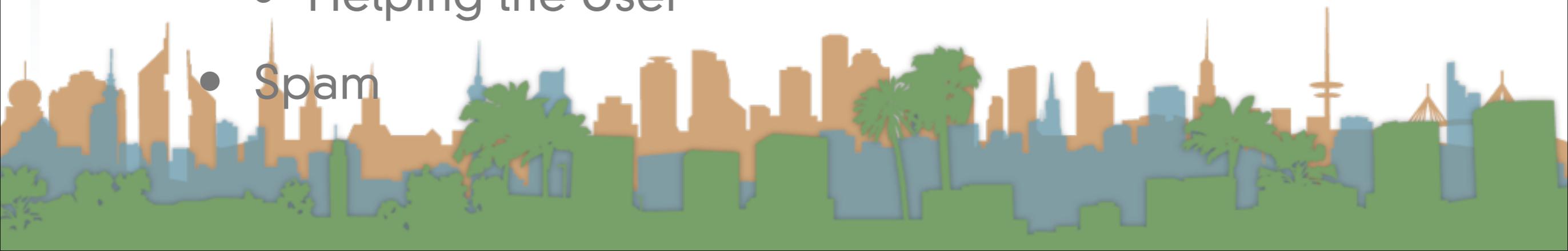
Loyalty to a given search engine

- iProspect Survey 4/2004

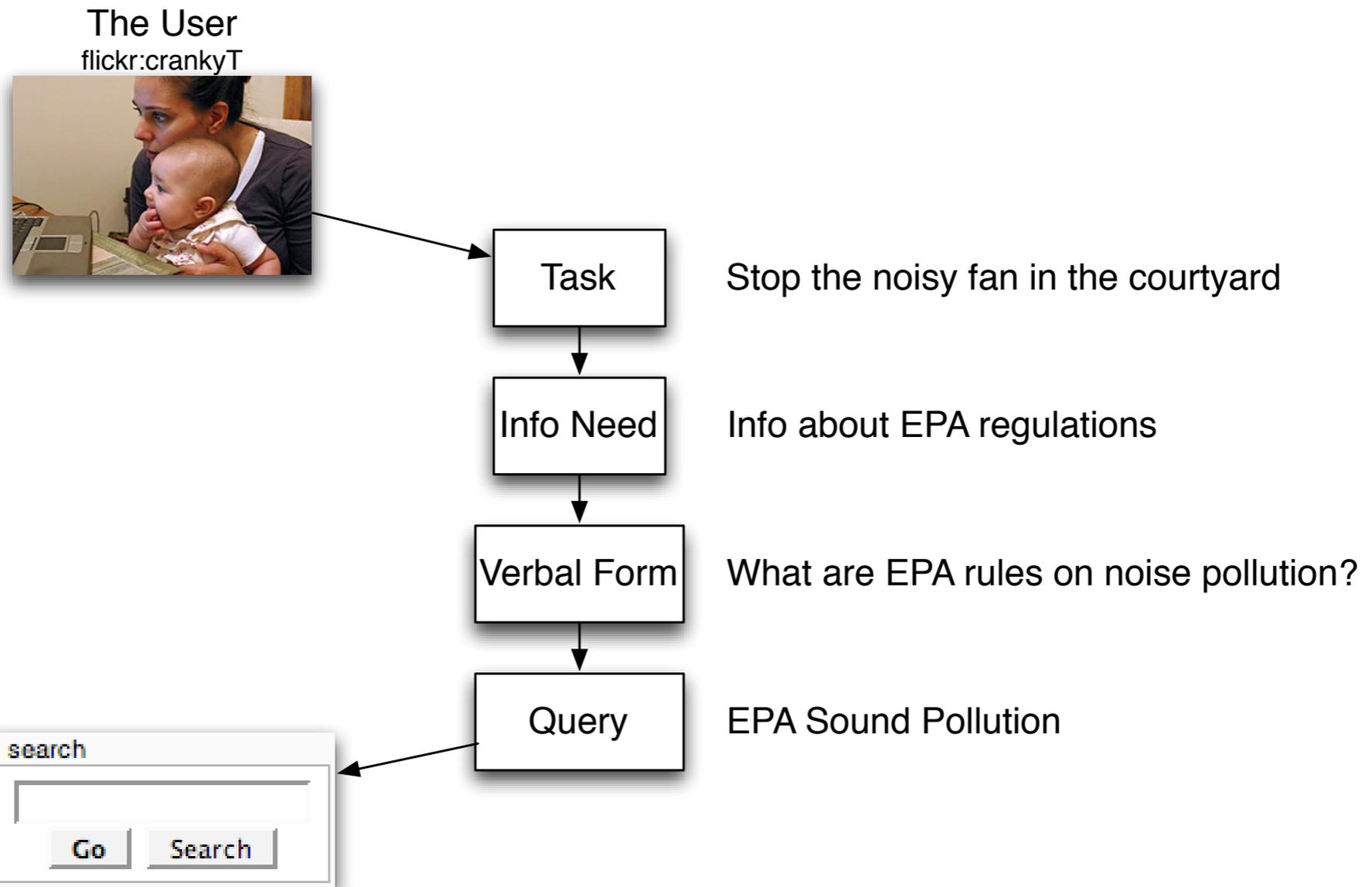


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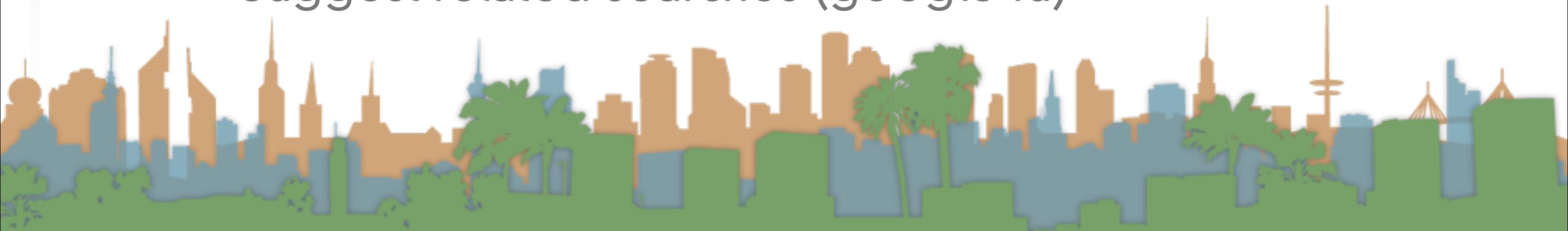
Answering “the need behind the query”

- The query is often an imprecise indicator of what the user really wants
- What can we do to get a better handle on the underlying information need?
- Query language
 - Adjust rank of English results for a Japanese query
- Use user context
 - In particular geographic context



Answering “the need behind the query”

- Guess what type of information the user wants
 - a web page?
 - a map?
 - a stock price?
 - what else?
- Correct queries
 - Suggest correct spellings
 - Suggest related searches (google-fu)



Examples - language



The screenshot shows a web browser window titled "kitakurihama - Google Search". The address bar contains "http://www.google.com/search?hl=en&cli" and the search bar contains "kitakurihama". The browser's tab bar shows several open tabs, including "Last open", "Class Development", "Research Links", "UCI", "Thesis pages", "DR", "Conferences", and "Place Lab". The search results page displays the Google logo, the search term "kitakurihama", and a "Search" button. Below the search bar, it indicates "Results 1 - 10 of about 276 for kitakurihama. (0.12 seconds)".

Web [Images](#) [Maps](#) [News](#) [Shopping](#) [Gmail](#) [more](#) ▼

[donald.j.patterson.iii@gmail.com](#) | [Web History](#) | [My Account](#) | [Sign out](#)

Google [Search](#) [Advanced Search](#) [Preferences](#)

Web Results 1 - 10 of about 276 for **kitakurihama**. (0.12 seconds)

Did you mean: [kujukurihama](#)

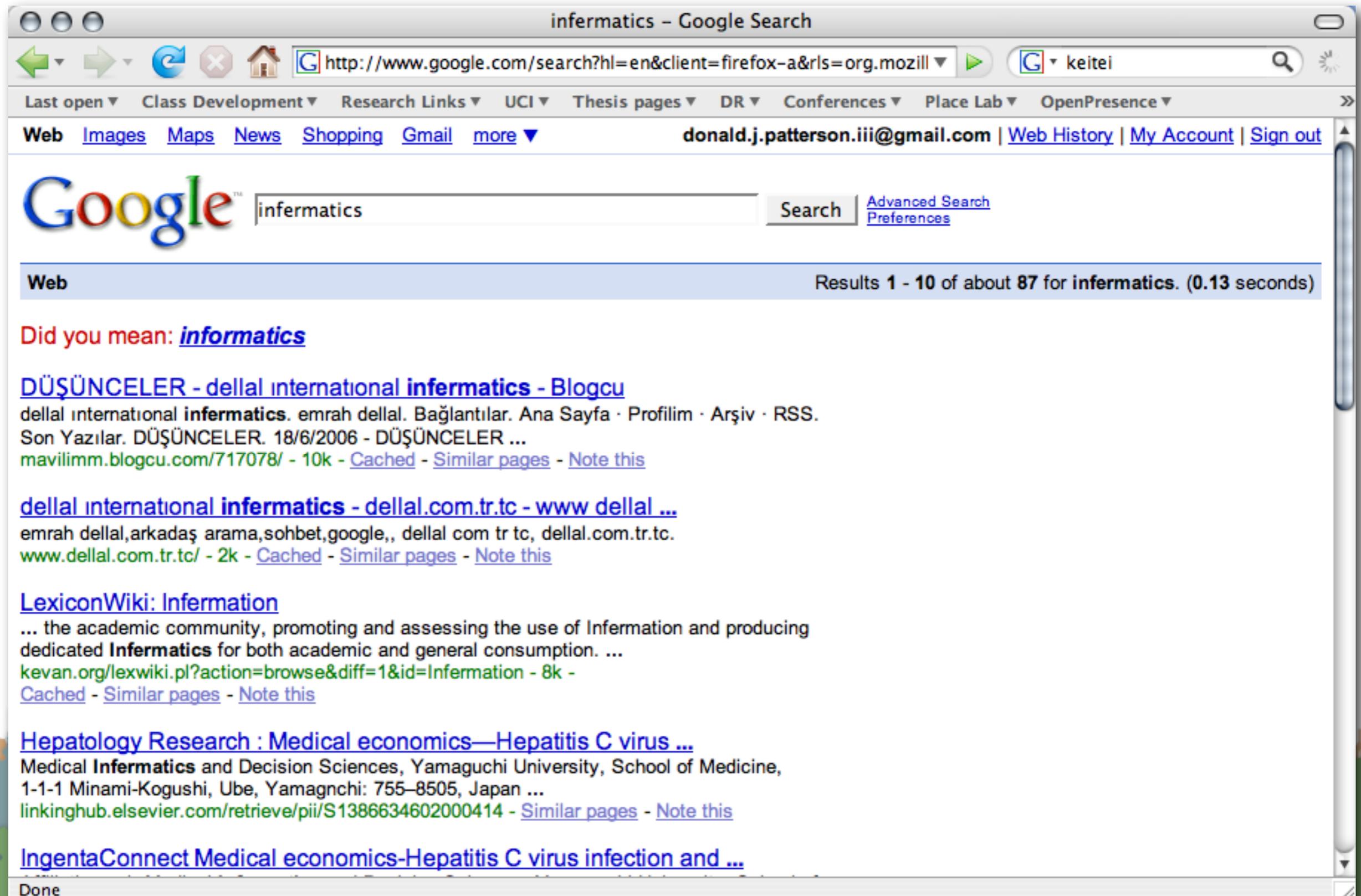
[MySpace.com - Nasty - Kitakurihama, Kanagawa - Hip Hop - www ...](#)
MySpace music profile for Nasty with tour dates, songs, videos, pictures, blogs, band information, downloads and more.
[profile.myspace.com/index.cfm?fuseaction=user.viewprofile&friendid=1000891776](#) - 48k - [Cached](#) - [Similar pages](#) - [Note this](#)

[Kitakurihama](#) - [[Translate this page](#)]
Kitakurihama. 1 to 7 out of 7 Glee land (グリーンランド) Karaoke box HAIR CLINIC TAIRA (ヘアクリニック タイラ) Hairdressing and cosmetics TAKOCHU (たこ忠) ...
[p.bari3.net/.../lookup2.asp?agntcd=1802&ct1=&ct1_nm=&ct2=007&ct2_nm=Kitakurihama&lv=1](#) - 5k - [Cached](#) - [Similar pages](#) - [Note this](#)

[保育所ちびっこランド 北久里浜園](#) - [[Translate this page](#)]
混合自由保育で三育法を実践。
[www.kidslink.jp/chibikko-kitakurihama/](#) - 2k - [Cached](#) - [Similar pages](#) - [Note this](#)

[YuDiary](#)
i waited for my friend on **kitakurihama** station at 1:00pm. there are a lot of fields in misakiguchi. i drove my car from **kitakurihama** station to his house. ...
[idauyutajifu.blogspot.com/](#) - 61k - [Cached](#) - [Similar pages](#) - [Note this](#)

Examples - query spelling



The screenshot shows a web browser window titled "infermatics - Google Search". The address bar contains the URL "http://www.google.com/search?hl=en&client=firefox-a&rls=org.mozilla" and the search bar contains the query "infermatics". The search results page displays the Google logo, a search button, and a status bar indicating "Results 1 - 10 of about 87 for infermatics. (0.13 seconds)". Below the status bar, a red suggestion "Did you mean: [informatics](#)" is shown. The first search result is titled "DÜŞÜNCELER - dellal international infermatics - Blogcu" and includes a snippet: "dellal international infermatics. emrah dellal. Bağlantılar. Ana Sayfa · Profilim · Arşiv · RSS. Son Yazılar. DÜŞÜNCELER. 18/6/2006 - DÜŞÜNCELER ... mavalimm.blogcu.com/717078/ - 10k - [Cached](#) - [Similar pages](#) - [Note this](#)". The second result is titled "dellal international infermatics - dellal.com.tr.tc - www dellal ..." and includes a snippet: "emrah dellal,arkadaş arama,sohbet,google,, dellal com tr tc, dellal.com.tr.tc. www.dellal.com.tr.tc/ - 2k - [Cached](#) - [Similar pages](#) - [Note this](#)". The third result is titled "LexiconWiki: Infermation" and includes a snippet: "... the academic community, promoting and assessing the use of Infermation and producing dedicated **Infermatics** for both academic and general consumption. ... kevan.org/lexwiki.pl?action=browse&diff=1&id=Infermation - 8k - [Cached](#) - [Similar pages](#) - [Note this](#)". The fourth result is titled "Hepatology Research : Medical economics—Hepatitis C virus ..." and includes a snippet: "Medical **Infermatics** and Decision Sciences, Yamaguchi University, School of Medicine, 1-1-1 Minami-Kogushi, Ube, Yamaguchi: 755-8505, Japan ... linkinghub.elsevier.com/retrieve/pii/S1386634602000414 - [Similar pages](#) - [Note this](#)". The fifth result is titled "IngentaConnect Medical economics-Hepatitis C virus infection and ...". The browser's status bar at the bottom shows "Done".

Examples - query expansion

The screenshot shows a browser window titled "Live Search: rock". The address bar contains the URL "http://search.live.com/results.aspx?q=rock&go=Search&mkt=en-l". The search bar contains the text "rock" and a green "Search" button. Below the search bar, there are navigation links: "Home", "Hotmail", "Spaces", "OneCare", and "Sign in".

Web results 1-10 of 441,000,000
See also: [Images](#), [Video](#), [News](#), [Maps](#), [MSN](#), [More](#) ▼

The Rock - [Jellyfish.com/Movies](#) Sponsored sites
Shop and compare prices across stores. Rebates up to \$1.10.

Rock.com® - The Official Site of Rock Music®
Free Email & Free Music Downloads by **Rock.com**. Get Free Internet Radio, Music Downloads & more. Get your free @rock.com email today
[www.rock.com](#) · [Cached page](#)

Rock music - Wikipedia, the free encyclopedia
Rock music is a form of popular music with a prominent vocal melody accompanied by guitar , drums , and bass . Many styles of **rock** music also use keyboard instruments such as organ ...
[en.wikipedia.org/wiki/Rock_music](#) · [Cached page](#)

Rock and roll - Wikipedia, the free encyclopedia
Rock and roll is a genre of music that evolved in the United States in the late 1940s and early 1950s, and quickly spread to the rest of the world.
[en.wikipedia.org/wiki/Rock_and_roll](#) · [Cached page](#)
[Show more results from en.wikipedia.org](#)

Rock - Australia's Climbing Magazine
Subscription information. Overview of current issue. Classifieds. Back issues and guide books for sale.

Related searches
[Rock Music](#)
[Rocks Minerals](#)
[Pictures Of Rocks](#)
[Rock Star](#)
[Kid Rock](#)
[Rock Cycle](#)
[Hard Rock Cafe](#)

Sponsored sites
Free Rock Music
Listen To Your Favorite Music Now!
It's Free with the Music Toolbar
[Music.alot.com](#)

The Rock
Interviews with Stars, Newsmakers & Icons at The Biography Channel®.
[www.biography.com](#)

Rock Videos
Enjoy Savings & Selection on **Rock** Videos!
[Shopzilla.com](#)

Done

Query shortcuts

- Map: "irvine, ca 92614"
- Calculation: "5+4"
- Flight Info: "american airlines 715"
- Stock price: "msft"
- Unit conversion: "1 dollar in euro"
- Music: "White Stripes"



Query shortcuts taken to the extreme



when is the next solar eclipse?



Input interpretation:

next solar eclipse after today

Eclipse type:

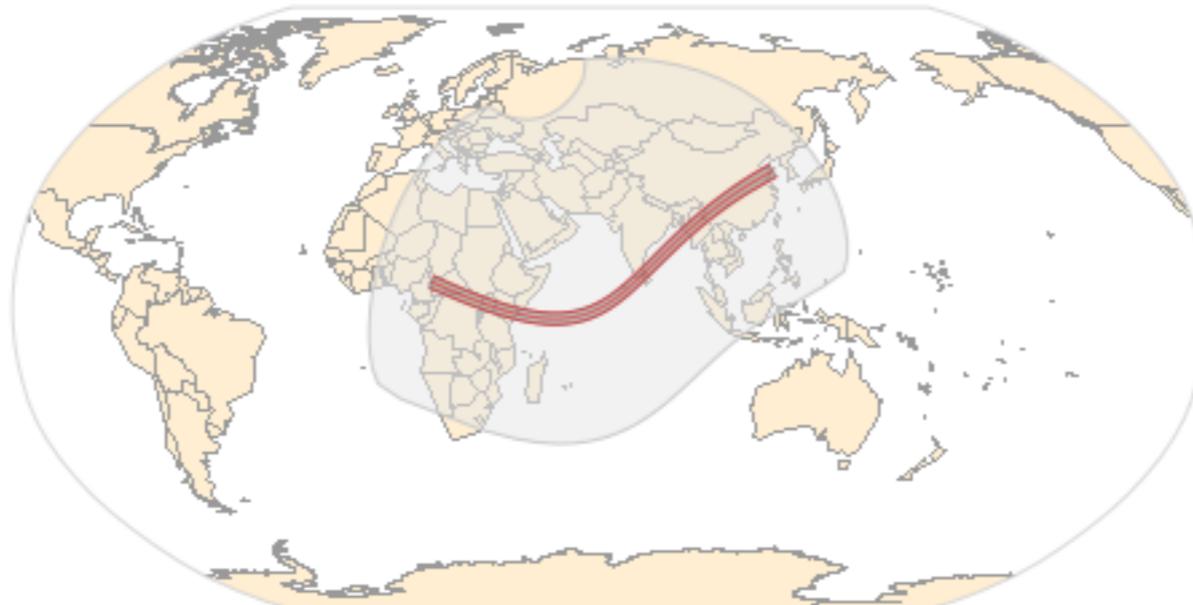
annular

Eclipse date:

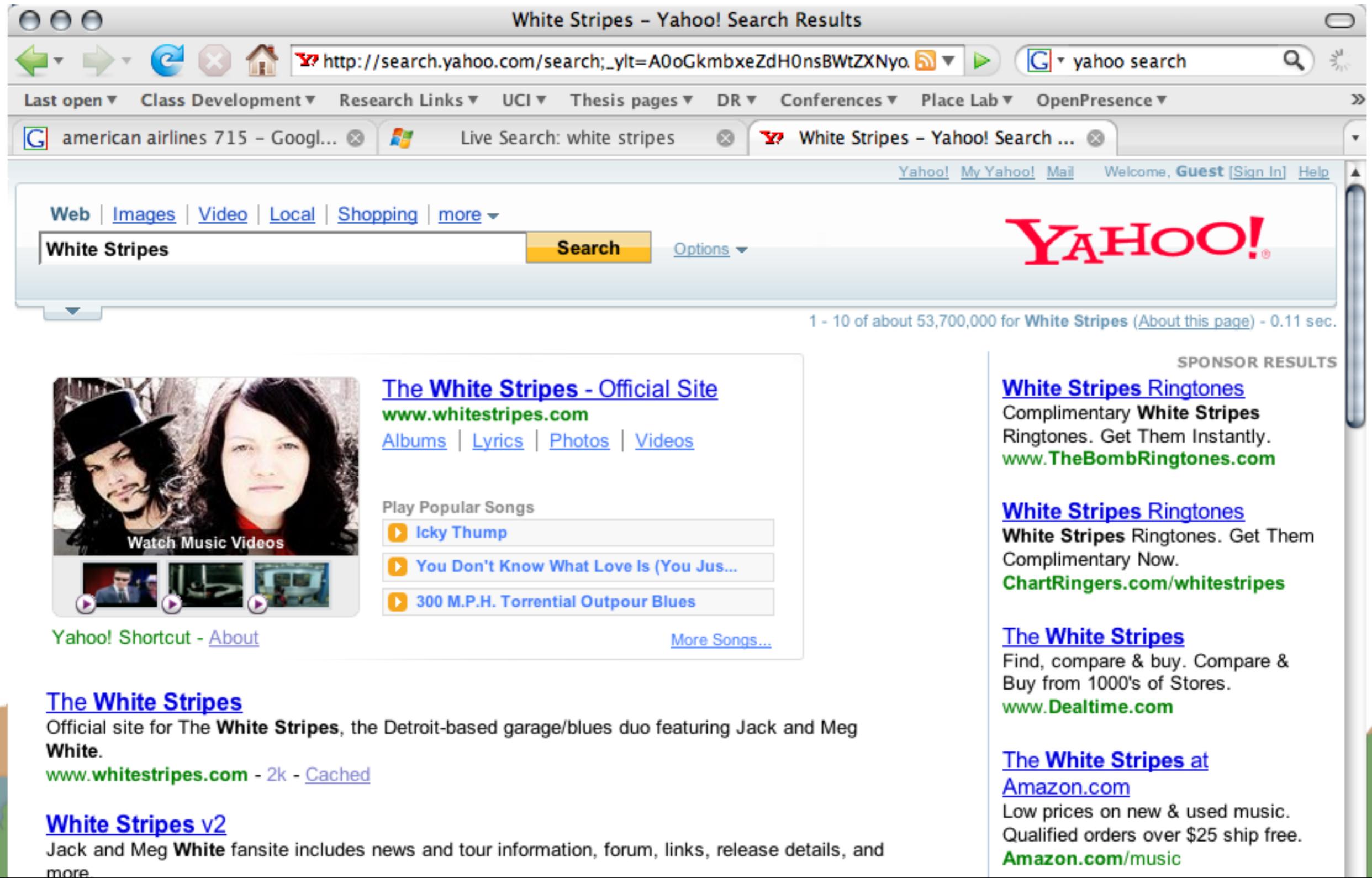
11:06 pm PST | Thursday, January 14, 2010 (7.344 days from now)

Eclipse path:

Show 3D | Orthographic projection



Examples - query shortcuts



The screenshot shows a web browser window titled "White Stripes - Yahoo! Search Results". The address bar contains the URL http://search.yahoo.com/search;_ylt=A0oGkmbxeZdH0nsBWtZXNyo. The search bar contains the text "White Stripes" and a "Search" button. The page displays search results for "White Stripes", including a featured snippet for the official site, a "Play Popular Songs" section, and several sponsored results for ringtones and music purchases.

White Stripes - Yahoo! Search Results

http://search.yahoo.com/search;_ylt=A0oGkmbxeZdH0nsBWtZXNyo

american airlines 715 - Googl... Live Search: white stripes White Stripes - Yahoo! Search ...

Web | Images | Video | Local | Shopping | more

White Stripes Search Options

YAHOO!

1 - 10 of about 53,700,000 for White Stripes (About this page) - 0.11 sec.

The White Stripes - Official Site
www.whitestripes.com
Albums | Lyrics | Photos | Videos

Play Popular Songs

- Icky Thump
- You Don't Know What Love Is (You Jus...
- 300 M.P.H. Torrential Outpour Blues

More Songs...

Watch Music Videos

Yahoo! Shortcut - [About](#)

The White Stripes
Official site for The **White Stripes**, the Detroit-based garage/blues duo featuring Jack and Meg **White**.
www.whitestripes.com - 2k - [Cached](#)

White Stripes v2
Jack and Meg **White** fansite includes news and tour information, forum, links, release details, and more

SPONSOR RESULTS

White Stripes Ringtones
Complimentary **White Stripes** Ringtones. Get Them Instantly.
www.TheBombRingtones.com

White Stripes Ringtones
White Stripes Ringtones. Get Them Complimentary Now.
ChartRingers.com/whitestripes

The White Stripes
Find, compare & buy. Compare & Buy from 1000's of Stores.
www.Dealtime.com

The White Stripes at Amazon.com
Low prices on new & used music. Qualified orders over \$25 ship free.
Amazon.com/music

Examples - query shortcuts

The screenshot shows a browser window titled "Live Search: Don Patterson irvine ca". The address bar contains the URL "http://search.live.com/results.aspx?q=Don+Patterson+irvine+ca&gr". The browser has several tabs open, including "american airlines 715 - Googl...", "Live Search: Don Patterson irvin...", and "White Stripes - Yahoo! Search ...". The search results page displays the query "Don Patterson irvine ca" in a search box, with a "Search" button and links for "Advanced" and "Options".

Web results 1-9 of 253,000
See also: [Images](#), [Video](#), [News](#), [Maps](#), [MSN](#), [More](#) ▼

» [Top local listings for Don Patterson near Irvine, CA](#) (1 more) Is this useful? [Yes](#) | [No](#)

- **Don Patterson** (626) 918-1974 15626 Dubesor St, La Puente
- **Don Patterson** (213) 389-7583 226 S Berendo St Apt 205, Los Angeles
- **Don Patterson** (760) 729-6941 2768 Dundee Ct, Carlsbad

[DBLife: University of California-Irvine](#)
Jadwiga Indulska, University of Queensland, Australia **Don Patterson**, University of **California Irvine** , USA Tom Rodden, Nottingham University, UK Program Committee:
dblife.cs.wisc.edu/search.cgi?entity=entity-13655&begin=60 · [Cached page](#)

[DBLife: University of California-Irvine](#)
Jadwiga Indulska University of Queensland, Australia **Don Patterson** University of **California Irvine** , USA Tom Rodden Nottingham University, UK...
dblife.cs.wisc.edu/search.cgi?entity=entity-13655&begin=90 · [Cached page](#)
[Show more results from dblife.cs.wisc.edu](#)

[Jerry M. Patterson](#)
Professor: University of **California** at **Irvine** (2000-) Moulton **Patterson** Associates ... Partner (1967-75) State Bar of **California** 1967. Do you know something we **don't**?
www.pndb.com/people/406/000163914 · [Cached page](#)

Sponsored sites

- [Irvine CA Book Hotel](#)
Visiting California & Need a Hotel?
Reserve Rooms for **Irvine CA!**
www.calibex.com/hotels
- [Locate Don Patterson](#)
Current address and phone available.
Instant results.
www.usa-people-search.com
- [Don Patterson at Amazon](#)
Low prices on new & used music.
Qualified orders over \$25 ship free
amazon.com/music
- [Irvine CA - Cheap Rates](#)
Visiting California & Need a Hotel?
Compare Top Sites for **Irvine CA!**
www.nextag.com/hotels

[See your message here...](#)

Examples - query aggregations

The screenshot shows a web browser window titled "diabetes - Yahoo! Search Results". The address bar contains the URL "http://search.yahoo.com/search;_ylt=A0oGkl24d5dHeL0A2gZXNyof". The search bar contains the text "diabetes" and a "Search" button. The page displays search results for "diabetes", including sponsored results and health-related information.

diabetes - Yahoo! Search Results

http://search.yahoo.com/search;_ylt=A0oGkl24d5dHeL0A2gZXNyof

Yahoo! My Yahoo! Mail Welcome, Guest [Sign In] Help

Web | Images | Video | Local | Shopping | more

diabetes Search Options

1 - 10 of about 222,000,000 for diabetes (About this page) - 0.09 sec.

SPONSOR RESULTS

Free Diabetes Supplies
www.LibertyMedical.com - Medicare Diabetics - Your supplies Could be 100% covered. Learn more.

Diabetes and Pain
www.Cymbalta.com - Diabetic peripheral neuropathic pain (DPNP) -learn about managing it.

Learn About Diabetes
www.Type2Diabetes-Info.com - Learn more about type 2 diabetes including treatment options.

Diabetes Learning Center
Educational site explains how to manage type 1 and type 2 diabetes.
www.bddiabetes.com

Manage Diabetes Naturally
Sugar Free Psyllium Fiber Products for Type 2 Diabetes. Order Online.
www.konsyl.com

Diabetes
Get a Free Meter from Liberty if You have Diabetes & on Medicare.
www.Diabetic-Testing-Supplies.com

Diabetes Is Info
Get Info on Diabetes Is from 14 search engines in 1.
www.info.com

Diabetes Information - Health Results

Articles	Community	Other Resources
Symptoms	Yahoo! Groups	National Institute of Diabetes &...
Treatments	Ask a Question	American Diabetes Association
Medications	Read Q & A	MedlinePlus: Diabetes

Yahoo! Shortcut - [About](#)

CDC: Basics About Diabetes
Fact sheet about diabetes covering its common symptoms, risk factors, and management options.
www.cdc.gov/diabetes/faq/basics.htm - 36k - [Cached](#)

American Diabetes Association

Losing Income Due to Diabetes

Context

- Context determination
 - Spatial
 - User Location
 - IP geocoding
 - cell phone localization
 - User input (“make this my home”)
 - Web page location
 - Target Location
 - “SNA” maps to a latitude and longitude



Context

- Query Stream
 - Previous queries have influence
- Personal Search
 - Your profile and history have influence
- Explicit
 - You choose to use a vertical search engine



Context

- Implicit Context
 - google.fr is the default in france
 - User Location and Target Location



Context Use

- Restrict Results / Delete inappropriate results
- Rerank results based on context
- Change the content presentation
 - Language etc.
 - Specifying a context is built into some of the search APIs



Helping the user

The screenshot shows a web browser window with the Amazon.com search results for "single cookbook". The browser's address bar shows the URL: <http://www.amazon.com/exec/obidos/search-handle-url/index=blend>. The search bar contains "single cookbook" and the "GO" button is highlighted. The page header includes the Amazon logo, navigation links like "Your Amazon.com", "Today's Deals", "Gifts & Wish Lists", "Gift Cards", "Your Account", and "Help". Below the header, there are buttons for "Shop All Departments", "Search Amazon.com", and "Your Lists".

The search results are displayed under the heading "single cookbook" and "Showing Top Results". The results are paginated, showing "Page: 1 2 3 | Next".

The first result is "Serves One: Simple Meals to Savor When You're on Your Own" by Toni Lydecker (Paperback - Dec 25, 2005). The price is \$11.53 (was \$16.95), with 26 used and new copies available from \$7.94. It is eligible for FREE Super Saver Shipping and has 8 five-star reviews.

The second result is "Eating in: The Official Single Man's Cookbook" by Rich Lippman, Jose Maldonado, and Joe Azar (Paperback - Oct 1988). The price is \$8.95 (was \$16.95), with 11 used and new copies available from \$5.92. It is not in stock but will be delivered when available, and is eligible for FREE Super Saver Shipping. It has 2 five-star reviews.

The third result is "Going Solo in the Kitchen" by Jane Doerfer (Paperback - Aug 25, 1998). The price is \$11.53 (was \$16.95), with 33 used and new copies available from \$7.45. It is eligible for FREE Super Saver Shipping.

On the left side of the page, there is a "Listmania!" section with a "Cooking - Just the two of us/you: A list by Laura" and a "Biggest Eater Cookbook". Below this is a "Search Listmania!" search bar with a "GO!" button.

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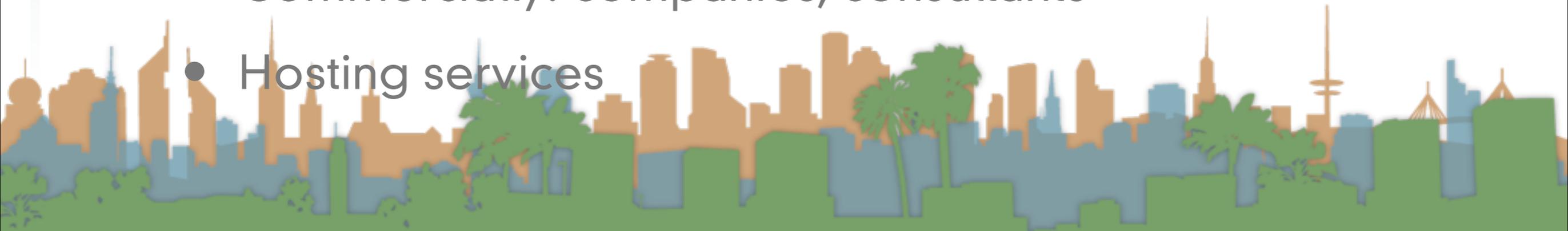
The trouble with paid placement (aka ads):

- It costs money... so instead
- Search Engine Optimization (“SEO”)
 - define: “Tuning” your web page to rank highly in the search results for select queries
 - Alternative to paying for placement
 - It is marketing. Getting your content to your audience.



Search Engine Optimization

- Motives
 - Commercial
 - Political
 - Religious
 - Lobbying
- Who does this?
 - Internally: webmasters
 - Commercially: companies, consultants
 - Hosting services



Search Engine Optimization

- Learn more about how to do it online:
 - Web-Master World
 - <http://www.webmasterworld.com>
 - Search Engine Specific Tricks
 - Discussions about academic papers and results

 **Content creation vs link building**

Let's get the IncrediBills and the like to pitch in on this one

 **Moved: 2 pages on site %55 similar - duplicate content or not?** 

Post was moved here: <http://www.webmasterworld.com/google/3537427.htm>

 **Ideal length of content for SEO purposes?**

How long should an article be?

 **Source of Competitor's Traffic from a Major .com?**

No apparent outlinks from the site to competitor's site

 **Moved: week old website ranked #14 in google for main keyword** 

Post was moved here: <http://www.webmasterworld.com/google/3535334.htm>

Search Engine Optimization

- There are ethical and unethical ways to approach SEO
- Legitimate approach is to:
 - create valuable content
 - make it widely accessible
 - clearly organize it
 - keep it up to date
 - use web standards
 - use web validation tools
 - get high visibility sites to link to your content



Search Engine Optimization

- Inethical approaches (aka spam):
 - lots of tricks
 - make lots of fake pages which point to your site
 - make lots of fake comments on sites which point to your site
 - In a nutshell, “lie”
 - Sometimes legitimate and illegitimate techniques are hard to differentiate. It can be a fine line between them.



Search Engine Optimization

- Ranking depends on the data center
- http://www.flickr.com/photos/the_impression_that_i_get/1321041609/
- Examine the different results:
- <http://www.mcdar.net/dance/index.php>

