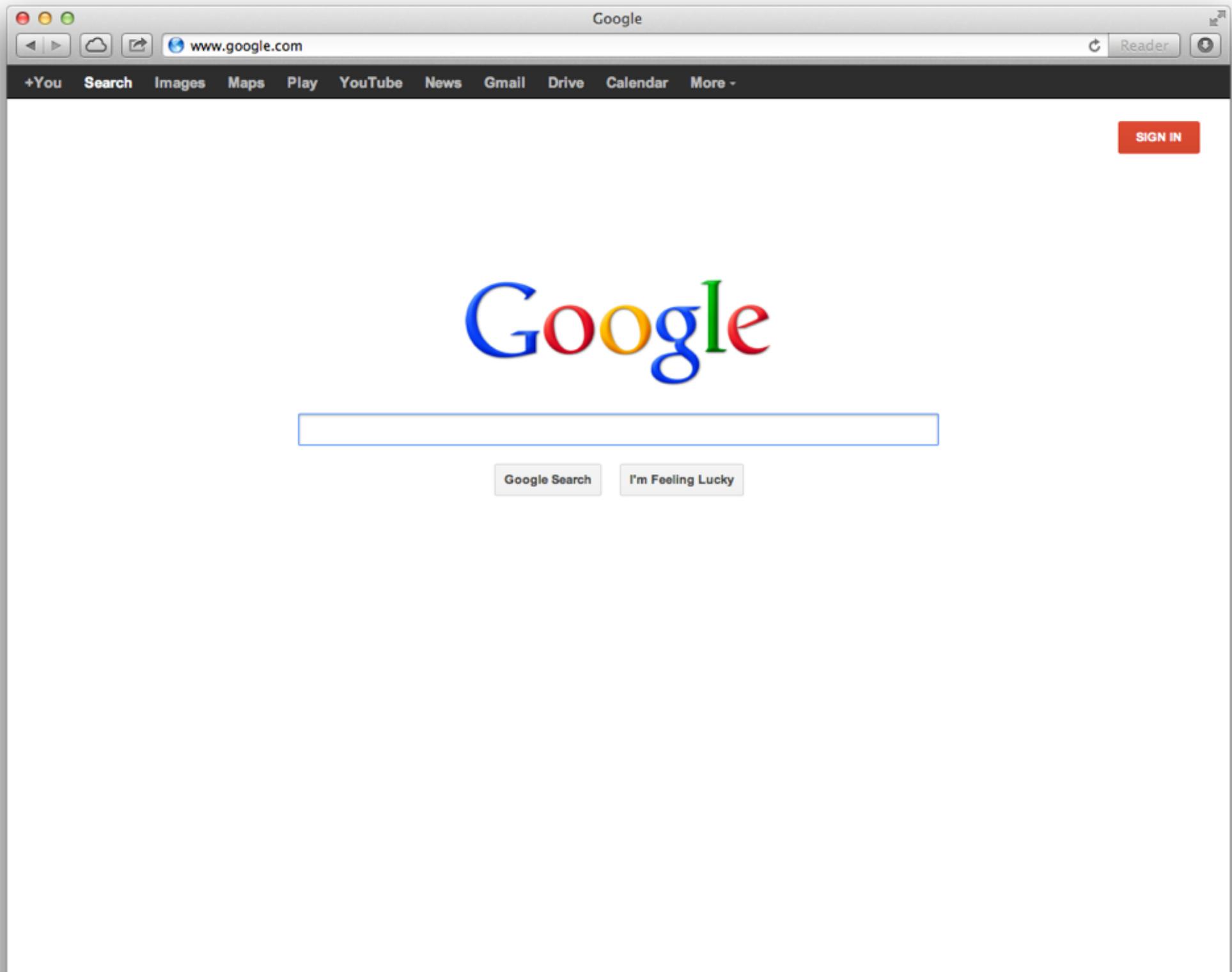


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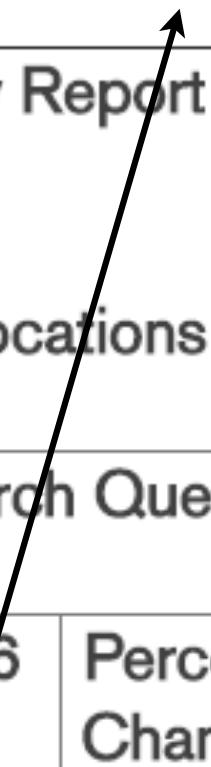
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Texas A&M University
Department of Computer Science & Engineering
Instructor: Prof. James Caverlee

Course Overview
17 January 2017

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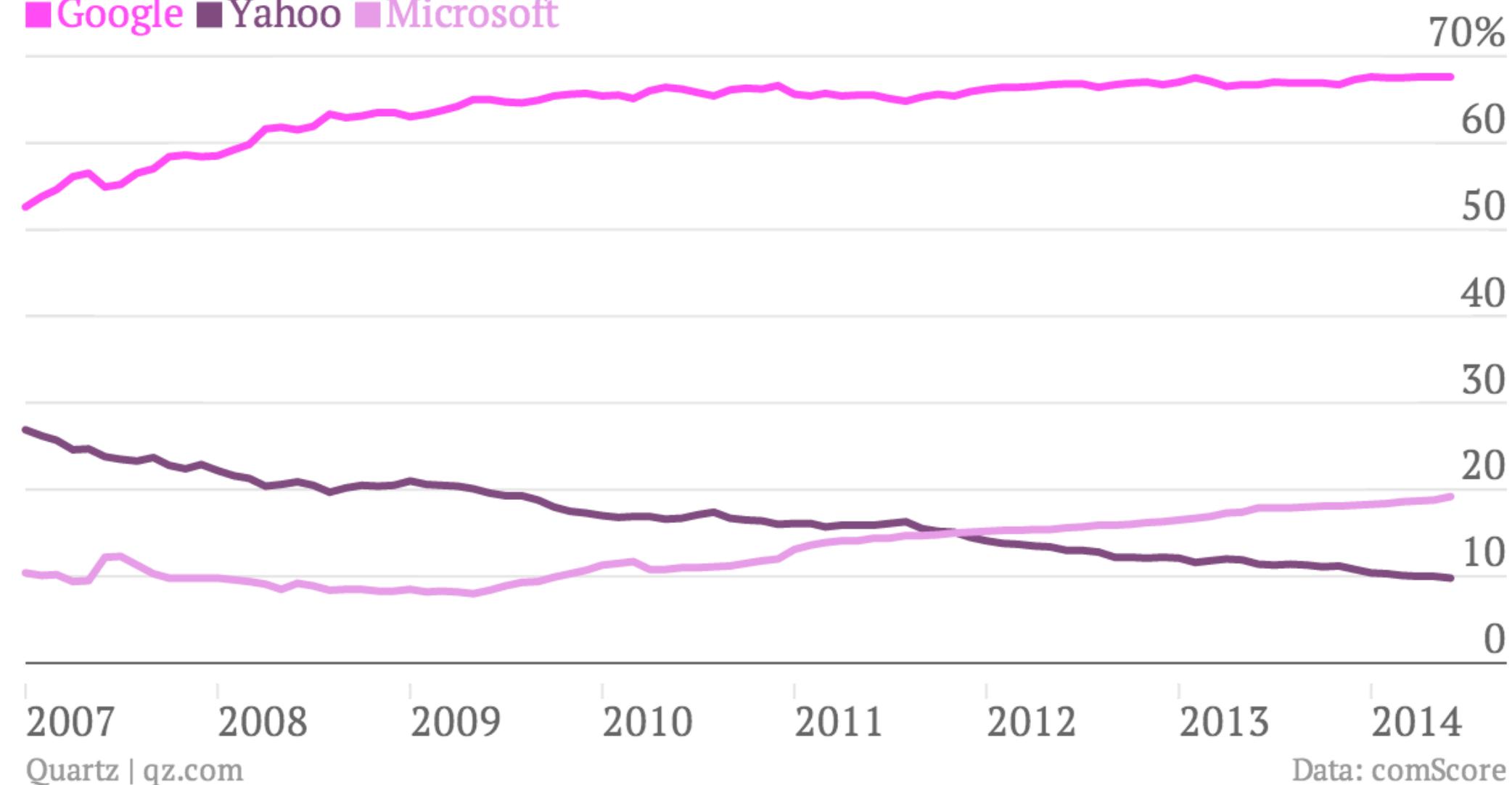


That's 16.8 Billion desktop searches
in February in the US



Core Search Entity	Explicit Core Search Queries (MM)		
	Jan-16	Feb-16	Percent Change
Total Explicit Core Search	17,482	16,823	-4%
Google Sites	11,156	10,762	-4%
Microsoft Sites	3,717	3,594	-3%
Yahoo Sites	2,165	2,048	-5%
Ask Network	289	273	-5%
AOL, Inc.	154	145	-6%

US web search market share
■ Google ■ Yahoo ■ Microsoft



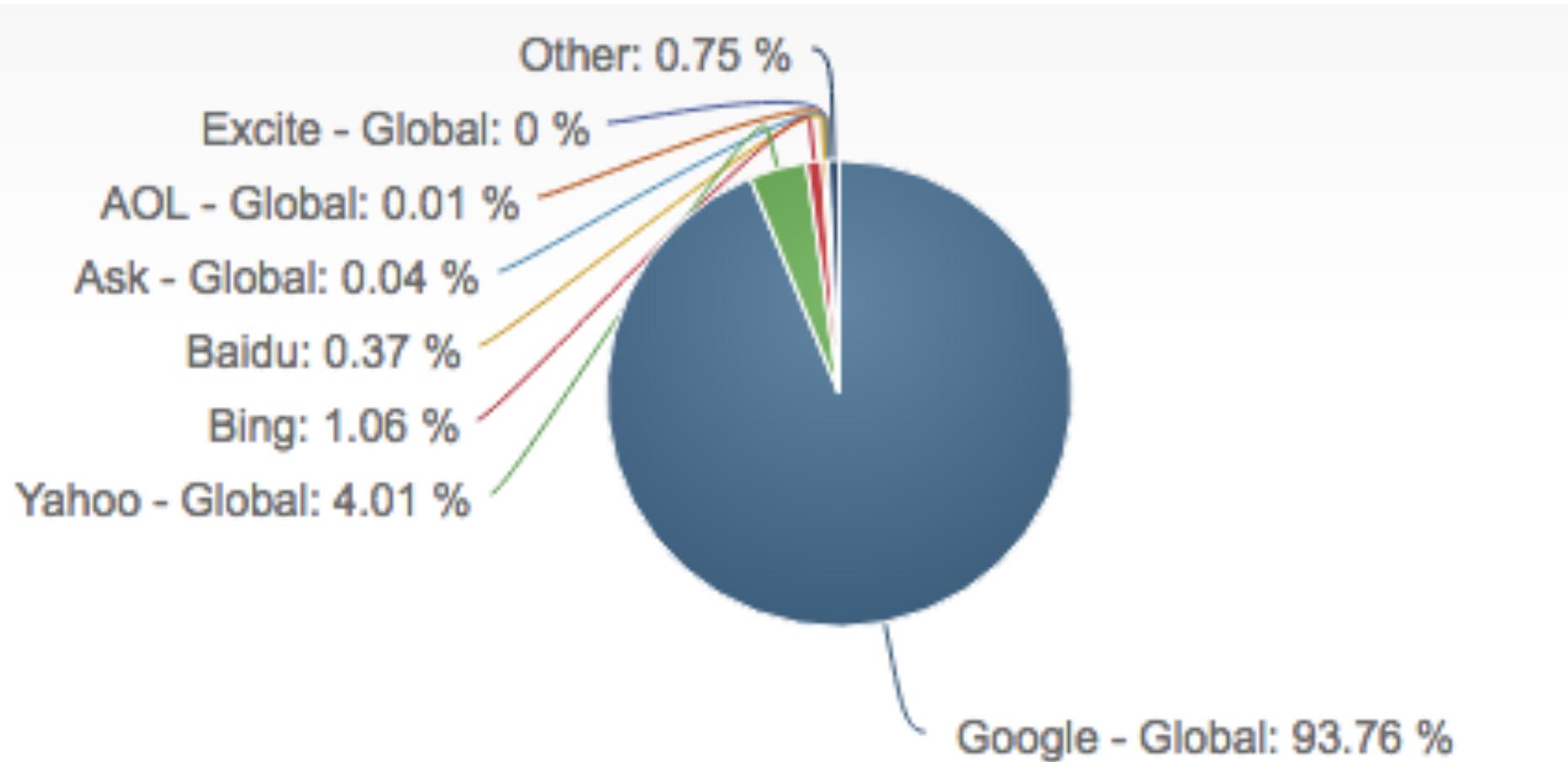
It's Official: Google Says More Searches Now On Mobile Than On Desktop

Company officially confirms what many have been anticipating for years.

Greg Sterling on May 5, 2015 at 12:34 pm



Mobile/Tablet Search Engine Market Share



General Motors Company (NYSE:GM)

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Real-time: 11:45AM EST

NYSE real-time data - Disclaimer
Currency in USD

Range	37.27 - 37.69	Div/yield	0.38/4.06
52 week	26.69 - 38.16	EPS	8.74
Open	37.34	Shares	1.52B
Vol / Avg	3.01M/15.62M	Beta	1.40
Mkt cap	56.75B	Inst. own	74%
P/E	4.26		

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Alphabet Inc (NASDAQ:GOOGL)

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827.16 -3.78 (-0.45%)

Real-time: 11:46AM EST

NASDAQ real-time data - Disclaimer

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Range	823.20 - 830.45	Div/yield	-
52 week	672.66 - 839.00	EPS	27.32
Open	830.00	Shares	296.09M
Vol / Avg.	518,273.00 / 1.50M	Beta	0.89
Mkt cap	563.15B	Inst. own	82%
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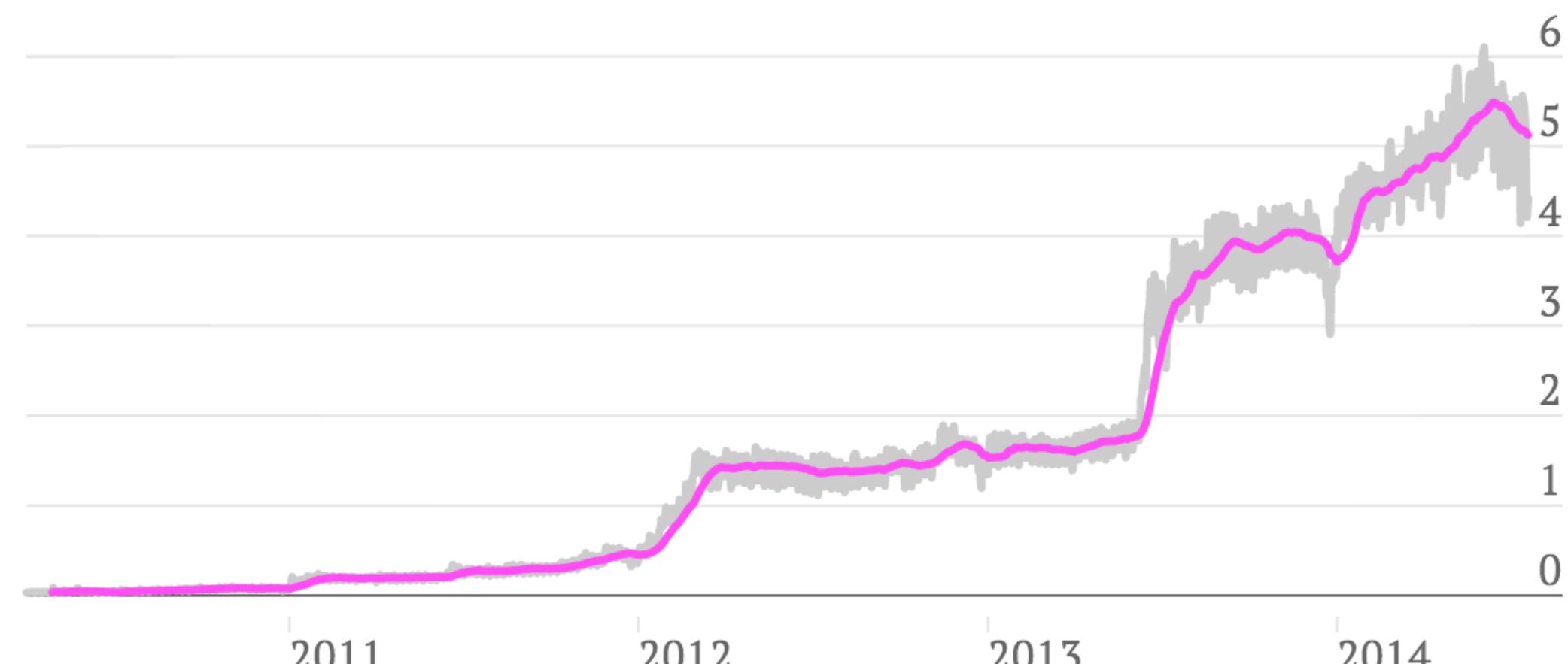


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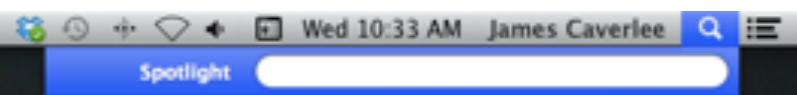
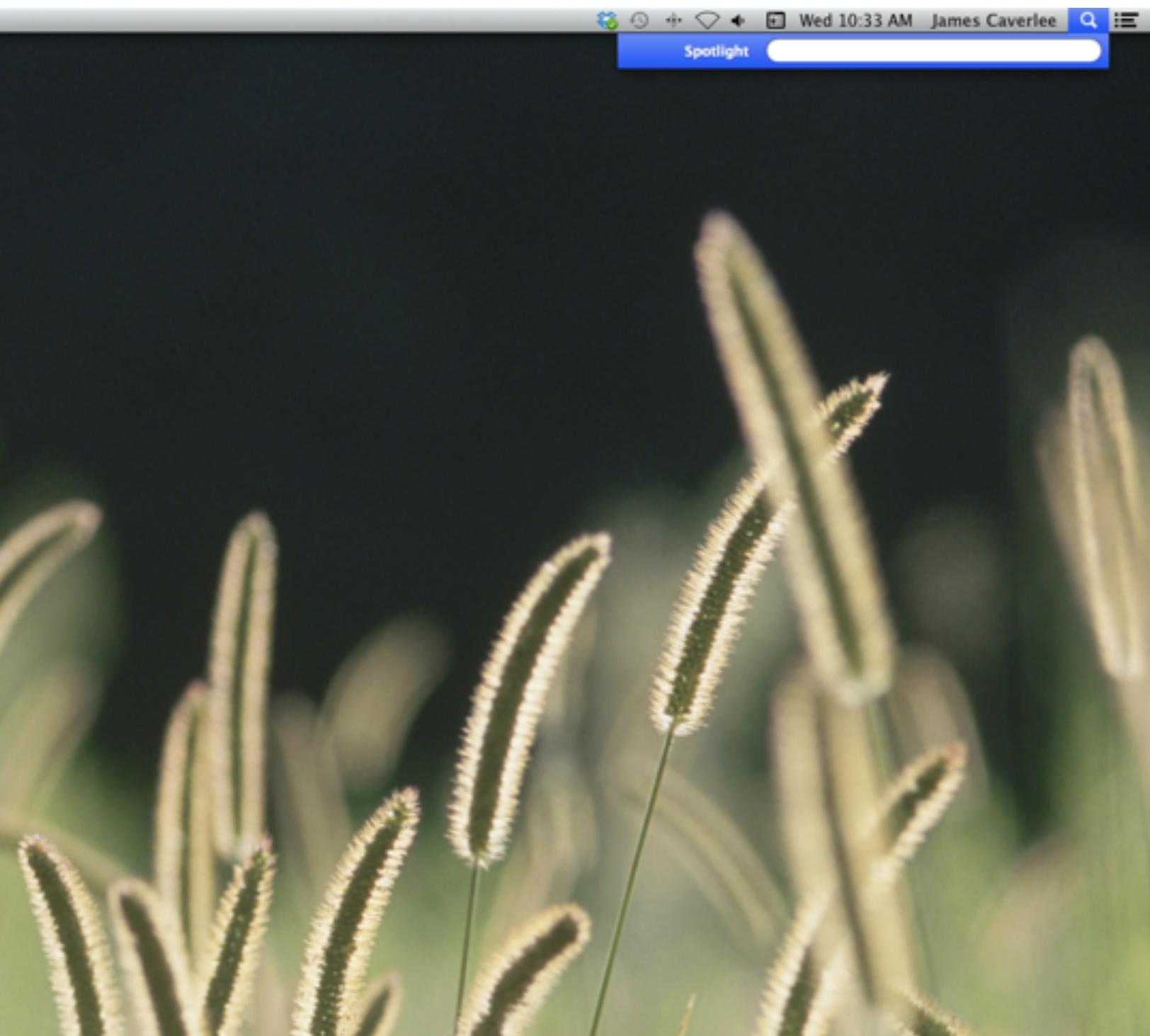
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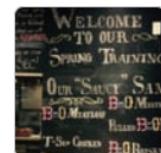
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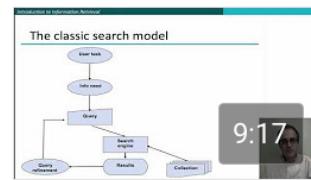
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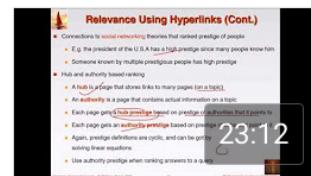
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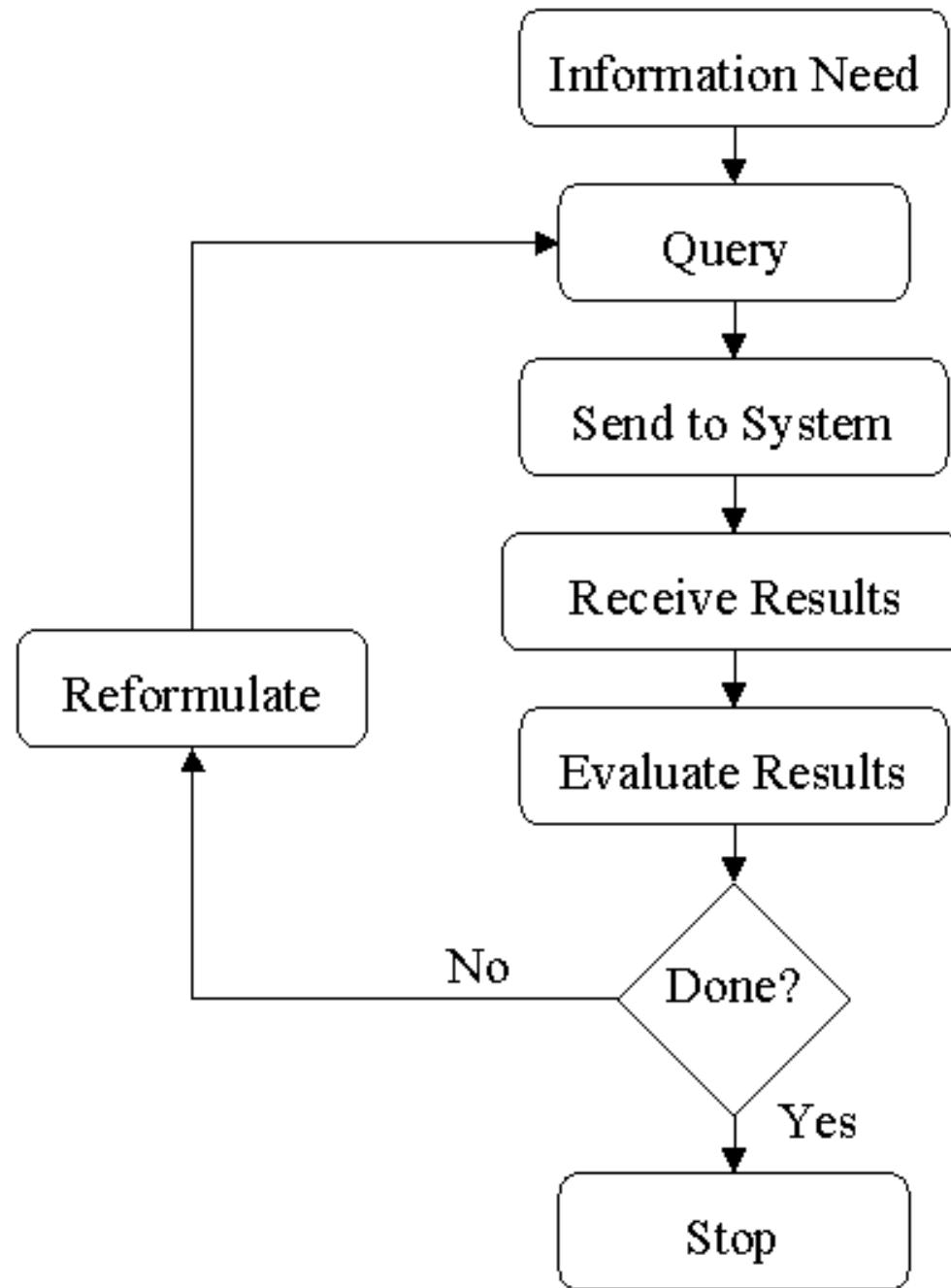


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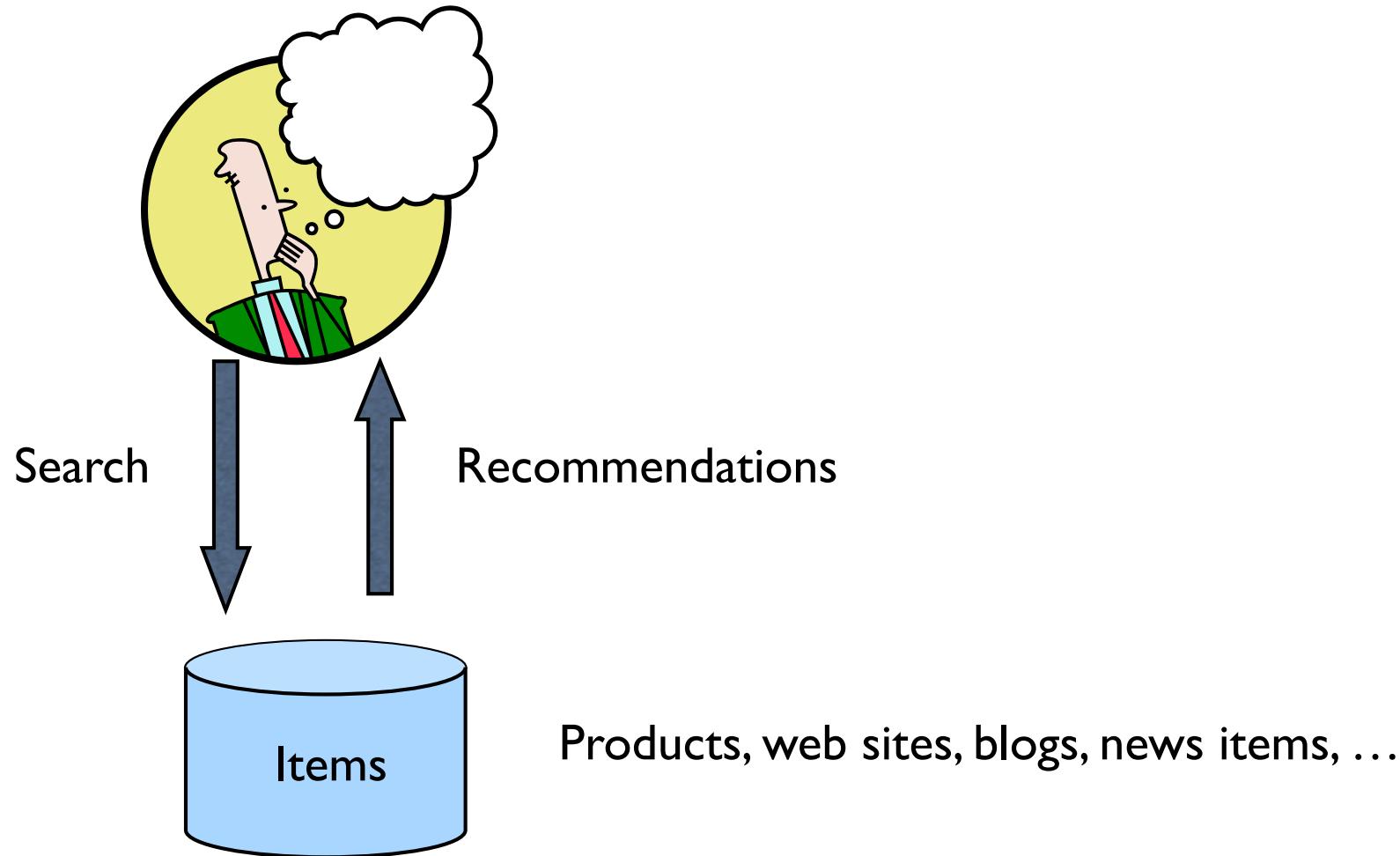
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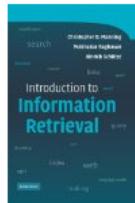
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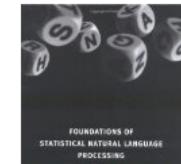
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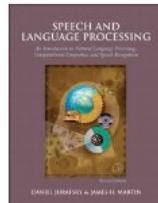
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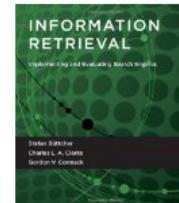
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 Super similarity

Rixton
68,883 listeners

Rixton are a British Pop/Rock/R&B band from Manchester, UK. Members of Rixton are lead singer and rhythm guitarist Jake Roche, bass/keys, backing vocalist Danny Wilkin, lead guitarist and backing vocalist, Charley Bagnall, and drummer Lewi Morgan.

 Super similarity

Meghan Trainor
28,437 listeners

Meghan was in the band Island Fusion for 4 years. She sang lead and back-up vocals, performed keyboards, guitar, and auxiliary percussion. The band performed many events and fund-raisers on Nantucket Island, including opening for Jamaican artist Beenie Man.

 Very high similarity

Katy Tiz
10,534 listeners

I sing, in the shower. Maybe one day I'll get a real job. Monsters made me do it. @KatyTizMusic "I'm always the loud one," smiles Katy Tiz.

 High similarity

Echosmith
48,925 listeners

 Medium similarity

Jacquie Lee
22,458 listeners

 Medium similarity

Troye Sivan
14,333 listeners

+ compelling
applications built on
IR principles



Google Search

images.google.com/search?hl=en&tbs=simg:CAESZRpjCxCo1NgEGgIIPQwLELCMpwgAAo6CAESFOwG5QaFB-YDhAf0

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Web Images Maps Shopping More Search tools

Size Color Type Time Visually similar More tools

Identify music in as little as 1 sec



Carrier 12:17

Mirrors

J T THE 20/20 EXPERIENCE AVAILABLE NOW iTunes

Mirrors
Justin Timberlake Download on iTunes

LyricPlay **T H E 2 0 / 2 0**
E X P E R I E N C E

Share Tweet More

Recommendations >

YouTube Videos >

A screenshot of the Shazam mobile application interface. At the top, it shows 'Carrier', signal strength, time '12:17', and battery level. The main title 'Mirrors' is displayed above the album art for Justin Timberlake's song 'Mirrors'. Below the album art, there are download links for 'iTunes' and 'LyricPlay'. The central part of the screen features the album cover art, which is a black and white photograph of Justin Timberlake's face where his facial features are replaced by various mechanical and electronic components like gears, knobs, and circuit boards. Below the album art, there are social sharing buttons for Facebook, Twitter, and more options, followed by two large buttons for 'Recommendations' and 'YouTube Videos'.

Google Translate

translate.google.com/#auto/es/This%20class%20is%20the%20best!

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Google

SIGN IN

Translate From: English - detected To: Spanish Translate

English Spanish French English - detected

English Portuguese Spanish

This class is the best! Esta clase es la mejor!

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Tweets >
Following >
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Favorites >
Lists >

Tweet to Aaron Durand

@everydaydude




3,844 TWEETS 223 FOLLOWING 6,809 FOLLOWERS

Aaron Durand
@everydaydude  FOLLOW YOU
Old man rap fan. I work @ Twitter.
San Francisco · about.me/everydaydude

Tweets

 **Billy Mabray** @billygoat
I predicted the new iPhone connect...
exact words were, "I finally have en...
 Retweeted by Aaron Durand
[Expand](#)

 **Aaron Durand** @everydaydude

Following 

- [Tweet to @everydaydude](#)
- [Send a Direct Message](#)
- [Add or remove from lists...](#)
- [Block @everydaydude](#)
- [Report @everydaydude for spam](#)
- [Turn off Retweets](#)
- [Turn on mobile notifications](#)

Similar to Aaron Durand >

Question Answering



This class

This class

- “Information Storage and Retrieval”
- Commonly called “Information Retrieval” or “IR”
- Textbook definition:

IR is finding material (usually documents) of an unstructured nature (usually text) that satisfies an information need from within large collections (usually stored on computers).

This class

- More broadly: **web search and recommender systems**
- What makes a system like Google or Bing (?) or Amazon or Netflix tick?
- What tricks does it use?
- How can those approaches be made better?
- What can we do to make things work more quickly?
- How do we decide whether it works well?
- ...
- **and (more generally) what are the principle ideas, algorithms, and systems for organizing information?**

This class

- By the end of the semester, I want each of you to have a **general purpose toolkit** of cool algorithms, approaches, and tricks
 - (Not just for Web search or for Information Retrieval)
- Examples:
 - PageRank (applied to Web, social networks, credit card transactions, ...)
 - k-means
 - Naive Bayes
 - Latent factor models
 - Shingling
 - ...

Brief History of “IR”



Sumerian tokens
4000 BC

History of the (IR) World



- Library of Alexandria
3rd Century BC
 - 500,000 volumes
 - catalogs and classifications
 - “controlled vocabularies”

to College Station, TX 77843 – Google Maps مكتبة الإسكندرية



http://maps.google.com/maps?client=safari&rls=en&q=library+of+alexandria&oe=UTF-8&um=1&ie=UTF-8

library of alexandria



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Search Maps

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(A) Egypt (Library of Alexandria)

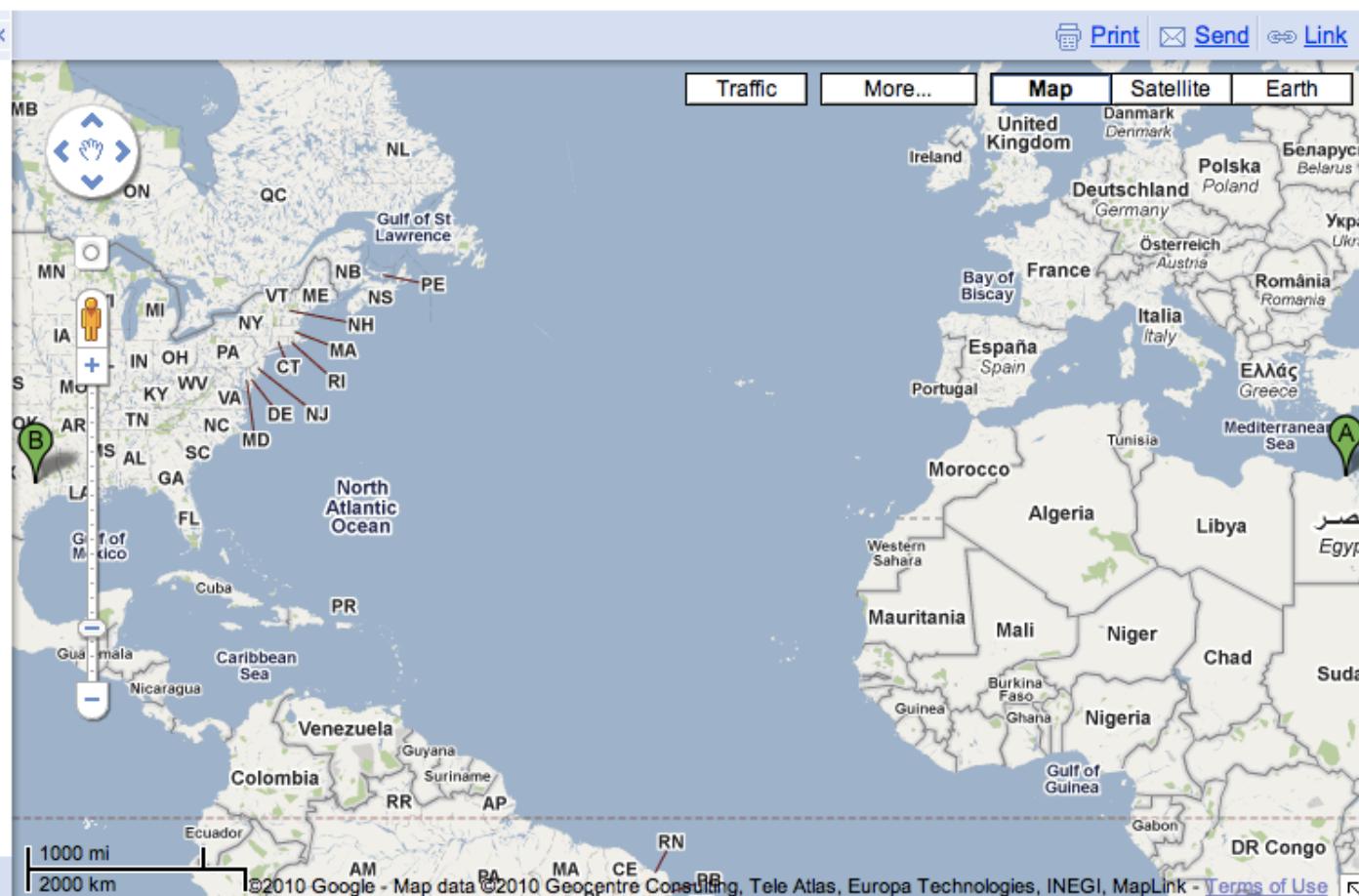
(B) College Station, TX 77843

Add Destination Show options

Get Directions

We could not calculate directions between Egypt (Library of Alexandria) and College Station, TX 77843.

Map data ©2010 Europa Technologies, INEGI, Tele Atlas



77843 | library of... | library of...



Controlled Vocabulary Indexing

ODP – Open Directory Project

http://www.dmoz.org/ Google

Most Visited Getting Started Latest Headlines

d m o z open directory project In partnership with AOL search

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Kids and Teens Arts, School Time, Teen Life...	News Media, Newspapers, Weather...	Recreation Travel, Food, Outdoors, Humor...
Reference Maps, Education, Libraries...	Regional US, Canada, UK, Europe...	Science Biology, Psychology, Physics...
Shopping Clothing, Food, Gifts...	Society People, Religion, Issues...	Sports Baseball, Soccer, Basketball...
World Català, Dansk, Deutsch, Español, Français, Italiano, 日本語, Nederlands, Polski, Русский, Svenska...		

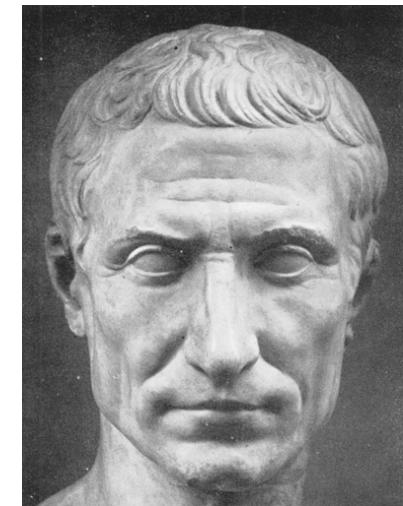
Become an Editor Help build the largest human-edited directory of the web

Copyright © 1998-2009 Netscape

4,598,551 sites - 82,103 editors - over 590,000 categories



History of the (IR) World



48 BC

History of the (IR) World

- First concordance of the Bible **I247**

- invention of the **inverted list data structure**

“River”:

Gen 2:10, Gen 2:13, Gen 2:14, Gen 2:14, Gen 15:18, Gen 15:18, Gen 15:18, Gen 31:21, Gen 36:37, Exo 23:31, Num 22:5, Deu 1:7, Deu 1:7, Deu 11:24, Deu 11:24, Jos 1:4, Jos 1:4, 2 Sam 8:3, 2 Sam 10:16, 1 Ki 4:21, 1 Ki 4:24, 1 Ki 4:24, 1 Ki 14:15, 2 Ki 17:6, 2 Ki 18:11, 2 Ki 23:29, 2 Ki 24:7, 1 Chr 1:48, 1 Chr 5:9, 1 Chr 5:26, 1 Chr 18:3, 1 Chr 19:16, 2 Chr 9:26, Ezr 8:15, Ezr 8:21, Ezr 8:31, Ezr 8:36, Neh 2:7, Neh 2:9, Neh 3:7, Job 40:23, Psa 46:4, Psa 72:8, Psa 80:11, Psa 105:41, Isa 7:20, Isa 8:7, Isa 11:15, Isa 19:5, Isa 27:12, Isa 48:18, Isa 66:12, Jer 2:18, Jer 46:2, Jer 46:6, Jer 46:10, Eze 1:1, Eze 1:3, Eze 3:15, Eze 3:23, Eze 10:15, Eze 10:20,

History of the (IR) World

- University of Oxford Library **1600**
 - all books printed in England
- Johnson's Dictionary **1755**
 - Set standard for dictionaries
 - Included common language
 - Helped standardize spelling
- Library of Congress **1800**
- Webster's Dictionary **1828**
 - significantly larger than previous dictionaries
 - standardized American spelling
- Roget's Thesaurus **1852**
- Dewey Decimal classification **1876**
- Carnegie Public Libraries **1880s**
 - 1681 built (first public library 1850)



College Station Caverlees

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77843

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A carnegie library, bryan tx

B College Station, TX 77843

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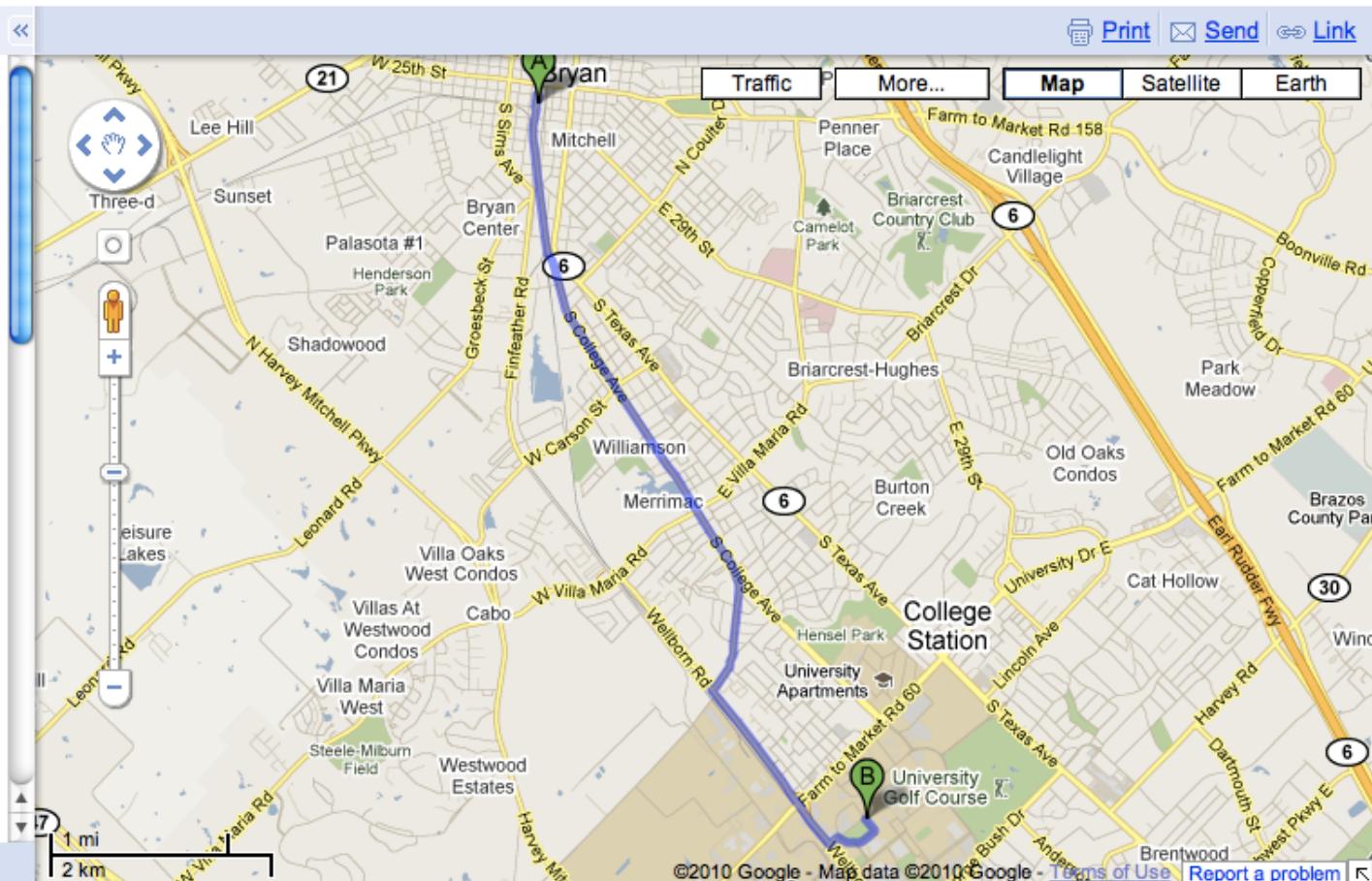
Driving directions to College Station, TX 77843

Suggested routes

S College Ave	12 mins
5.2 mi	
S Main St and S College Ave	12 mins
5.6 mi	
S Texas Ave	13 mins
5.7 mi	

A Carnegie Center History Library
111 South Main Street
Bryan, TX 77803-3243

+ 77843 | library of... | library of...

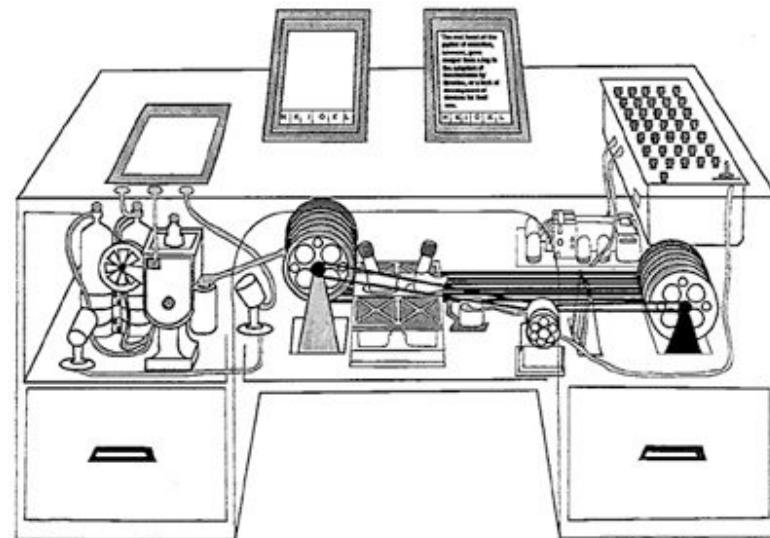


Carnegie Libraries

- Between 1883 and 1929, there were 2509 libraries built in US, Britain, Ireland, ...
- By 1919, of the 3500 libraries in the US, half were built with construction grants provided by Carnegie

History of the (IR) World

- Punched card retrieval systems **1930s**
- Vannevar Bush's Memex **1945**
- Personal information store based on associations





Vannevar Bush

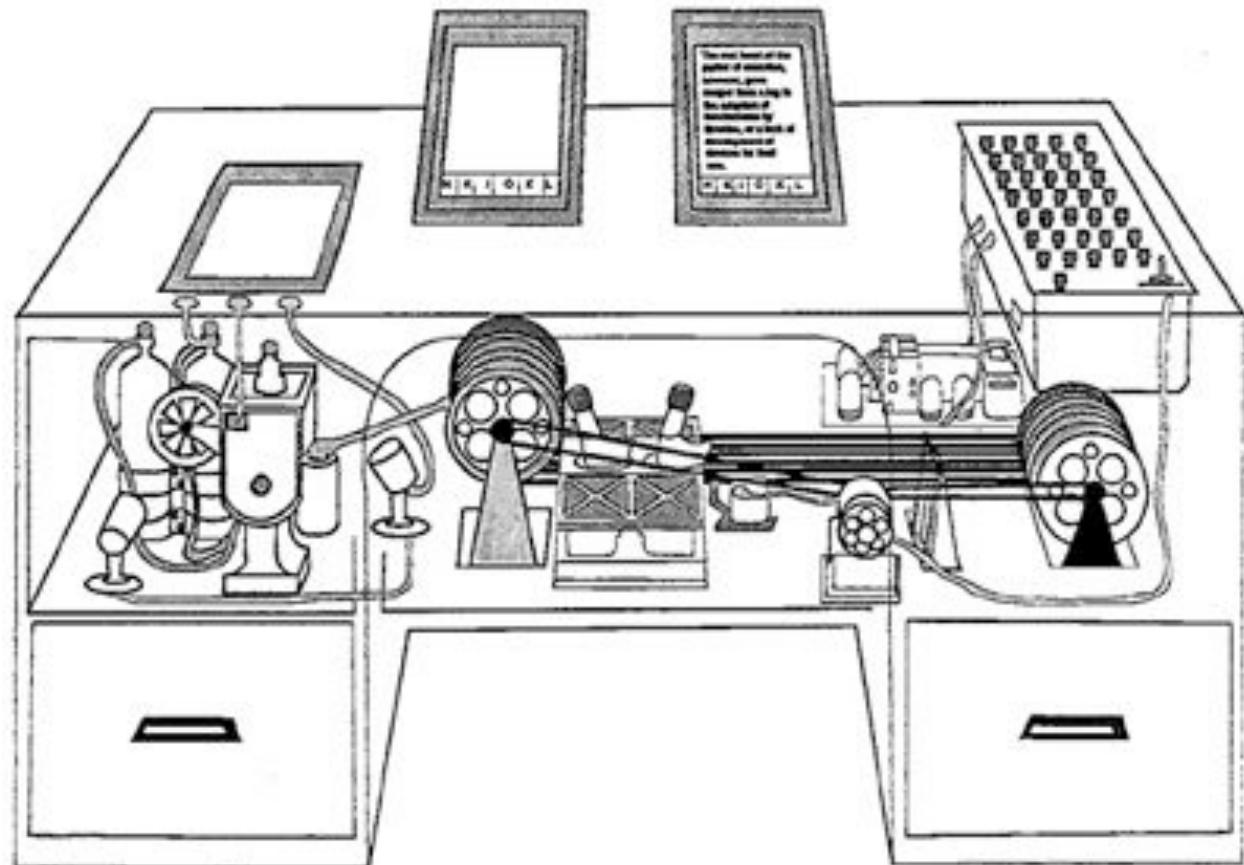
Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, "memex" will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.

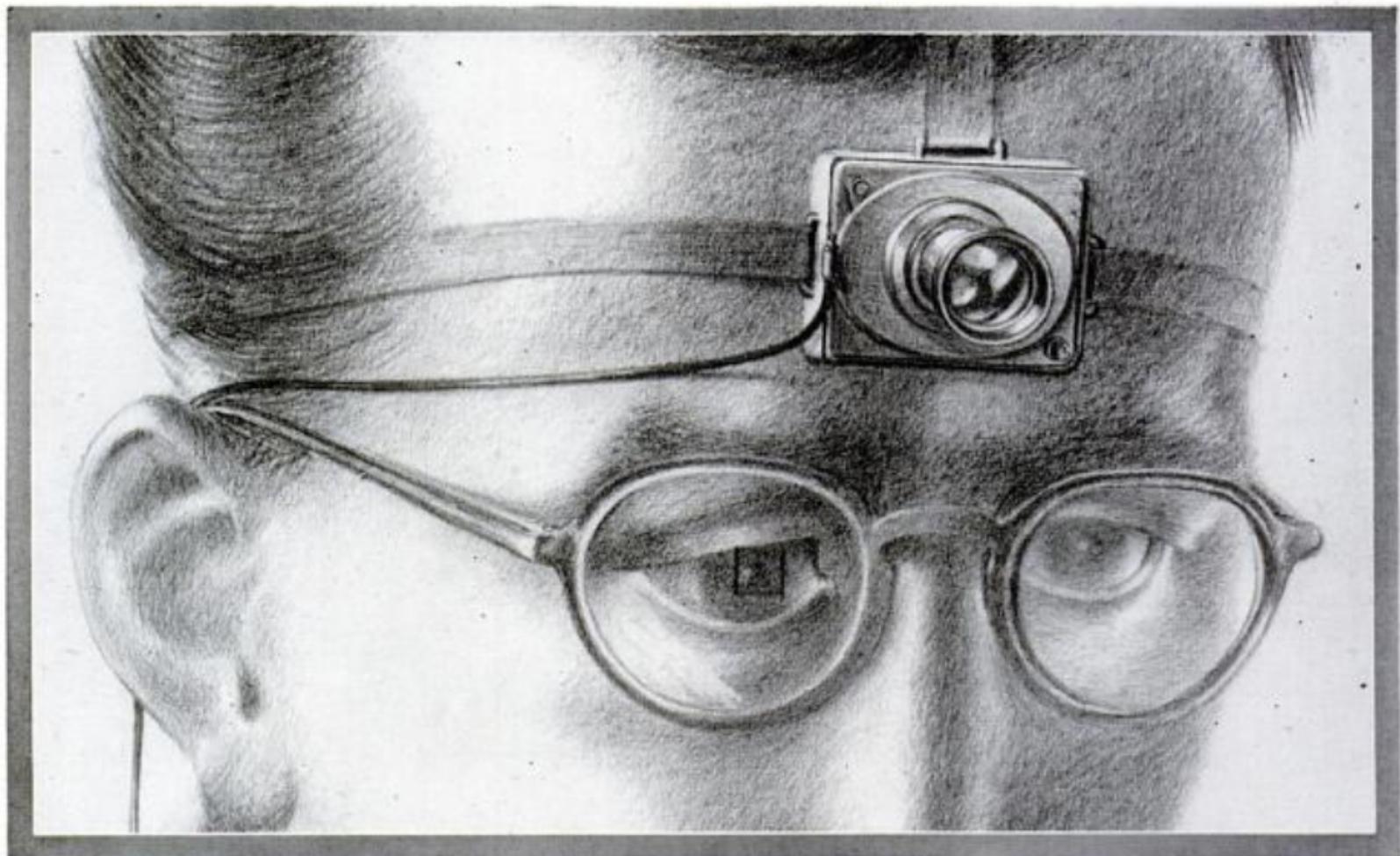


WIKIPEDIA

The Free Encyclopedia

It consists of a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture at which he works. On the top are slanting translucent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers. Otherwise it looks like an ordinary desk.





A SCIENTIST OF THE FUTURE RECORDS EXPERIMENTS WITH A TINY CAMERA FITTED WITH UNIVERSAL-FOCUS LENS. THE SMALL SQUARE IN THE EYEGLASS AT THE LEFT SIGHTS THE OBJECT

AS WE MAY THINK

A TOP U. S. SCIENTIST FORESEES A POSSIBLE FUTURE WORLD
IN WHICH MAN-MADE MACHINES WILL START TO THINK

by VANNEVAR BUSH

DIRECTOR OF THE OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

Condensed from the *Atlantic Monthly*, July 1945



To Do:

- Sign up for Piazza
- Look for a “getting to know you” thread and post about yourself
- Start reading
- HW0 out (ungraded)
 - includes “getting started with Python”