

CAPTURING THE UNSERVED WEB SEARCHERS' MARKET

THE N-DIMENSIONAL SEARCH ENGINE

Make Sence, Inc.

OUTLINE

- **State of the Web**: Current Search Engines produce unsatisfactory results for complex searches
- **The Opportunity**: Search Engine limited capabilities = unserved users & unrealized revenues
- **The Solution**: Solve complex queries using the ***N-Dimensional Search Engine***
- **The Benefits**: Access the unserved 16% web search market and corresponding advertising opportunities
- **The Technology**: ***Knowledge Correlation***
- **The Make Sence Group**: Our team and product history

THE STATE OF WEB SEARCHES

Current search capability is limited

IF: Simple question (“green tea”)
 + asked enough times by enough people
 + specific documents on the “open” WWW

THEN: search works = “Limited Search”

The screenshot shows a Google search interface with the query "green tea". The search results are displayed under the "Web" tab. The first result is a sponsored link for "Wu-Long Slimming Tea" from www.WulongforLife.com. The second result is a link to the Wikipedia page for "Green tea". The third result is a link to "Green Tea Health Benefits" from chinesefood.about.com. The fourth result is a link to "Green tea - green tea information and health benefits of green tea". On the right side, there are more sponsored links for "Rare Okinawan Green Tea", "Health In A Tea Cup", and "Lose 42lbs In 3 Months".

Google Web Images Groups News Maps Scholar more »

"green tea" Search Advanced Search Preferences

Search: ☒ the web ☐ pages from Canada

Web Results 1 - 10 of about 2,490,000 for "green tea" [definition]. (0.14 seconds)

Wu-Long Slimming Tea
www.WulongforLife.com The official home of Wu-Long Tea. World's most powerful fat burner. Sponsored Link

Green tea - Wikipedia, the free encyclopedia
The very best Japanese **green tea** is said to be that from the Uji region of Kyoto [1]. Shizuoka Prefecture (静岡県) [2] is also famous for its **green tea**. ...
en.wikipedia.org/wiki/Green_tea - 66k - Cached - Similar pages

Green Tea Health Benefits
Information and resources pertaining to the health benefits of **green tea**. How the polyphenols and catechins in **green tea** can improve your health.
chinesefood.about.com/library/weekly/aa011400a.htm - 33k - Cached - Similar pages

Green tea - green tea information and health benefits of green tea.
Green tea - green tea information and benefits of green tea. Our green tea resource site provides a green tea & salad tea product line that offers green

Rare Okinawan Green Tea
Official Okinawan Diet Slimming Tea as seen on O prahs and Rachel Ray.
www.RareOkinawanTea.com

Health In A Tea Cup
Amazing Tea Organic, 100% Herbal Darjeeling, Black, Oolong, Green Tea
www.bestteatime.com

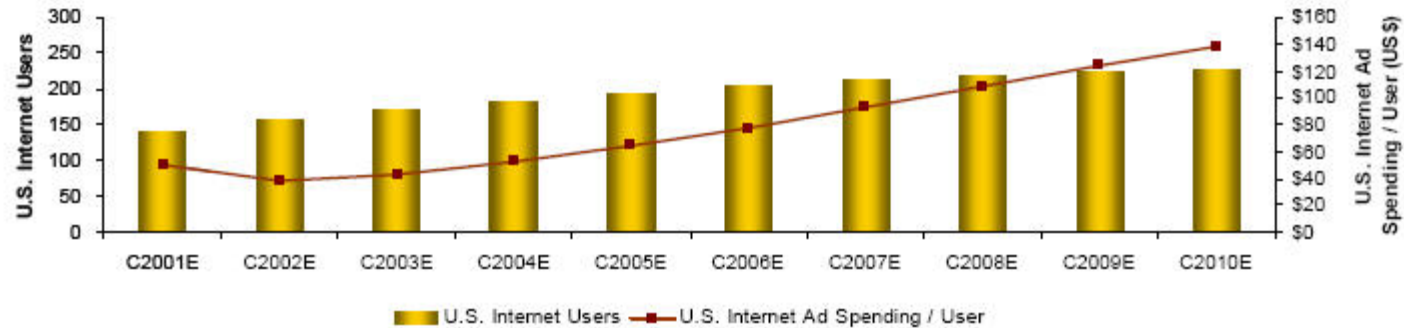
Lose 42lbs In 3 Months
How I Went From Fat To Fit In Under 3 Months. 100% Guaranteed To Work!
MicroNutra.com

Sign in

THE STATE OF WEB SEARCHES

Exhibit 5

Morgan Stanley US Internet Users vs. Internet Advertising / User



e - Morgan Stanley Research estimates

Source: Internet Advertising Bureau and Morgan Stanley Internet Research

Limited Searches work for approximately **84 - 85%** of the 265 million daily searches on major search engines^{1,2,3,11}

Using Limited Searches, the industry collected context sensitive advertising revenue of US\$177 per US household in 2005⁴

THE STATE OF WEB SEARCHES

However, Limited Searches provide unsatisfactory results for other queries

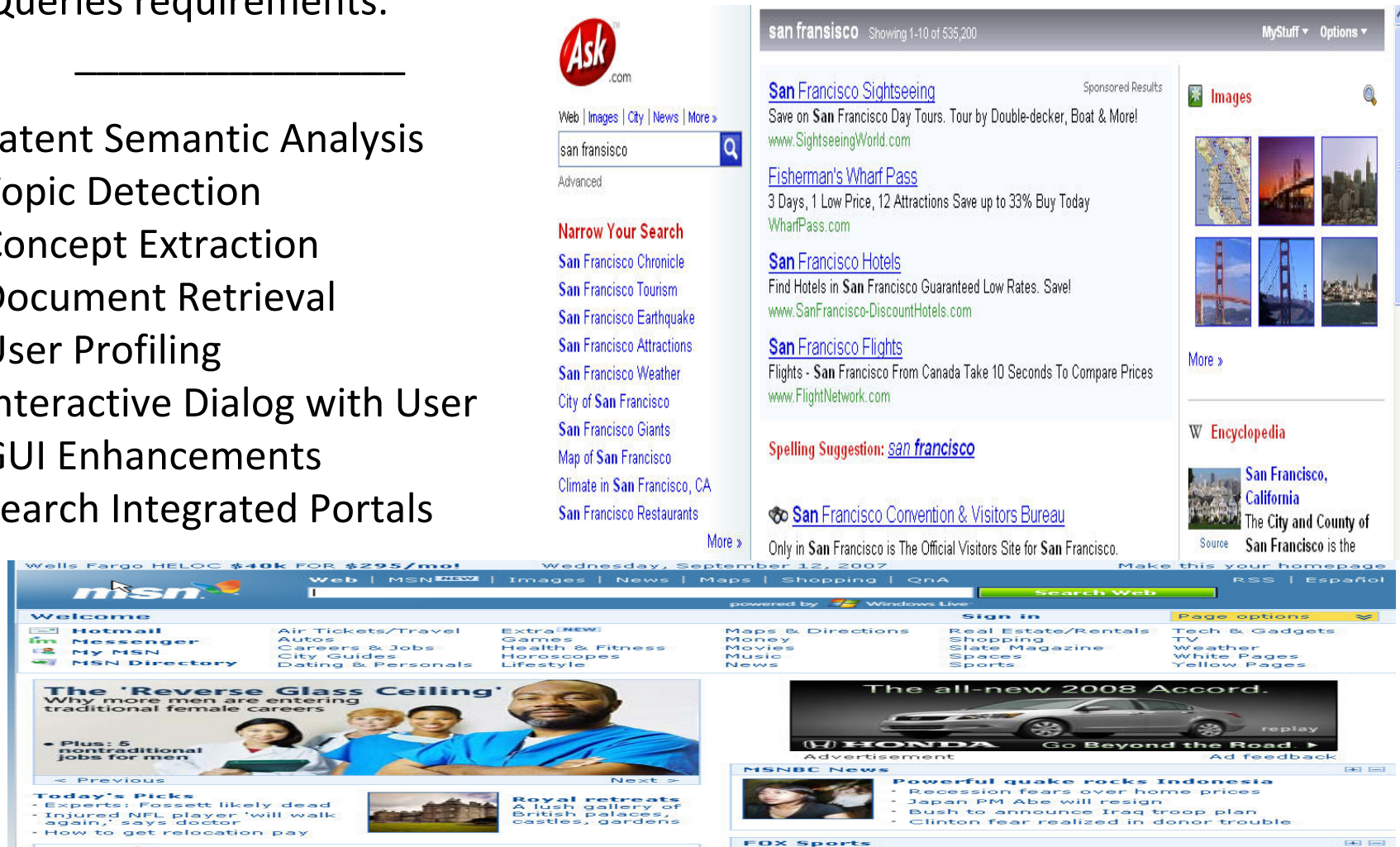
- (1) Complex questions
 - (2) Questions never asked before
 - (3) Questions previously asked infrequently
 - (4) Questions with answers spread piecemeal thru many documents
 - (5) Questions whose answers are not part of the open Web
- (the “Complex Queries”)



THE STATE OF WEB SEARCHES

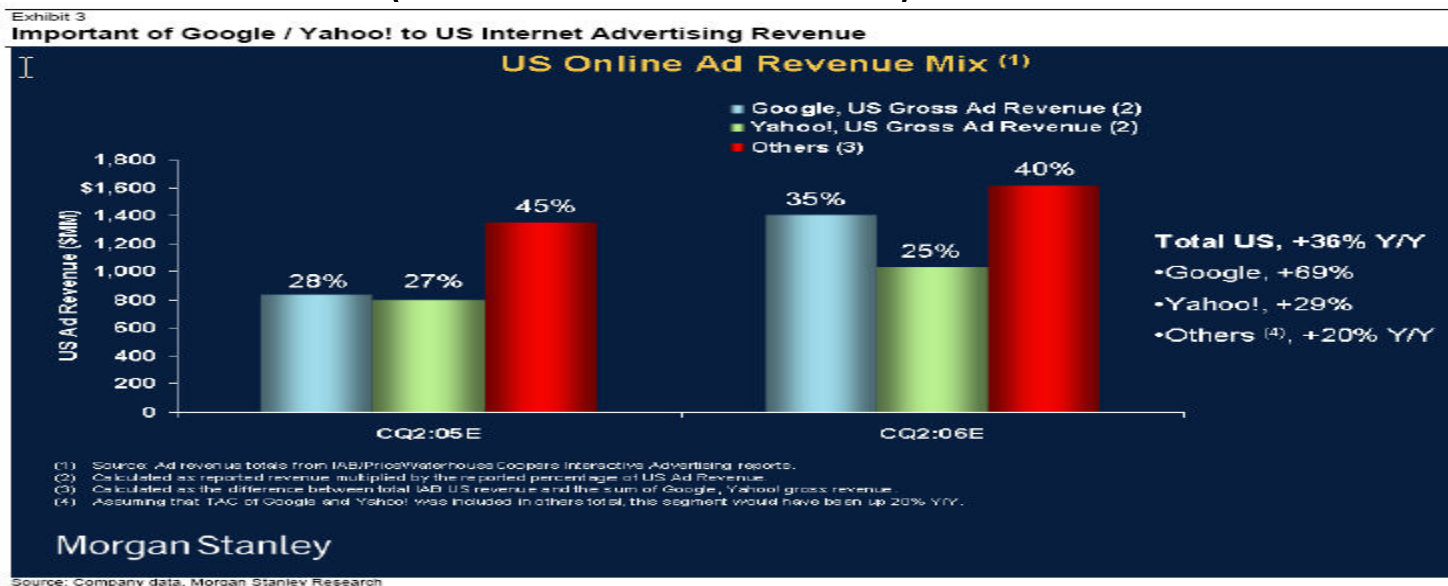
The industry response of “Better Limited Searches” does Not satisfy Complex Queries requirements.

- Latent Semantic Analysis
- Topic Detection
- Concept Extraction
- Document Retrieval
- User Profiling
- Interactive Dialog with User
- GUI Enhancements
- Search Integrated Portals



THE OPPORTUNITY

Google has captured the general Limited Search market both technologically (“page rank” algorithm etc.) & using its business models (AdWords and AdSense)



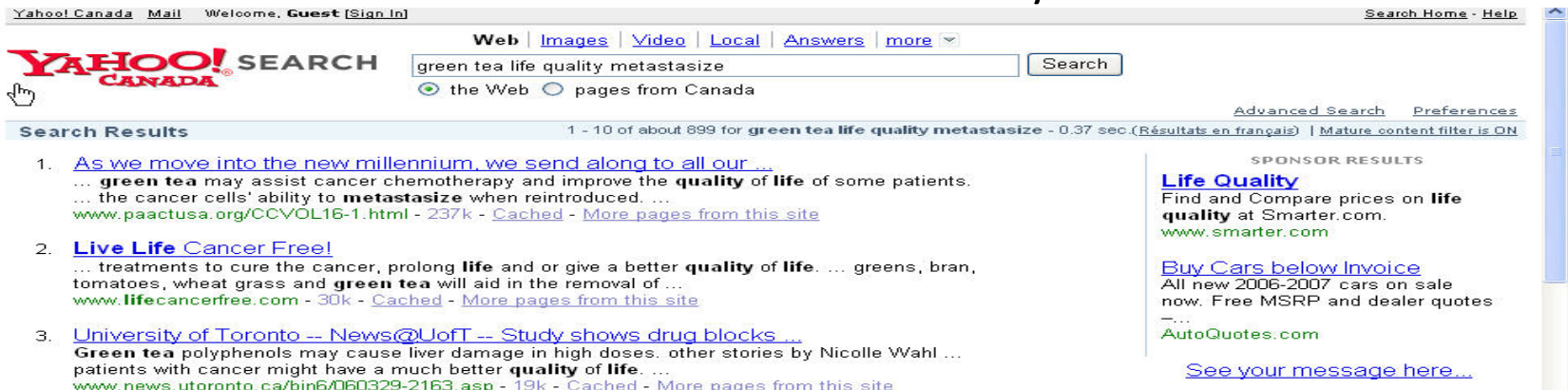
Vertical search and niche providers , & big footprint web players, are taking conversion rate traffic- using Limited Searches

BUT – the Complex Queries market remains unserviced!!

THE OPPORTUNITY

A new market exists for Search advertisers who currently:

1. Are paying for ads which are inappropriately placed in front of Complex Queries searchers “ out of context “ due to unsatisfactory search results



OR

2. Do not get their ads placed in front of Complex Queries searchers who would be potential consumers !



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THE OPPORTUNITY

Scale of the Opportunity: Approximately 16% of current search queries are likely to be Complex Queries!!

Exploiting this Opportunity: Such Complex Queries demand a new and “more complete search” – satisfied only by fundamentally extending Search Engine capabilities

Losing this Opportunity: Simply “Improving” Limited Searches will NOT address this major opportunity

An “*N-dimensional Search*” is required to exploit this opportunity

THE SOLUTION: N-DIMENSIONAL SEARCHES

*Make Sence, Inc. has developed **The Knowledge Correlation Search Engine (CSE)** to capture N-Dimensional Searches.....*

.....and to help a search provider capture the 16 to 24% high value Complex Query search user market!!

THE SOLUTION: N-DIMENSIONAL SEARCHES

What value is an *N-dimensional Search*?

Used with a Limited Search Engine, an N-Dimensional Search provides a more complete search capability to meet the needs of all of today's search engine users

Green tea - Windows Internet Explorer

http://www.umm.edu/altmed/articles/green-tea-000255.htm

File Edit View Favorites Tools Help

Correlation Search Engine Proof of Concept - Step 1: Ask The Question

File View Options Help

UNIVERSITY OF MICHIGAN MEDICAL CENTER

Home

Related Pro Center for In Medicine

Knowledge Correlation Search Engine [2007 Prototype]
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X Term: green tea Y Term: life quality Context1: metastase Context2: Col

Search Pause Stop Save Clear Log

Status: Correlation in Step 23 of 56 [maximum steps]

Supporting Research

Overview

Archeological evidence suggests that people consumed tea leaves steeped in boiling water as many as 500,000 years ago. Botanical evidence indicates that India and China were among the first countries to cultivate tea. Today, hundreds of millions of people drink tea around the world, and studies are now suggesting that green tea (Camellia sinensis) in particular has many health benefits.

There are three main varieties of tea -- green, black, and oolong. The difference between the

Uses of this Herb

- Atherosclerosis
- Breast cancer
- Colorectal cancer
- Crohn's disease
- Diabetes
- Hypercholesterolemia
- Lung cancer
- Prostate cancer
- Skin cancer
- Ulcerative colitis
- Wounds

Drugs that Interact

- Summary
- Beta-blockers
- Beta-Lactam Antibiotics
- Birth Control Medications

Correlation Run Log

```
0000311 =====
Green tea in chemoprevention
cancer chemoprevention by tea
tea is top quality
0000313 =====
Green tea in chemoprevention
cancer chemoprevention by tea
tea provides qualities
0000315 =====
Green tea in chemoprevention
cancer chemoprevention by tea
tea is high quality
0000317 =====
Green tea in chemoprevention
cancer chemoprevention by tea
tea prolong life
0000319 =====
Green tea in chemoprevention
cancer chemoprevention by tea
tea is medium quality
0000321 =====
Green tea in chemoprevention
cancer chemoprevention by tea
tea depending quality
0000323 =====
Green tea in chemoprevention
cancer chemoprevention by tea
tea has life
```

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THE SOLUTION: N-DIMENSIONAL SEARCHES


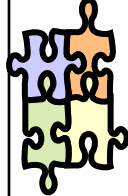





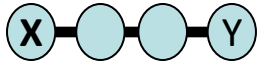




When is an *N-dimensional Search* Used?

Appropriate for virtually all Complex Queries, including when search terms are:

- Semantically complex and/or compound
- Have a minimum of two terms, phrases or concepts
- Contain “content words” which exhibit lexical and/or semantic overlap or disjunction
- Usually are comprised of 5, 6, or 7 terms, phrases or concepts



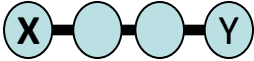


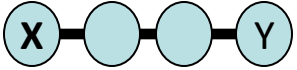
THE SOLUTION: N-DIMENSIONAL SEARCHES

Comparing a Limited Search with the **Knowledge Correlation Search Engine (CSE)**

	Index	Rank	 Document Knowledge Decomposition	 New Knowledge Generation	Decision  & Action
	SE	SE			
Make Sence 	SE	CSE 	CSE 	CSE 	

THE SOLUTION: N-DIMENSIONAL SEARCHES

Comparing a Limited Search with the *Knowledge Correlation Search Engine (CSE)*

	Single Term Simple Search Query	Multi-Term Simple Search Query	<i>N-dimensional Search Query</i>
	SE	SE	
Make Sence CSE 			CSE 

THE SOLUTION: N-DIMENSIONAL SEARCHES

Sample Knowledge Correlation Search Result

Knowledge Correlation Search Engine

Results 1-20 of 67 for green tea life quality metastasize

1	http://en.wikipedia.org/wiki/Green_tea	(39 uses)	Sponsored Links
2	http://en.wikipedia.org/wiki/Potential_effects_of_tea_on_health	(33 uses)	
3	http://www.benefitsdrinkinggreentea.com/	(28 uses)	
4	http://herbalteacenter.stores.yahoo.net/greentea3.html	(23 uses)	
5	http://www.goldenmoontea.com/	(21 uses)	
6	http://www.newstarget.com/green_tea.html	(20 uses)	
7	http://www.internationalliving.com/issues/2007/2007_article.html	(18 uses)	
8	http://cancer.stanford.edu/skincancer/skin/types/actikera.html	(16 uses)	
9	http://chinesefood.about.com/library/weekly/aa011400b.htm	(14 uses)	
10	http://www.alltea.com/leaves/brewing/	(12 uses)	
11	http://cpmcnet.columbia.edu/dept/cs/programs/pancreas/pancreatic_cancer.html	(11 uses)	
12	http://atlas.nrcan.gc.ca/site/english/maps/people/leandsociety/QOL	(7 uses)	
13	http://www.calresco.org/lucas/qol.htm	(6 uses)	
14	http://ajrccm.atsjournals.org/cgi/content/full/159/3/812	(6 uses)	
15	http://www.bulkherbstore.com/gtc	(6 uses)	
16	http://www.accessomaha.com/metrodata/qualityoflife.asp	(5 uses)	
17	http://www.dod.mil/execsec/adr95/qol_.html	(5 uses)	
18	http://www.health.am/aids/more/opportunistic_neoplasms/	(5 uses)	
19	http://www.raysahelian.com/greentea.html	(5 uses)	
20	http://www.prescriptionwarehouse.com/terms/skin_cancer.html	(5 uses)	

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THE BENEFITS OF N-DIMENSIONAL SEARCHES

Why Should Providers Offer *N-dimensional Search* capability?

Multiple Markets

1. **New Market:** N-Dimensional search capability opens up a new unserved/underserved space in the Search Market; **15–16%** of current searches (**N-dimensional**) can now be satisfied
2. **Latent Market:** consists of **7–8%** of existing search query volume is available for capture (latent demand)
3. **Retention of Existing Market:** Opportunity to generate higher overall site loyalty among focused users

THE BENEFITS OF N-DIMENSIONAL SEARCHES

Why Should Providers Offer *N-dimensional Search* capability?

The Monetization opportunity from high value demographics!

Profile : N-Dimensional search query users are among the most focused^{4,13}, more likely to click thru and “stick” and to “take the next step” of submitting contact information or making purchases

Market size : 32 million N-Dimensional search query users a day get no answers and receive no useful ads! 15 million additional search customers¹⁵ are now available

Market Value: N-Dimensional search query users create a market for premium ad fees

THE BENEFITS OF N-DIMENSIONAL SEARCHES

Why Should Providers Offer *N-dimensional Search* capability?

To solve the major problem of acquiring User Profiles.

- The more specific User Profile information about individual consumers the more valuable a sales lead becomes¹⁶
- N-dimensional Search takes even an anonymous user's input and determines the user's actual intent for the search
- With N-dimensional Search, advertisers can get the same results as with expensive customer capture methods¹⁶

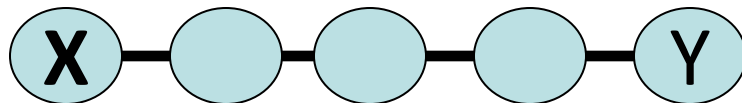
Appendix 1

Correlation Technology Overview

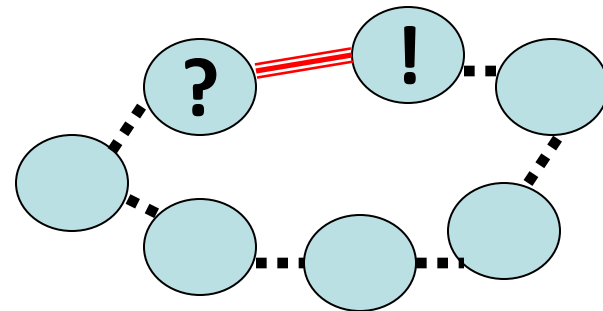
Knowledge Correlation is a novel
mechanism for capturing the
associations hidden in data

There are two forms of Knowledge Correlation:

Connect the Dots

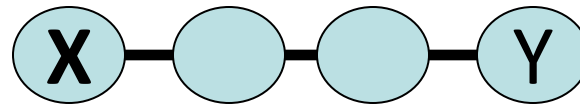


Free Association



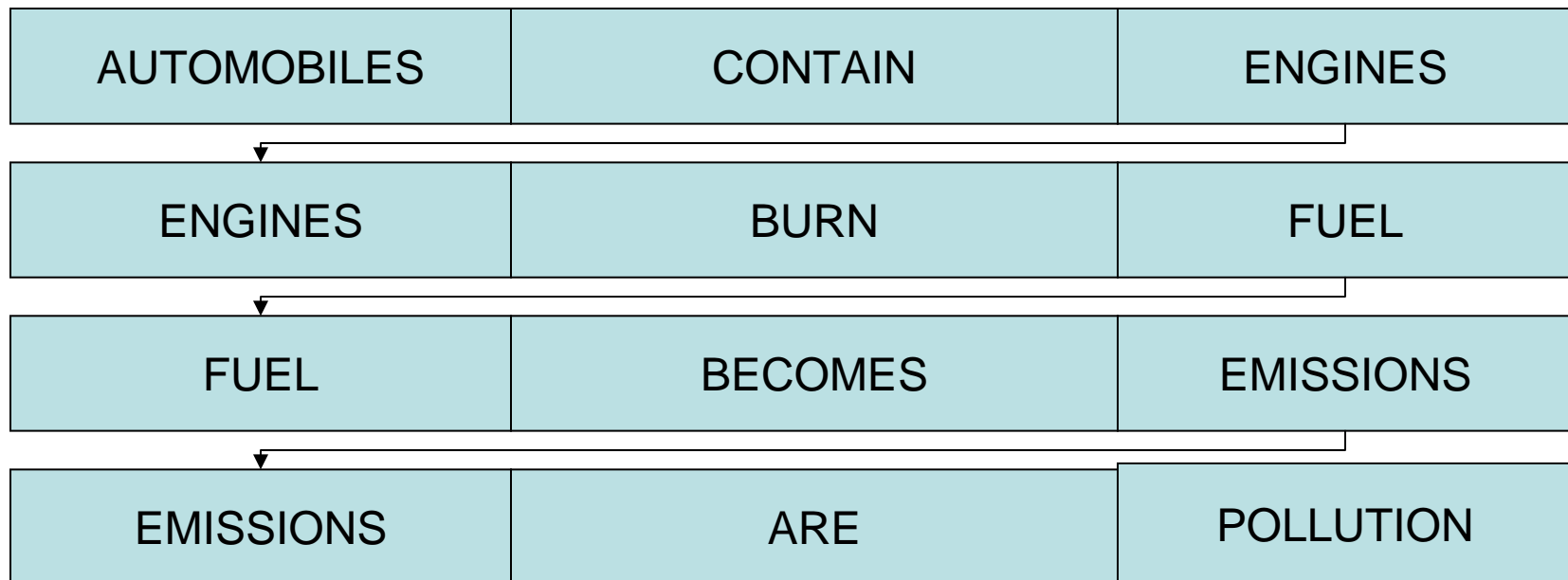
A Knowledge Correlation Search Engine

Connect the Dots



Used to find if ANY association can be constructed connecting a given origin to a given destination set of terms, phrases or concepts:

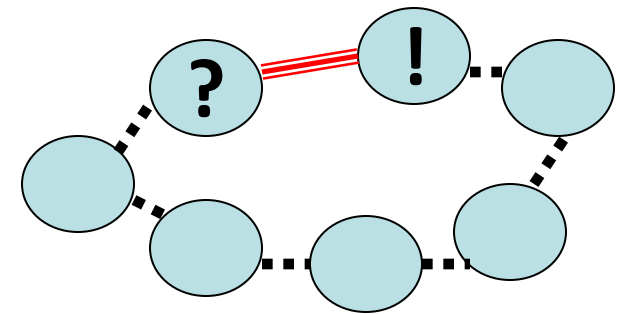
X TERM = "AUTOMOBILES"
Y TERM = "POLLUTION"



Free Association

Has this happened to you?

- Man is seated at a table in a restaurant
- He notices another couple, strangers, sitting nearby
- He further notices that the woman is wearing a red dress
- He thinks to himself:
 - “My wife has a red dress like that”
 - “She last wore that dress when we went to the Bahamas three years ago”
 - “My buddy George told me a couple of months back he was going to the Bahamas. I wonder if he went.”
 - “My wife is friends with George’s wife (Carol)”
- Man asks his wife, “Have you spoken to Carol lately?”



In a fraction of a second, the man in this example followed a chain of memory (knowledge) fragments and acted upon them.

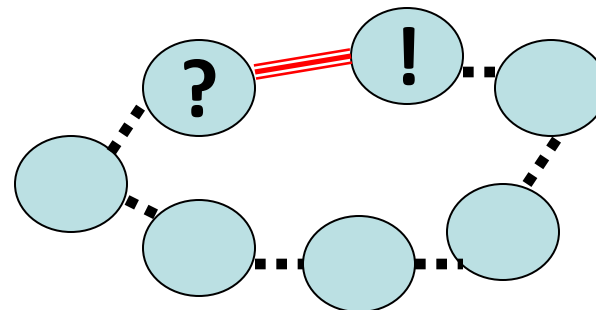
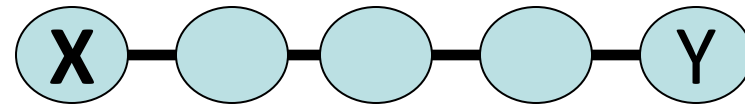
Humans think like this all the time. Now, using Knowledge Correlation Technology, computers can emulate this type of human experience-driven association.

Applications for Connect the Dots:

- Risk Mitigation
- Compliance (Sarbanes Oxley)
- Workforce Re-engineering
- Anti-Money Laundering

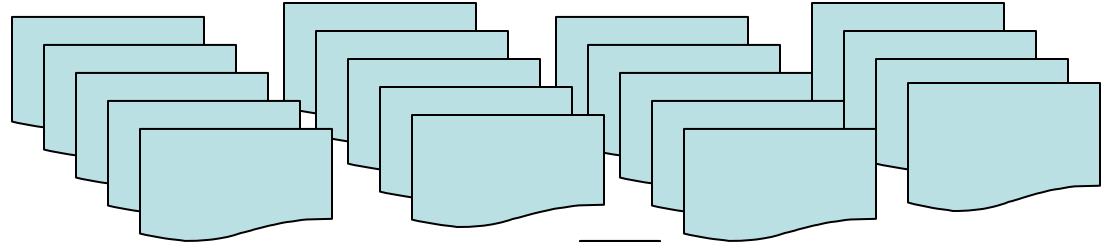
Applications for Free Association:

- Compound Discovery (Bio-Pharma)
- Legal Precedent Discovery
- News and Event Analysis
- Uncertainty Modeling




How does Knowledge Correlation work?

1. Take *a lot* of documents

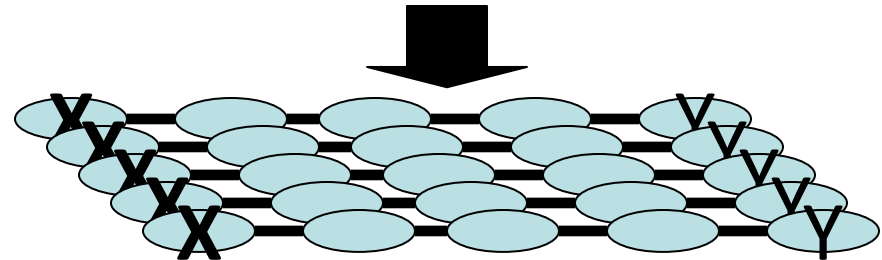


2. Decompose the documents into “fragments of knowledge” and store all the fragments in a large database



AUTOMOBILES	CONTAIN	ENGINES
ENGINES	BURN	FUEL
FUEL	BECOMES	EMISSIONS
EMISSIONS	ARE	POLLUTION

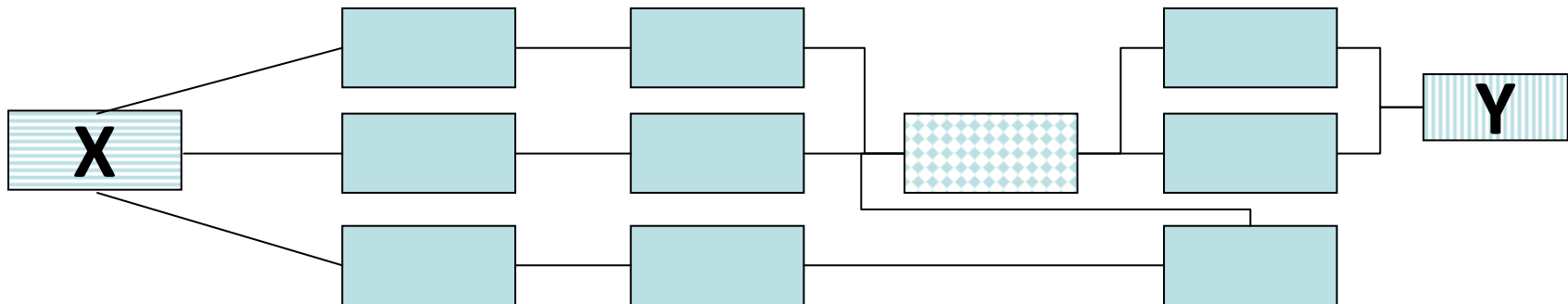
3. Try millions and millions and millions of ways to chain the fragments together to answer a user question.



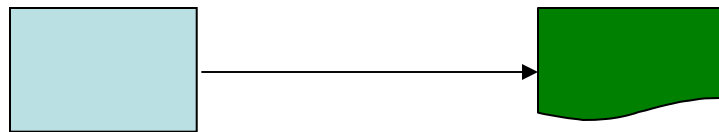
If even one chain from X to Y can be constructed... *Knowledge* has been Discovered! The chains are “correlations”

How is Knowledge Correlation used in Search?

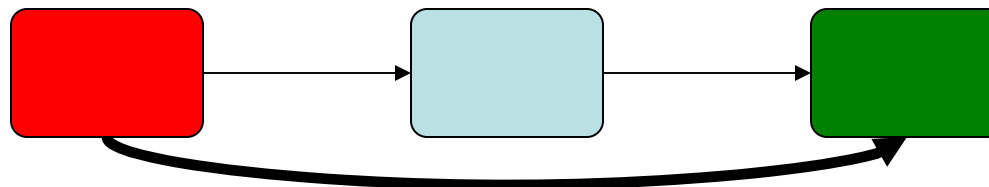
Based upon the **user's input**, all the chains (correlations) that can be constructed linking X to Y create a **network**, like the one below...



Each “knowledge fragment” in the **network** still “points back” to the **document** from which the “knowledge fragment” was extracted...



By linking user input to fragment to document, user input is linked to documents...



Appendix 2

Search Demand Model and Statistics

A Knowledge Correlation Search Engine

How We Model Demand For N-dimensional Search

We are interested first in current demand, and then in latent demand.

To model existing demand, we allocate the approximately 17% of searches [five, six, seven or more terms³] as evidence of demand for N-dimensional search. We are able to do this means of statistical analysis and phrase composition analysis on such queries.

Demand for search should be characterized as a derived demand; i.e., households only demand search in the course of carrying out other economic activities and not for the pleasure of search in and of itself. Household demand for search is only determined by demand for exogenous economic activities. In some views, the cost of search is considered virtually irrelevant, but search costs have an effect on consumer behavior⁸. Search time is the major component of variable costs experienced by those using major search engines to find information on the internet.

Because of these characteristics, latent demand for search can therefore be modeled in the much same manner as latent demand for transportation, called “induced travel”⁵.

The underlying theory behind induced travel is based upon the simple economic theory of supply and demand. Any increase in highway capacity (supply) results in a reduction in the time cost of travel⁵. Like travel, search (in a characteristic shared by all internet applications) is highly sensitive to time cost^{5,8} and those costs have been calculated. In search, we construe increased capacity to mean reduction in time to reach a relevant search result. When any good (travel or search) is reduced in cost, demand for that good increases⁵. Induced travel that represents new trips and longer trips is called “generative”⁶. On average, every 10% reduction in travel time (cost) produces an 8% increase in travel⁷. Reduction in search costs have been found to produce increases in effective demand elasticity for consumer goods^{8,9}. Although we estimate all increase in “capacity” to be attributable to N-dimensional Search, to be conservative, we estimate a price elasticity of only -.5. Further, 80% to 100% of all new capacity in a transportation system is absorbed by induced travel over time, and the relative near and long term effect of improved search has been shown to exhibit similar characteristics⁸.

A Knowledge Correlation Search Engine

	A	B	C	D	E	F	G	H	I	J	K	L
1	PENN TREEBANK TAGSET OF WORD CLASSES											
2	WORD CLASS		MEANING		EXAMPLE		p IN REUTERS		p IN PEYAWARY		Count in 1K Word Core Vocabulary	
3												
4	NN		noun, singular or mass		table		0.17000 *		0.30094		288	
5	NNP		proper noun, singular		John		0.15500 *		N/A		N/A	
6	NNS		noun, plural		tables		0.07000		N/A		N/A	
7	NNPS		proper noun, plural		Vikings		0.00100		N/A		N/A	
8	VB		verb, base form		take		0.02500 *		0.21421		205	
9	VBD		verb, past tense		took		0.05000		N/A		N/A	
10	VBG		verb, present participle		taking		0.01750		N/A		N/A	
11	VBN		verb, past participle		taken		0.02500		N/A		N/A	
12	VBP		verb, singular present		take		0.01000		N/A		N/A	
13	VBZ		verb, 3rd person		takes		0.01750		N/A		N/A	
14	JJ		adjective		green		0.07750		0.29363		281	
15	RB		adverb		naturally		0.02500		0.10449		100	
16	IN		preposition		in, of, like		0.12500		0.03448		33	
17	CC		conjunction		and		0.01250		0.01358		13	
18	CD		cardinal number		third		0.05250		N/A		N/A	
19	DT		determiner		the		0.08500		N/A		N/A	
20	MD		modal		could, will		0.01000		N/A		N/A	
21	PRP		personal pronoun		I, he, it		0.02000		0.03866		37	
22	TO		to		to		0.02500		N/A		N/A	
23	[other]		N/A		N/A		0.02650		N/A		N/A	
24												
25			N-dS Support				0.61850		0.96378			
26												

A Knowledge Correlation Search Engine

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	LIKELIHOOD OF OCCURANCE													
2														
3				1	2	3	4	5	6	7				
4	NN			0.30094	0.30021	0.29948	0.29874	0.29801	0.29727	0.29653				
5				0.24000	0.23917	0.23751	0.23503	0.23177	0.22774	0.22300				
6														
7	VB			0.21421	0.21339	0.21257	0.21174	0.21091	0.21008	0.20925				
8				0.14500	0.14429	0.14288	0.14079	0.13805	0.13468	0.13074				
9														
10	JJ			0.29363	0.29289	0.29215	0.29140	0.29066	0.28992	0.28917				
11				0.07750	0.07722	0.07667	0.07586	0.07478	0.07345	0.07188				
12														
13	NP			0.15600	0.15600	0.15600	0.15600	0.15600	0.15600	0.15600				
14														
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24														
25														
26														
27														

A Knowledge Correlation Search Engine

	A	B	C	D	E	F	G	H	I	J	K	
1	OUTCOMES OF INTEREST (N-dimensional Search) with Examples											
2						0.6185						
3	2-TERMS:		10		0.38254							
4	3-TERMS:		20		0.23660							
5	4-TERMS:		35		0.14634							
6	5-TERMS:		56		0.09051							
7	6-TERMS:		84		0.05598							
8	7-TERMS:		120		0.03462							
9	TOTAL:		325		0.94660							
10												
11	NN	NN					0.05760000	0.23917		automobiile	pollution	
12	NN	NNP					0.07488000			automobiile	China	
13	NN	VB					0.06960000	0.38254		tea	metastsize	
14	NN	JJ					0.03720000			policy	expensive	
15	NNP	NNP					0.02433600			China	Virginia	
16	NNP	VB					0.04524000			Islam	terrorize	
17	NNP	JJ					0.02418000			Moses	contemporary	
18	VB	VB					0.02102500			compromise	terrorize	
19	VB	JJ					0.02247500			attacked	happy	
20	JJ	JJ					0.00600625			common	fair	
21	NN	NN	NN							religion	lethality	politics
22	NN	NN	NNP							religion	lethality	Poland
23	NN	NN	VB							army	disease	retreat
24	NN	NN	JJ							religion	lethality	happy
25	NN	NNP	NNP							severely	Grand	Hotel

A Knowledge Correlation Search Engine

Citations

1. Crane, J. 2007. August Search Market Share. Compete.com
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