Web Design with Search Engine Optimization Techniques and Web Intelligence

BY

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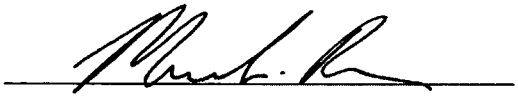

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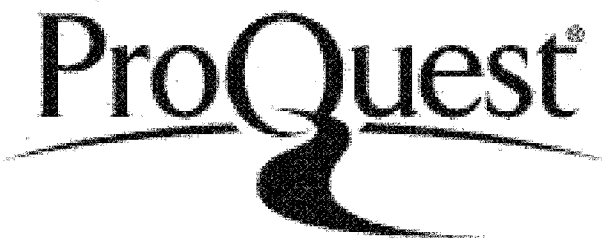

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ABSTRACT

With the rapid growth of the Internet and World Wide Web, Web technology becomes a standard for people around the world. Search Engines such as: Google, Yahoo and Bing often face large amount of data, many choices to select from, and so much information to digest when people search with the Search Engines. In this thesis, we first compare the Search Engines by keyword searches, image searches, and its semantic processing capabilities in the Information Technology (IT) (i.e. Computer Science), Business (i.e. Accounting), and Health Science areas in the Wikipedia Categories. For the comparative experiments, we focus on the performance analyses of accuracy, relevance, and efficiency (in response time) of the search results from different search engines. We then discuss the concepts of Search Engine Optimization (SEO), Web Intelligence (WI), Web Analytics (WA) and Business Intelligence (BI) that helps companies do businesses today. We design and compare various Web Pages by the SEO and WI techniques. Furthermore, we discuss the Google Analytic Tool, and use it to facilitate our Web development.

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Lastly, I would like to thank my family for the supports from the undergraduate till now. Without my family support, I wouldn't be able to complete my studies.

BIOGRAPHY

Mr. Chun Keung Hui received his B.S. degree in Computer Science at Long Island University, Brooklyn Campus, New York in May 2007. In Fall 2007, he continues his graduate studies in computer science. From August 2007 to August 2008, he worked at Netcom Information Technology as a Computer Technical Support. He worked with the instructors to prepare the IT trainings before it starts which includes Microsoft, Oracle, Linux, Autodesk, Adobe Suite, and etc.

Mr. Chun Keung Hui currently works at New York City Department of Transportation (DOT) as a Computer Associate since June 2008. At DOT, he helps clients with desktop software, hardware and telecommunication issues.

Mr. Chun Keung Hui maintained a GPA of 3.65 in his graduate studies in Computer Science at Long Island University, Brooklyn Campus, New York. He received Master Computer Science Faculty Award in 2011.

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CHAPTER 1 INTRODUCTION

A search engine is a tool that is designed to search for information in the World Wide Web. [1] "The information may consist of web pages, images, videos, maps, and other types of files. Search engines are operating algorithmically or are a mixture of algorithmic and human input." The most recent release of search engines is Bing.com, it allows user to plan their trips using Expedia, Vayama, American Airlines, etc to compare the prices. It also allows users to search for top local restaurants and events and maps for driving directions. Bing also allows you to have instant access to in-depth health info, medicine, and treatment options and hospital ratings. Furthermore, [7] "Bing's Maps Web Services is a set of programmable SOAP services that allow you to match addresses to the map, search for points of interest, integrate maps and imagery, return driving directions, and incorporate other location intelligence into your Web application."

In addition, keyword search can be a single keyword, a term, a phrase, a question, or a sentence. In our keyword search experiments, we test 1 word keyword, 2 word keyword, and 3 word keyword searches in IT (computer science) area, Business (accounting) area, and Health Science area in Google, Yahoo, and Bing search engines.

Furthermore, images search also relies on keywords to search the index of the search engines. The results of the images search will index the keywords on the images, if they matches, then it will be account as accurate rate, and if the keyword search of the image have all the keywords but in different orders, it will be account as recall rate.

There are many factors involving in the internet searches today. Each website contains contents that are relatively related to their business marketing. As a result, they would include many popular keywords, and terms, and actions in their website to improve the conversion rate. Today, many experts use the methodology like Google web analytic tool to track the performance of their web, the percentage of the people clicking the actions. As a result, business intelligence takes place from the analysis to improve the marketing of the website to improve their profits.

From Wikipedia, [2] "**Search Engine Optimization** is the process of improving the volume and quality of traffic to a web site from search engines through "**organic**" or "**algorithmic**" search results." Search Engine Optimization also targets different kinds of searches; image search, video search, news search, and etc. The relationship of each search is that they all relies on the keyword or keywords to index from the search engine to list the results. The contributions of keyword searches will

provide statistically figures that help us to understand the differences between the lengths of the keyword search, the similarity of the keyword search and image search. Thirdly, we also define the importance of using search engine optimization techniques and web intelligence for our web design. And finally, we use Google Analytics to evaluate a web design by myself.

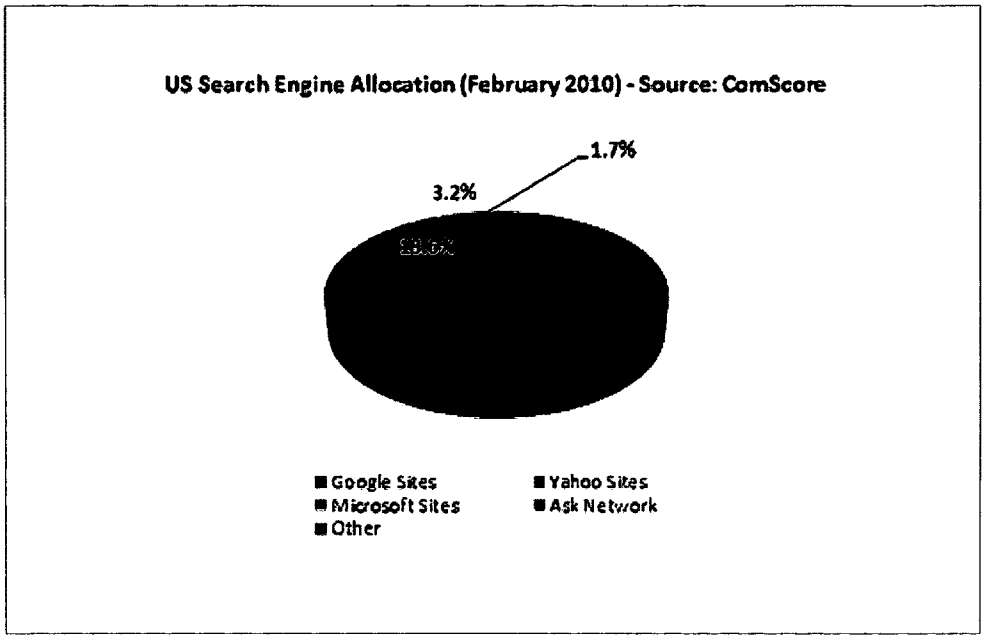


Figure 1.1: US Share of Searches: February 2011

Furthermore, this link [3] http://www.targetcasttalks.com/tag/Bing/ from comScore, Inc shows that 65.4% of users using Google as search engine. Yahoo is 2nd in 16.1%, Microsoft is 3rd at 13.6% as of February 2011.

In this thesis, we will first compare the search engines by keyword searches using Google, Yahoo, and Bing. In Chapter 2, we gather the data and create the graphs for the accurate rate, error rate, and recall rate in computer science area, accounting area, and health science area. In Chapter 3, we compare the semantic process capabilities of search engines in the Information Technology (IT) (i.e. Computer Science), Business (i.e. Accounting), and Health Science areas in the Wikipedia Categories. In Chapter 4, we do the same experiments with image searches. In Chapter 5, we applied Search Engine Optimization (SEO), Web Intelligence (WI) to design and compare various Web Pages. In Chapter 6, we used Web Analytics (WA) tool using Google Analytic for the website study, www.travel4share.org.

CHAPTER 2 COMPARATIVE EXPERIMENTS ON KEYWORD SEARCHES OF SEARCH ENGINES

2.1: The performance analyses of accuracy, relevance, and efficiency (in response time) of the search results from different search engines

In the keyword search experiments, we compared the top 3 search engines today; they are Google, Yahoo and Bing. In addition, we used the keywords from Wikipedia testing IT, Business, and Health Science categories. In the experiment, we count the accurate rate, error rate, and recall rate in the first 30 pages of each search engine; Google, Yahoo, and Bing.

Definition of Accurate rate, Error rate, Recall rate:

Accurate Rate – The information is perfectly found from the search result, it does not contain information that is unrelated. When we query the keyword, it must show in the search result in order to count as accurate.

Formula #1: Accurate Rate Formula:

$$\%\ \text{of Accurate rate} = \frac{\text{Number of accurate keyword result}}{\text{the first 300 pages of results}}$$

For example: If we search the word "Treasury Stock" in the Google search engine, one of the search results are like this "Business leaders mixed on treasury stock Asian Economic News ...". The result showing that the word "treasury stock" is listed in the same order, so we consider this result as an accurate data.

Error Rate – The information is not correct, it shows information that is unrelated to the topic, the order of the word is showing incorrectly, and the spelling is incorrect.. It does not query the keyword in the search result.

Formula #2: Error Rate Formula:

$$\%\ \text{of Error rate} = \frac{\text{Number of accurate keyword result}}{\text{the first 300 pages of results}}$$

For example, if we search the word "Network Security" in the Yahoo search engine, and one of the search results are like this "International Relations and Security Network". This result, we consider it is an error data because the word is in different order.

Furthermore, if the word you search is incorrectly spelled, then it is also consider an error. For example, if we want to search the word "Constructor", and it has "Contractor" in the result, it will be counted as an error.

Recall rate – The information has similar related topics from the key word that you are searching. For example, if the word is object oriented programming and in the search result if it contains the 3 words, but separated, it is also counted as a recall rate. If only two words from the keyword shown, then it consider incorrect in the recall rate.

Formula #3: Recall Rate Formula:

$$\%\ of\ Recall\ rate = \frac{Number\ of\ accurate\ recall\ result}{the\ first\ 300\ pages\ of\ results}$$

For example, if we search the word "Unified Markup Language", it has one result contains "Contact: Richard Grigonis for Telephony **Markup Language** movement, web virtual communities, **unified** messaging, and development platforms. Contact: Robert L.", this result consider as a recall data because it contains the three words we are searching in the MSN search engine.

Also, if the result contains only one of the words we are searching; it does not count as a recall rate for that data. For example, "v 1.50 Add your quote. **Language**: ..", this was found in one of the result in BING engine.

Response rate – The response rate is the amount of time it is needed for the search engines to query the results in seconds.

For example, we can see that the response rate for searching the word "computer architecture" in Google is 0.11 sec used to query the results.

Semantic web - such as semantic data repository and inference engine that helps to increase the performance and stabilization in dealing with large amount of information.

All our experiments were conducted in a standard PC environment including

Computer Motherboard: Asus

Operating System: Window XP

Memory: 4GB

In the Computer Science Keyword Search, we used keywords.

Table 2.1 - Computer Specifications for 2009 Research

1 word keywords	2 words keywords	3 words keywords
Constructor	Computer Architecture	object oriented programming
Interface	Software engineering	PL-SQL
inheritance	data mining	Extensible Markup Language
pseudocode	Network Security	Binary Search Tree
metadata	Artificial Intelligence	Personal Identification number
database	Search Engines	Unified Markup Language
configuration	Class Diagram	Java Virtual Machine
Cryptograph	Operating System	Local Area Networks
Algorithm	Sequence Diagram	Advanced Encryption Standard
destructor	Computer Graphic	Application Program Interface

Table 2.2 – Computer Science Keywords

2.2: Keyword Search Experiments in IT (i.e. Computer Science) Area

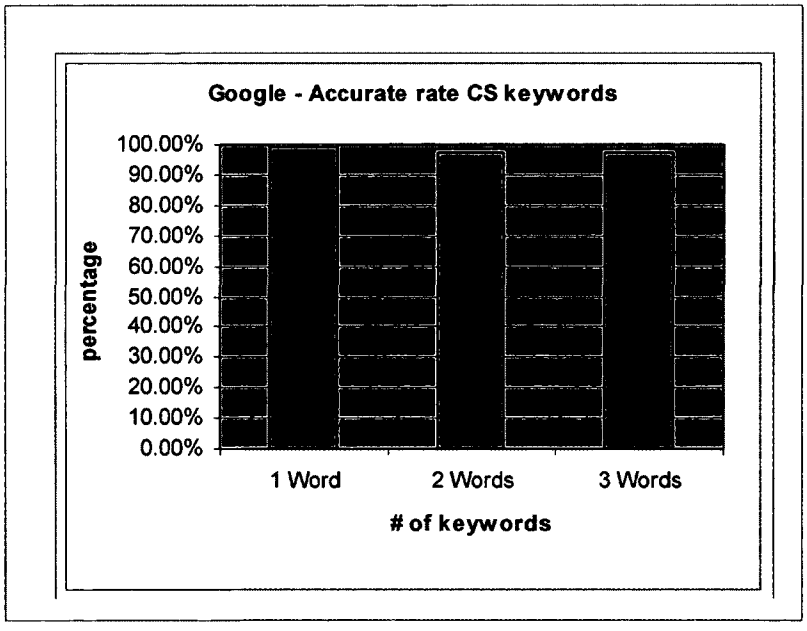


Figure 2.1 – Google accurate rate Computer Science Keywords

In Google's Computer Science keywords, the top 3 of 1 word keywords that gets 100% are Inheritance, pseudocode, Destructor and the top 3 of 2 words keywords get 100% is Sequence Diagram, Data mining, and Class diagram, and top 3 of 3 word keywords gets 100% is Application Program Interface, Extensible Markup Language, Personal Identification number, and Advanced Encryption Standard.

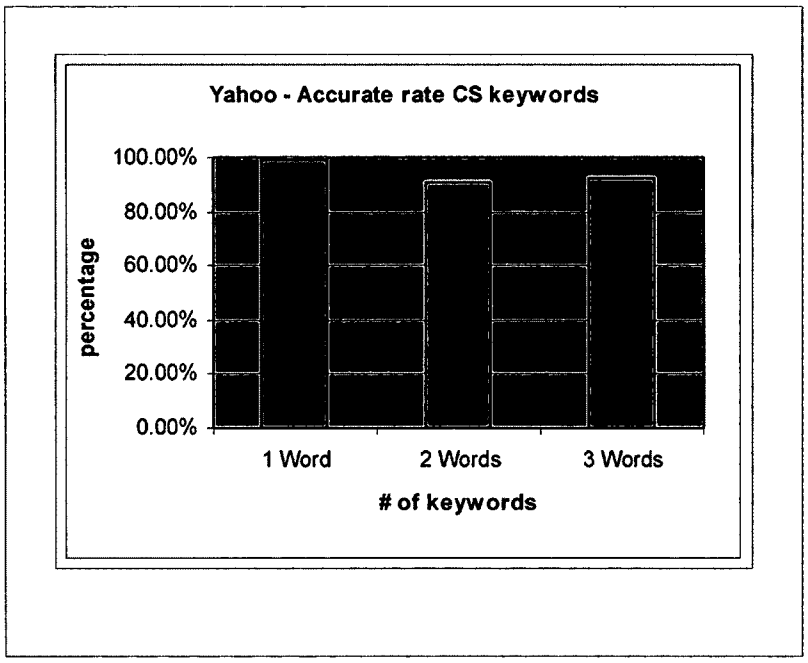


Figure 2.2 – Yahoo accurate rate Computer Science Keywords

In Yahoo's Computer Science keywords, the top 3 of 1 word keywords that gets 100% are Metadata, Algorithm , and 99.6% Cryptograph and inheritance, and top 3 of 2 words keywords are Artificial Intelligence, Operating System, and Data Mining, and top 3 of 3 words keywords is PL-SQL, Advanced Encryption Standard, and object oriented programming.

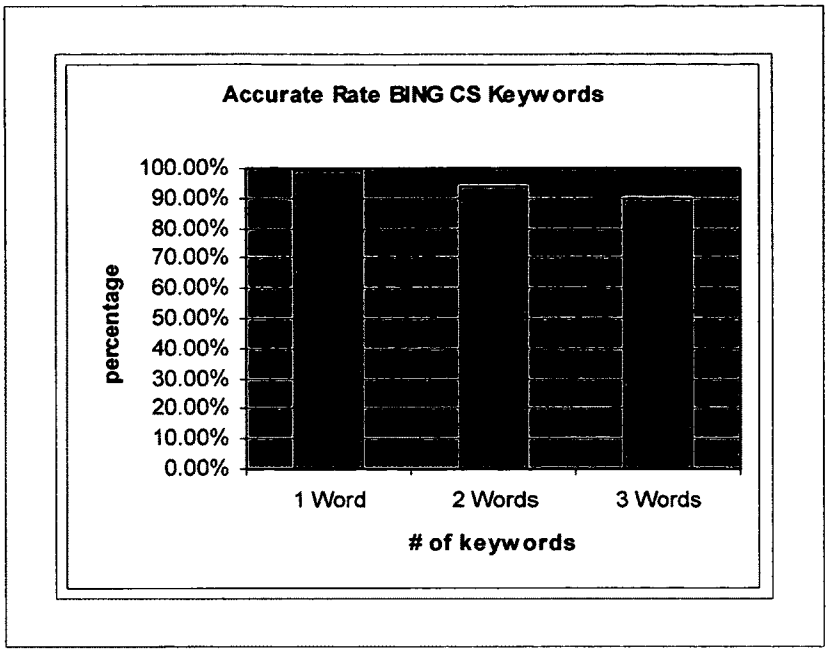


Figure 2.3 – Bing accurate rate Computer Science Keywords

In Bing's Computer Science keywords, the top 3 of 1 word keywords are, Algorithm , Interface, Cryptograph and Inheritance, Metadata, and top 3 of 2 words keywords are Artificial Intelligence, Operating System, and Data Mining, and top 3 of 3 words keywords is PL-SQL, Advanced Encryption Standard, and Application Program Interface.

In the **Computer Science keywords comparison**, we can conclude that Google has the highest accurate rate at 99.40% on 1 keyword, and Yahoo is 2nd at 99.13% and Bing at 99.09%. On 2 keywords, Google has an accurate rate at 96.98%, and Bing at 2nd at 94.11%, and Yahoo at 91.35%. Finally, on 3 keywords, Google has accurate rate at 97.13%, Yahoo is 2nd at 92.31%, and Bing at 89.67%.

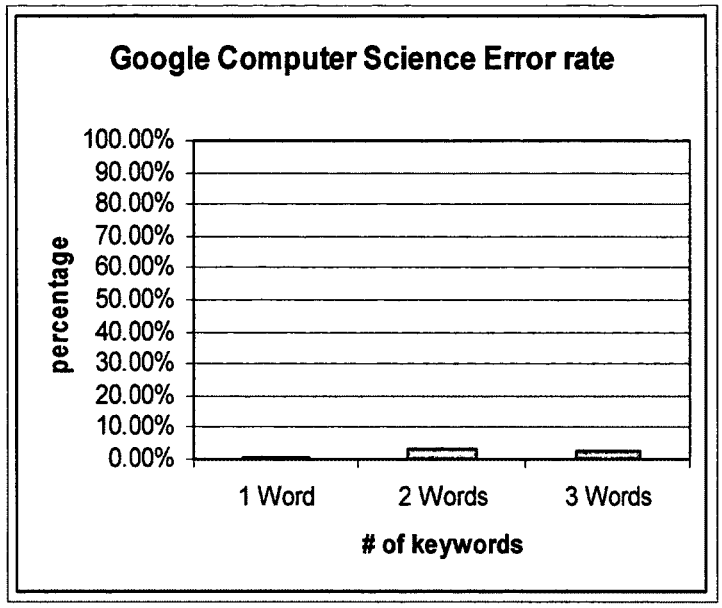


Figure 2.4 – Google error rate Computer Science Keywords

The worst keyword for 1 word keyword is database at 97.6%, 2 word keyword is Computer Graphic at 95.6%, and 3 word keywords is Unified Markup Language at 81.3%.

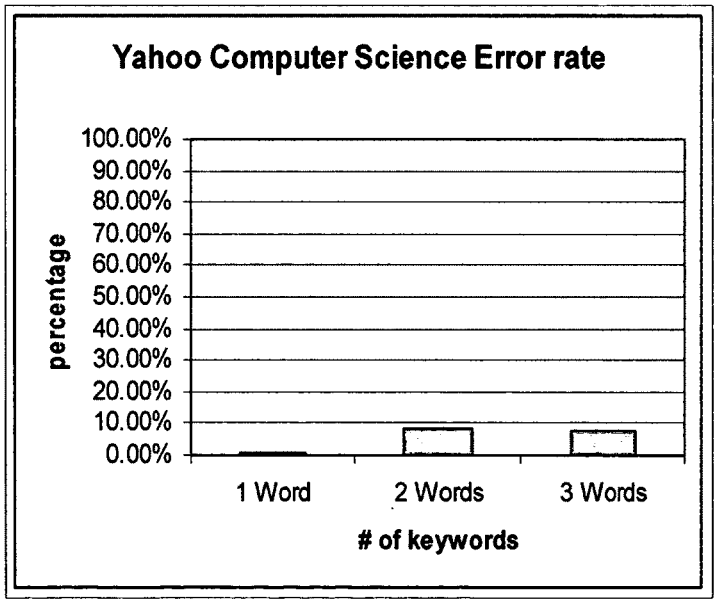


Figure 2.5 – Yahoo error rate Computer Science Keywords

The worst keyword for 1 word keyword is configuration at 97.6%, 2 word keyword is Class Diagram at 82.60%, and 3 word keywords is Unified Markup Language at 79.30%

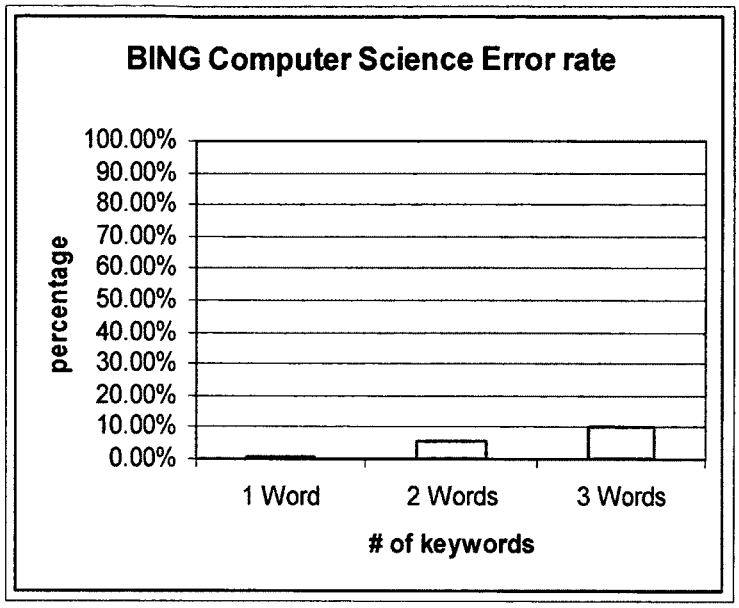


Figure 2.6 – Bing error rate Computer Science Keywords

The worst keyword for 1 word keyword is destructor at 97.3%, 2 word keyword is Search Engines at 90%, and 3 word keywords is Unified Markup Language at 34.3%.

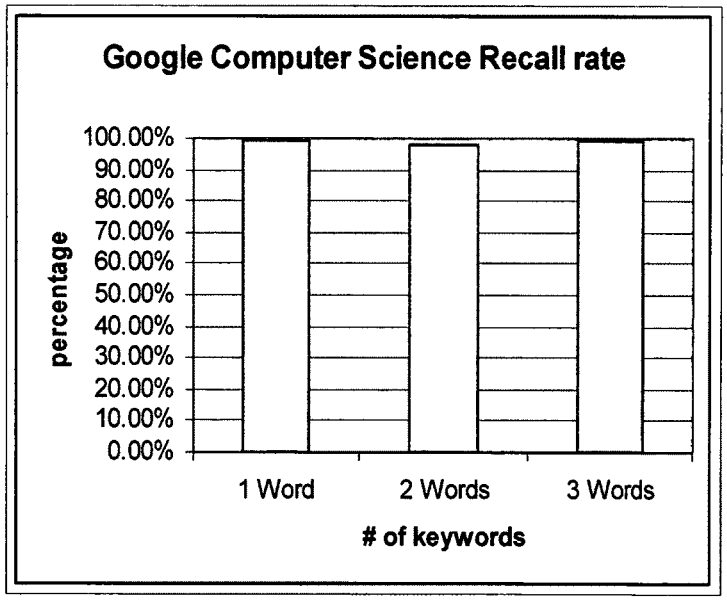


Figure 2.7 – Google recall rate Computer Science Keywords

Google has 100% on 1 word keyword recall rate in destructor, inheritance, and pseudocode. Google has 100% on 2 word keyword recall rate with Class Diagram and Sequence Diagram. It has 100% on 3 word keyword recall rate on Application Program interface.

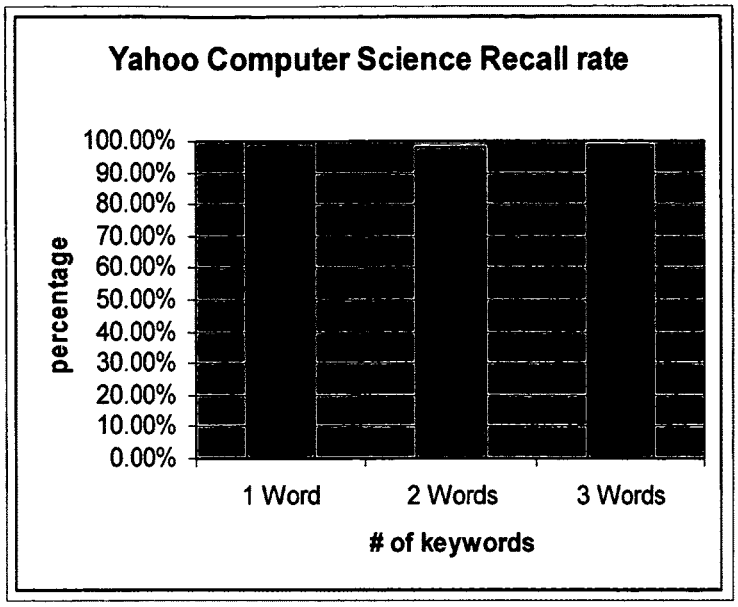


Figure 2.8 – Yahoo recall rate Computer Science Keywords

Yahoo has 100% on 1 word keyword recall rate in metadata and algorithm. Yahoo has 100% on 2 word keyword recall rate with Computer Architecture and Sequence Diagram. It has highest percentage on 3 word keyword recall rate on Application Program interface.

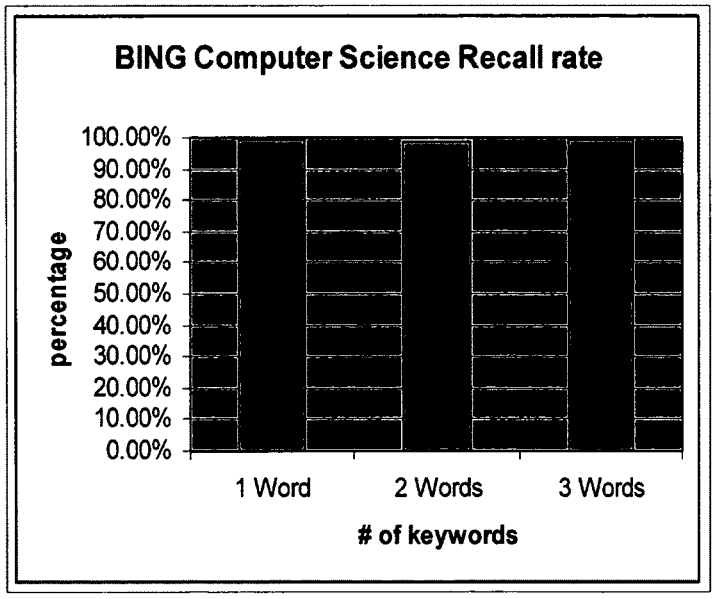


Figure 2.9 – Bing recall rate Computer Science Keywords

Bing has 100% on 1 word keyword recall rate in algorithm. Bing has 100% on 2 word keyword recall rate with computer architecture and artificial intelligence, and software engineering. It has 100% on 3 words keyword recall rate on object oriented programming, and local area network.

The graph shows that Bing has better Recall rate than Google and Yahoo overall.

1 word keywords	2 words keywords	3 words keywords
Depreciation	Financial Statement	Internal Revenue Service
Liabilities	Account Receivable	Collateralized Mortgage Obligation
Mortgage	Account Payable	Theory of Constraints
UnderWriters	Supply Chain	Economic Value Added
Periodicity	Theoretical Capacity	Market Interest rate
Dissolution	Dividend income	Materials Inventory Account
Expenditure	Adverse Opinion	Cost of Goods Sold
Liquidation	Fiscal Year	Return on Investment
Patents	Scatter Diagram	Total Quality Management
Revenue	Treasury Stock	Process Value Analysis

Table 2.3 – Accounting Keywords

In 2011, we update the keyword search result in Computer Science, Accounting, and Health Science category. In Computer Science category, we used the keywords, pseudocode, network security, and advanced encryption standard.

Computer Science category:

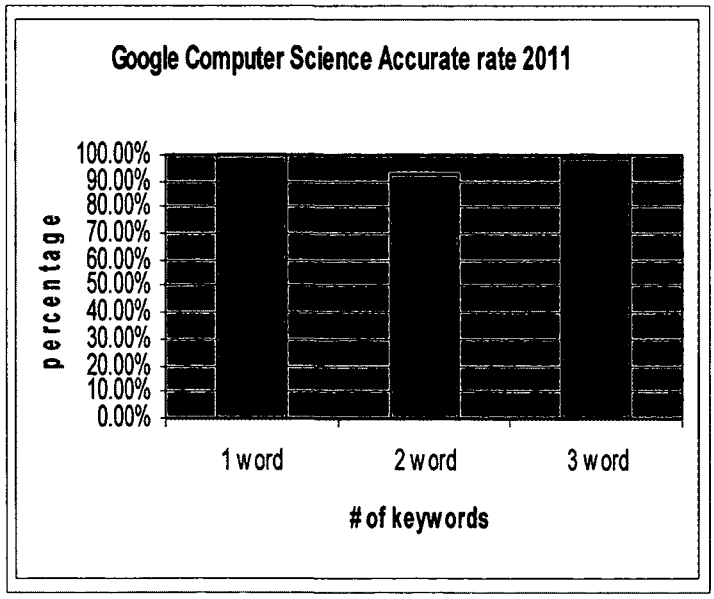


Figure 2.28 – Google Computer Science Accurate rate 2011

The graph shows that's the accurate rate in pseudocode is 99.6%, network security at 93%, and advanced encryption standard at 99.3%.

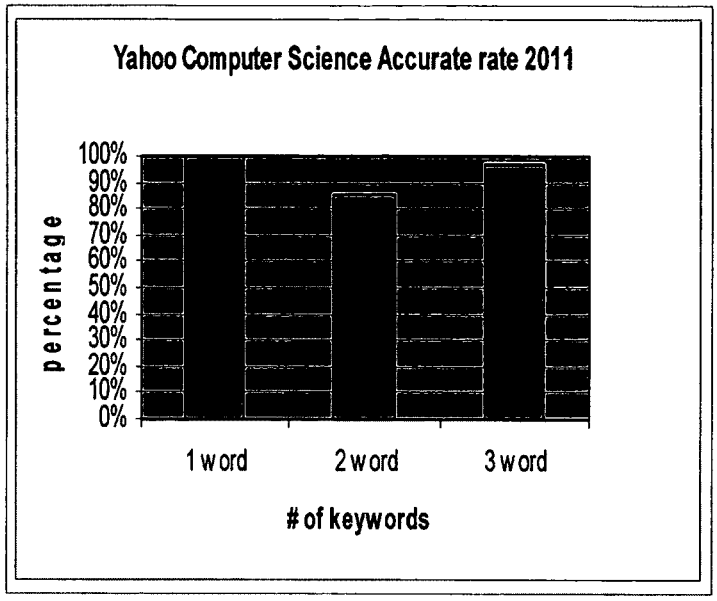


Figure 2.29 – Yahoo Computer Science Accurate rate 2011

The graph shows that's the accurate rate in pseudocode is 100%, network security at 85.3%, and advanced encryption standard at 97.3%.

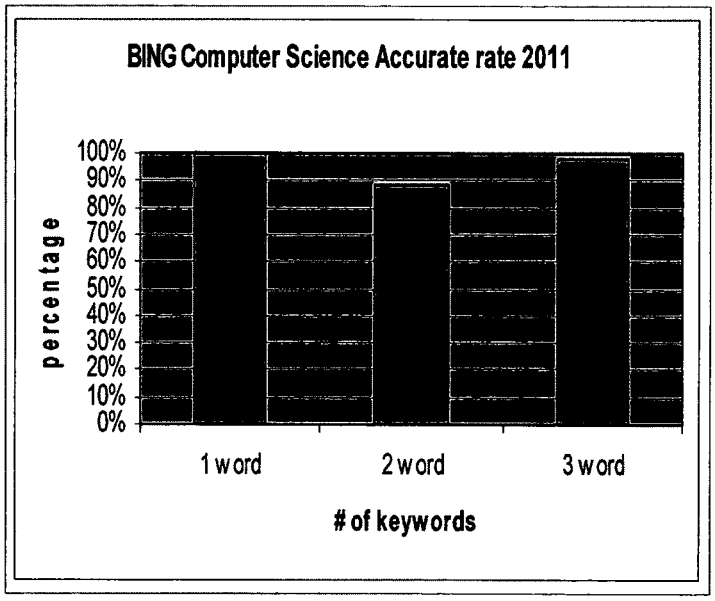


Figure 2.30 – Bing Computer Science Accurate rate 2011

The graph show that's the accurate rate in pseudocode is 100%, network security at 88.3%, and advanced encryption standard at 98%.

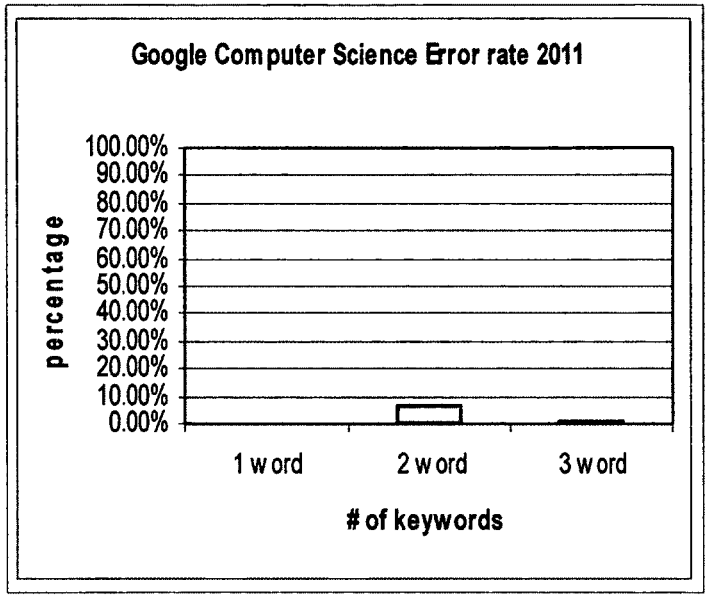


Figure 2.31 – Google Computer Science Error rate 2011

The graph show that's the error rate in pseudocode is 0.4%, network security at 7%, and advanced encryption standard at 0.7%.

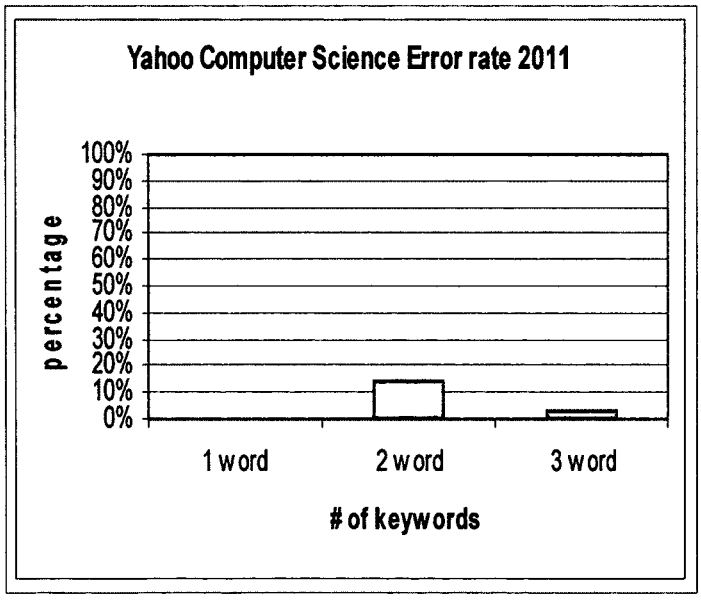


Figure 2.32 – Yahoo Computer Science Error rate 2011

The graph show that's the error rate in pseudocode is 0%, network security at 14.7%, and advanced encryption standard at 2.7%.

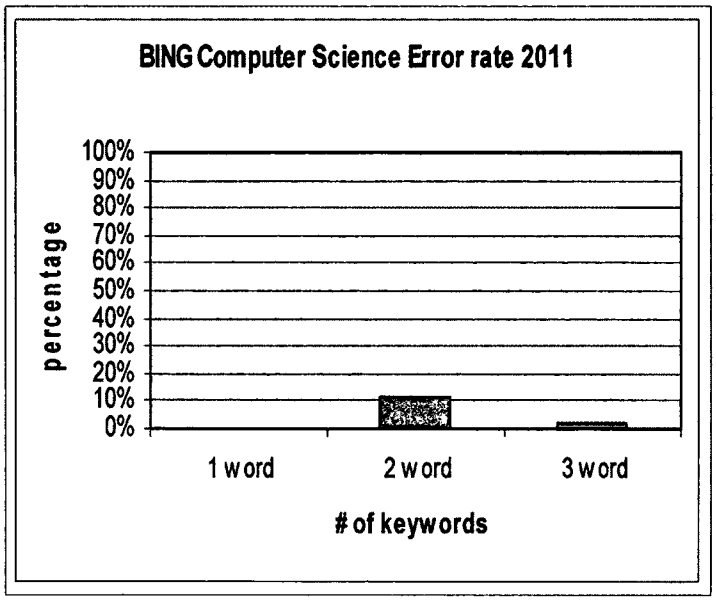


Figure 2.33 – Bing Computer Science Error rate 2011

The graph show that's the error rate in pseudocode is 0%, network security at 11.7%, and advanced encryption standard at 2.7%.

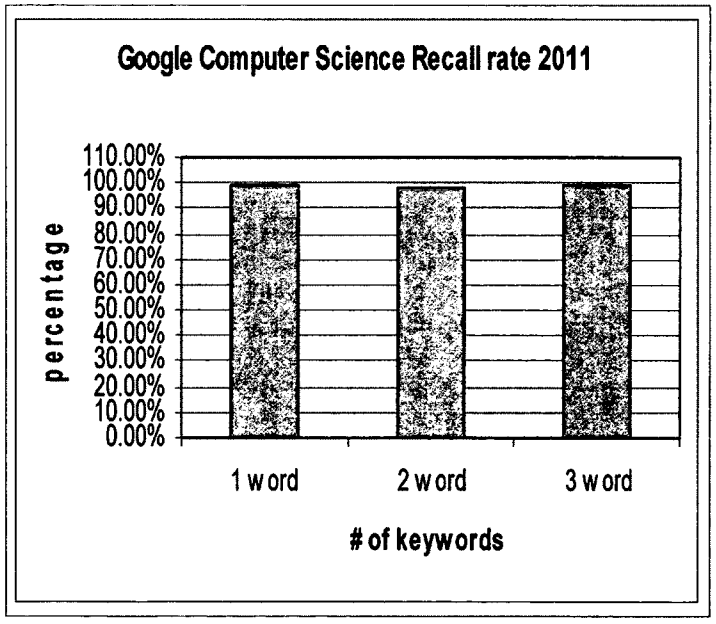


Figure 2.34 – Google Computer Science Recall rate 2011

The graph show that's the recall rate in pseudocode is 99.6%, network security at 97.6%, and advanced encryption standard at 99.3%.

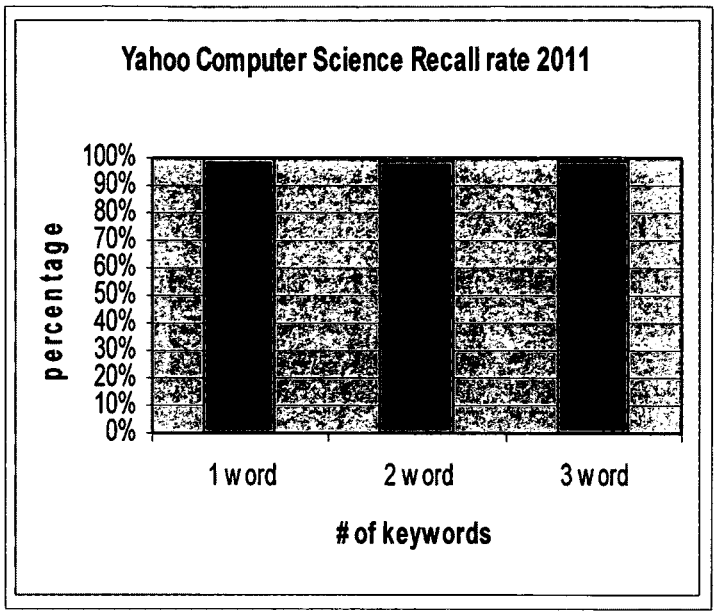


Figure 2.35 – Yahoo Computer Science Recall rate 2011

The graph show that's the recall rate in pseudocode is 100%, network security at 99.3%, and advanced encryption standard at 99.3%.

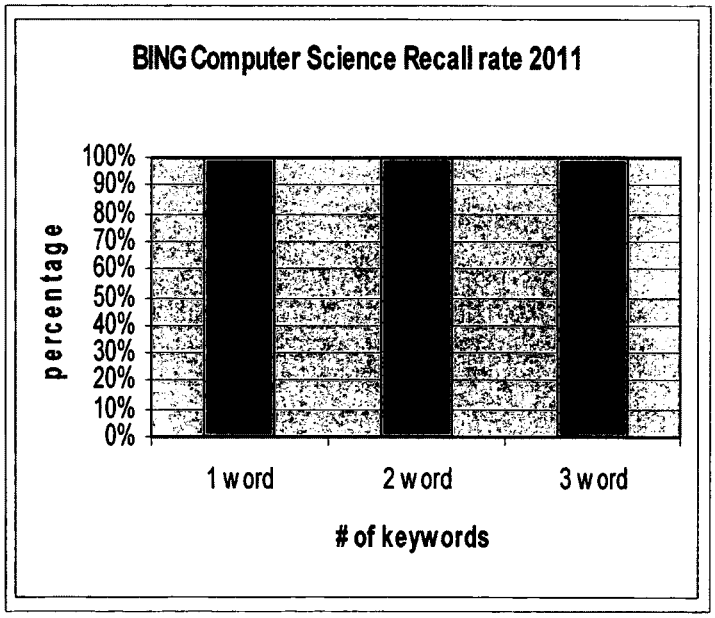


Figure 2.36 – Bing Computer Science Recall rate 2011

The graph show that's the recall rate in pseudocode is 100%, network security at 100%, and advanced encryption standard at 99.6%.

2.3: Keyword Search Experiments in Business (i,e. Accounting) Area

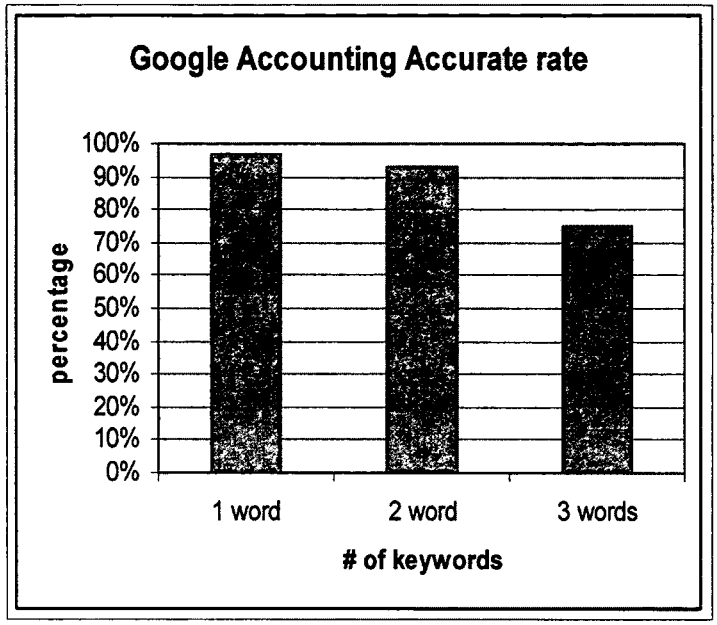


Figure 2.10: Google accurate rate accounting Keywords

In Google's Accounting keywords, there are 7 of 1 word keyword gets 100%, and they are Depreciation, Liabilities, Mortgage, Periodicity, Expenditure, Liquidation, Patents; and the top 2 of 2 words keywords get 100% are Account Payable, and Scatter Diagram, and 3 word keywords gets 100% are Cost of Goods Sold, and Return on Investment.

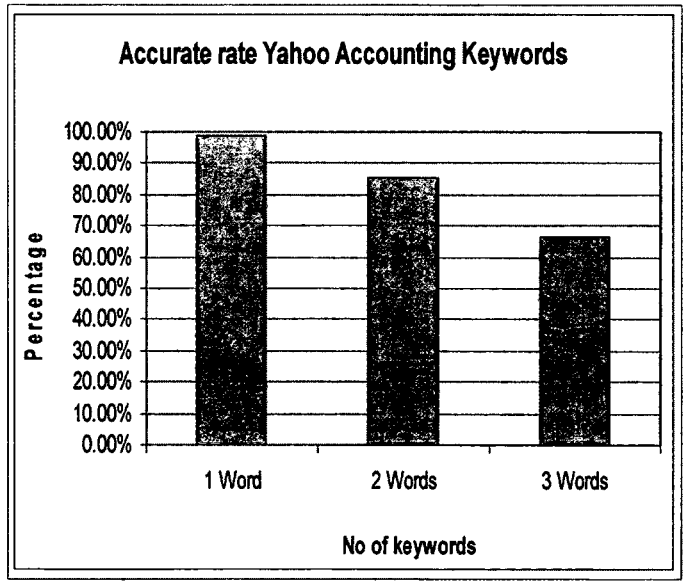


Figure 2.11: Yahoo accurate rate accounting Keywords

In Yahoo's Accounting keywords, there are 7 of 1 word keyword gets 100%, and they are Depreciation, Liabilities, Mortgage, Periodicity, Expenditure, Liquidation, Patents; and the top 2 of 2 words keywords get 100% are Account Payable, and Scatter Diagram, and 3 word keywords gets highest accurate rate of 99.6% is Cost of Goods Sold.

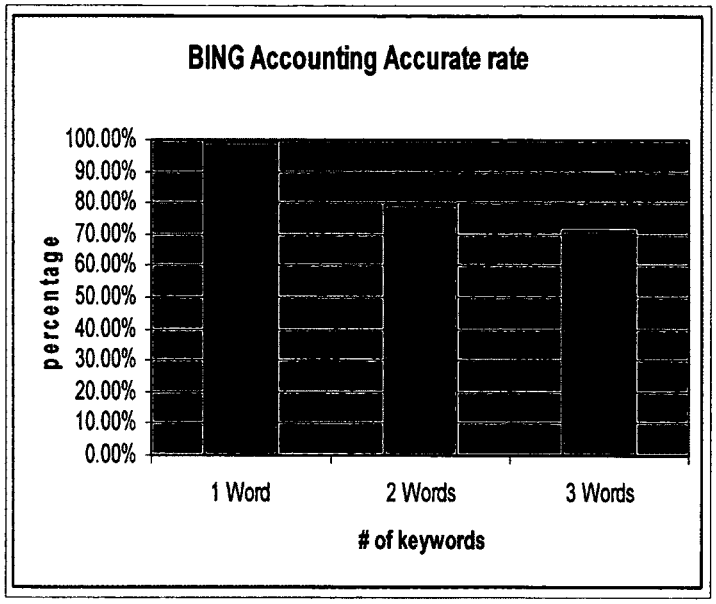


Figure 2.12 – Bing accurate rate accounting Keywords

In Bing's Accounting keywords, there are 1 of 1 word keyword gets 100% are Liquidation and Patents,; and the top 2 of 2 words keywords get highest accurate rate is Supply Chain at 99.6%, and 3 word keywords gets highest accurate in percentage is Internal Revenue Service.

We can conclude that Google has the highest accurate rate in accounting keywords searches. And Bing is better in 3 keywords search than Yahoo.

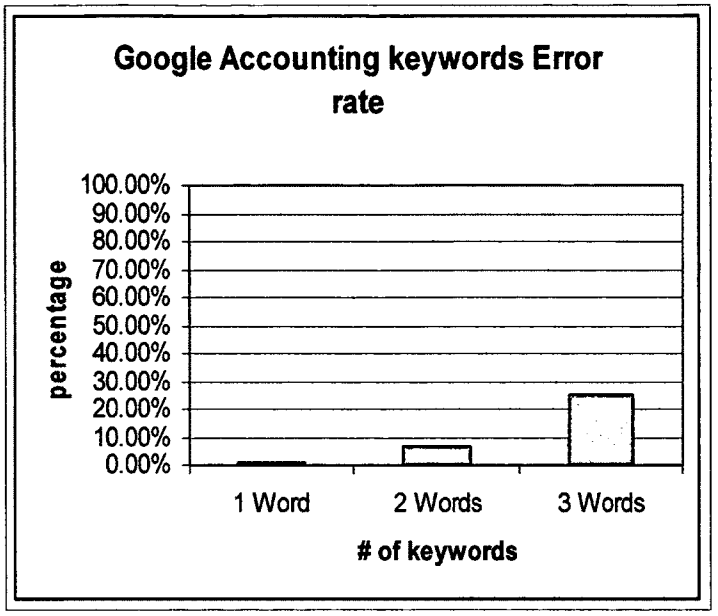


Figure 2.13 – Google error rate accounting Keywords

The worst keyword for 1 word keyword is UnderWriters at 97.6%, 2 word keyword is Theoretical Capacity at 67.6%, and 3 word keywords is Materials Inventory Account at 5.3%.

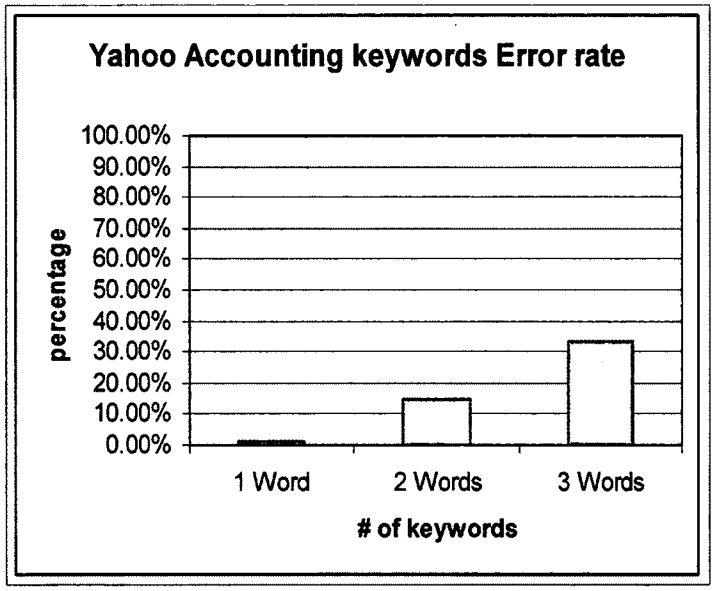


Figure 2.14 – Yahoo error rate accounting Keywords

The worst keyword for 1 word keyword is Mortgage at 98.3%, 2 word keyword is Treasury Stock at 40.3%, and 3 word keywords is Materials Inventory Account at 9.3%.

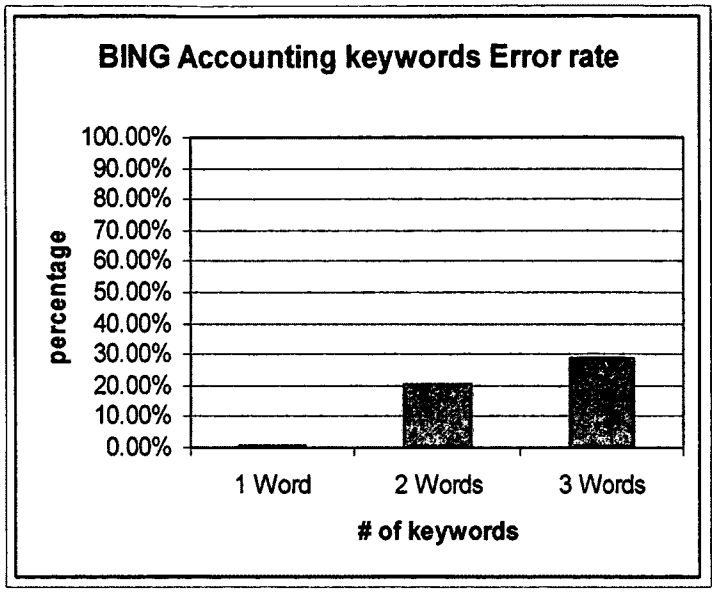


Figure 2.15 – Bing error rate accounting Keywords

The worst keyword for 1 word keyword is Underwriters at 98.3%, 2 word keyword is Dividend income at 63.0%, and 3 word keywords is Materials Inventory Account at 5.0%.

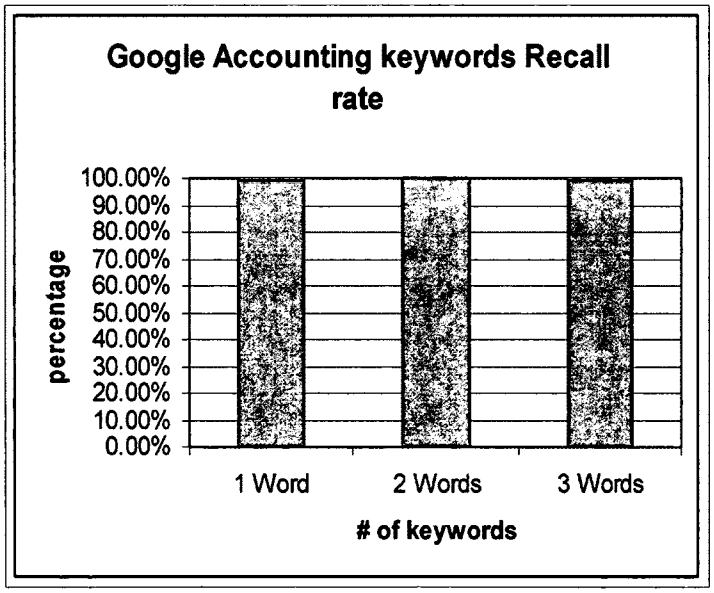


Figure 2.16 – Google recall rate accounting Keywords

Google has 100% on 1 word keyword recall rate in depreciation, Liabilities, Mortgage, Periodicity, Expenditure, Liquidation, Patents. Google has 100% on 2 word keyword recall rate with Account Receivable, Account Payable, Adverse Opinion, and Scatter Diagram. It has 100% on 3 word keyword recall rate on Material Inventory Account, Cost of Goods sold, Return on Investment, and Process Value Analysis.

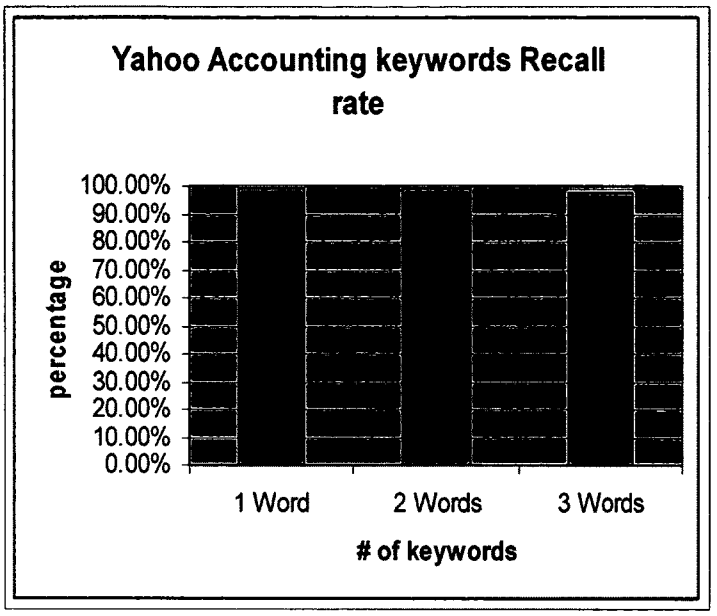


Figure 2.17 – Yahoo recall rate accounting Keywords

Yahoo has 100% on 1 word keyword recall rate in Expenditure. Yahoo has 100% on 2 word keyword recall rate with Financial Statement, Supply Chain, and Fiscal Year. It has 100% on 3 word keyword recall rate on Cost of Goods sold, and Process Value Analysis.

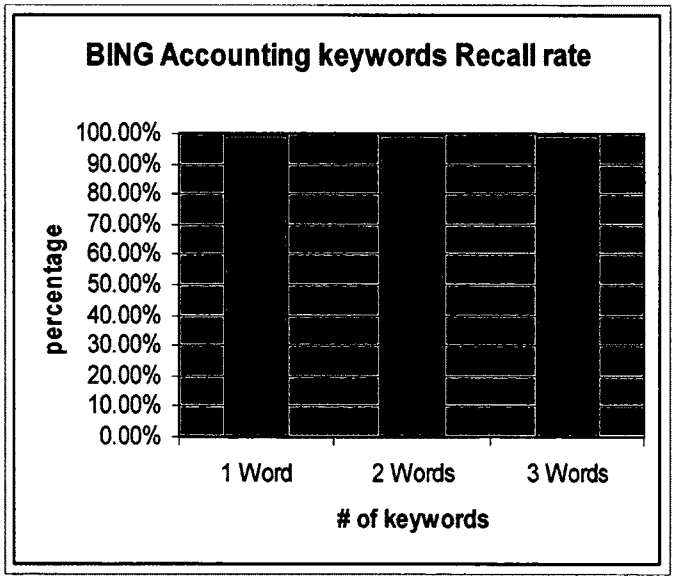


Figure 2.18 – Bing recall rate accounting Keywords

Bing has 100% on 1 word keyword recall rate in Liquidation, and Patents. Bing has 100% on 2 word keyword recall rate with Financial Statement, Account Payable, Theoretical Capacity and Supply Chain.. It has 100% on 3 word keyword recall rate on Internal Revenue Service, and Materials Inventory Account.

Accounting category:

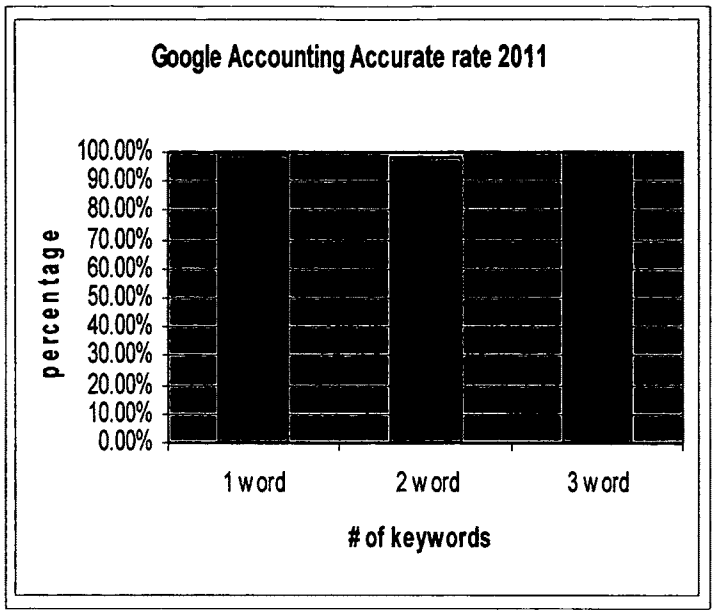


Figure 2.37 – Google Accounting Accurate rate 2011

The graph show that's the accurate rate in patents is 99.3%, treasury stock at 98.3%, and cost of goods sold at 100%.

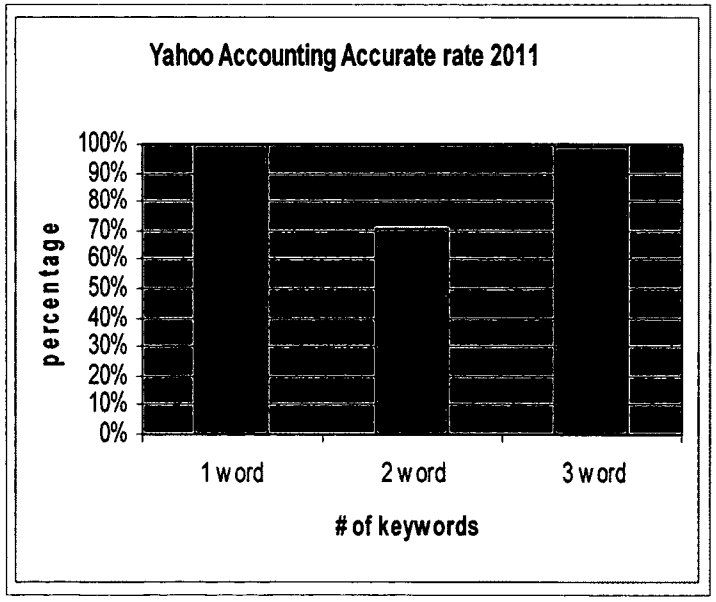


Figure 2.38 – Yahoo Accounting Accurate rate 2011

The graph show that's the accurate rate in patents is 100%, treasury stock at 71%, and cost of goods sold at 99%.

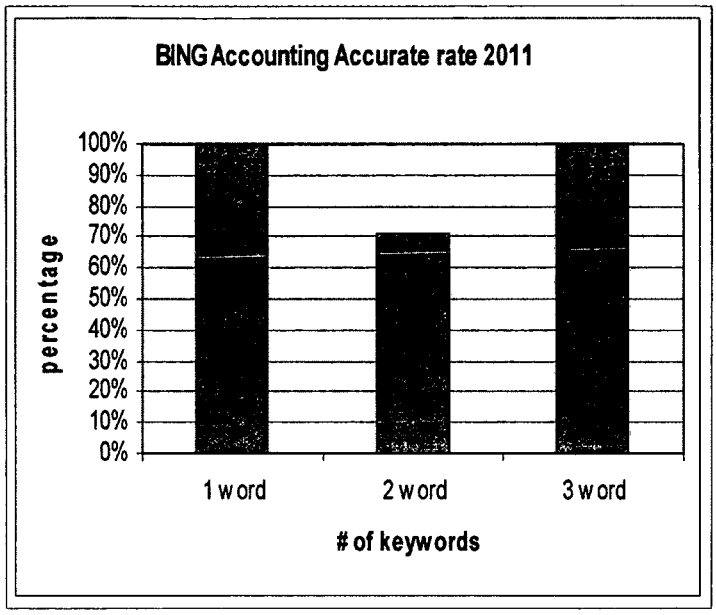


Figure 2.39 – Bing Accounting Accurate rate 2011

The graph show that's the accurate rate in patents is 100%, treasury stock at 71%, and cost of goods sold at 99%.

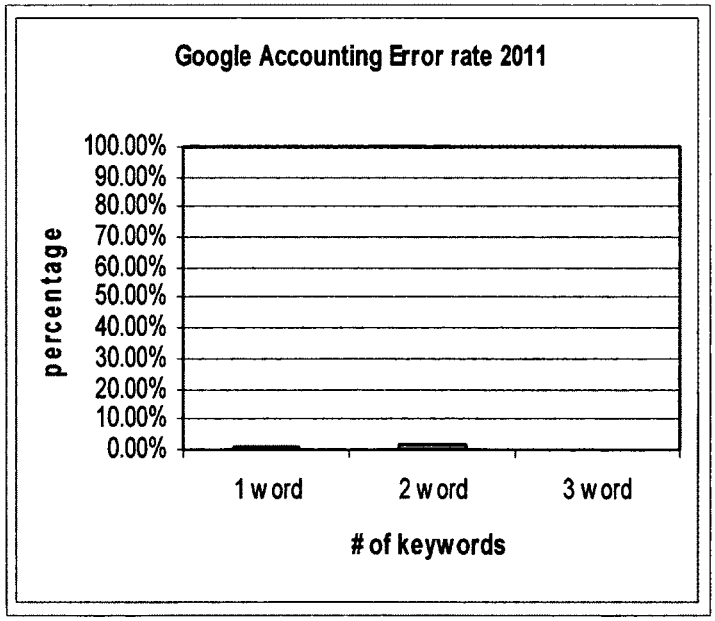


Figure 2.40 – Google Accounting Error rate 2011

The graph show that's the error rate in patents is 0.7%, treasury stock at 1.7%, and cost of goods sold at 0%.

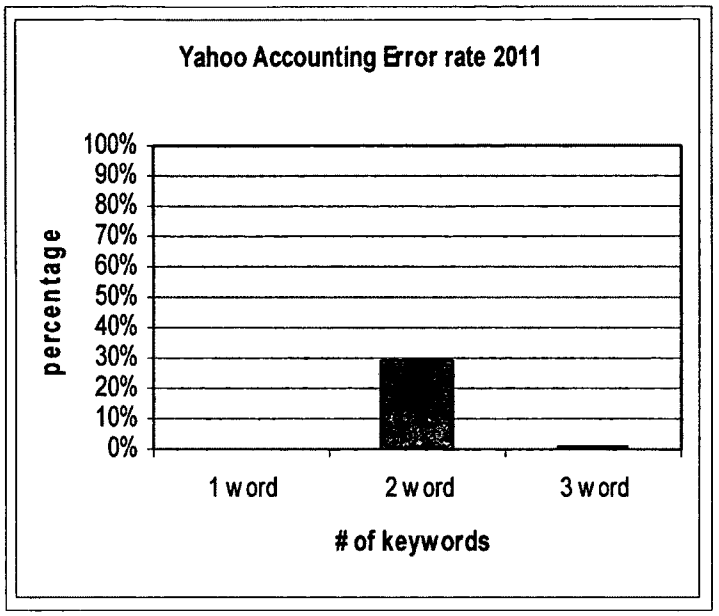


Figure 2.41 – Yahoo Accounting Error rate 2011

The graph show that's the error rate in patents is 0%, treasury stock at 29%, and cost of goods sold at 1%.

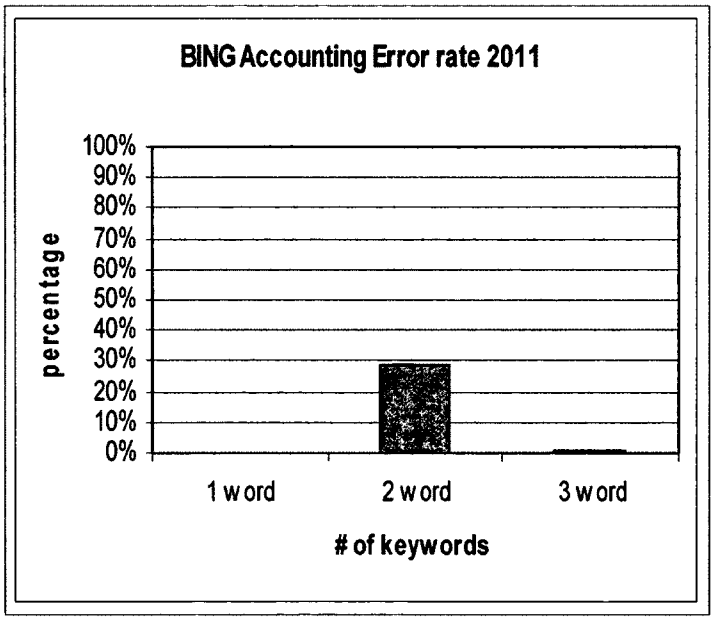


Figure 2.42 – Bing Accounting Error rate 2011

The graph show that's the error rate in patents is 0%, treasury stock at 29%, and cost of goods sold at 1%.

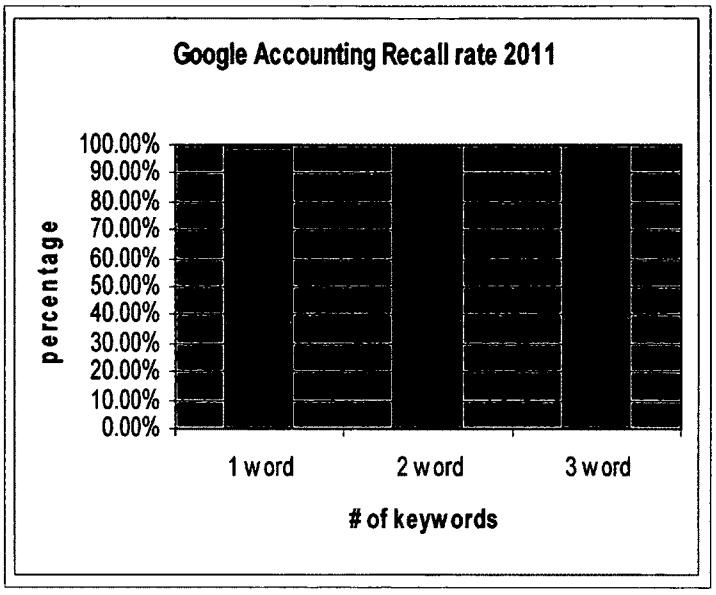


Figure 2.43 – Google Accounting Recall rate 2011

The graph show that's the recall rate in patents is 99.3%, treasury stock at 99.6%, and cost of goods sold at 100%.

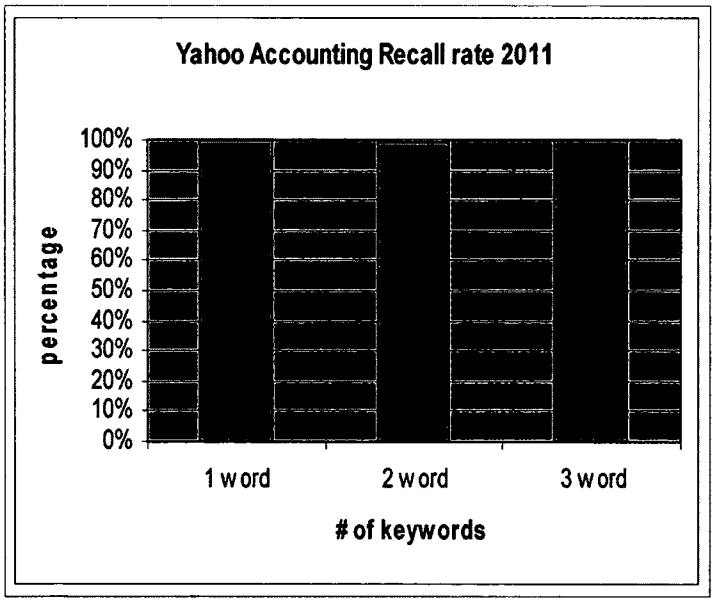


Figure 2.44 – Yahoo Accounting Recall rate 2011

The graph show that's the recall rate in patents is 100%, treasury stock at 99%, and cost of goods sold at 100%.

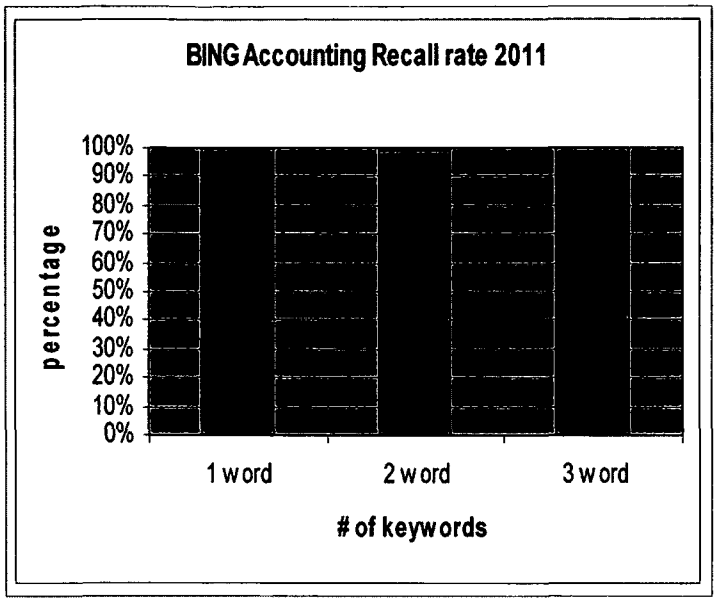


Figure 2.45 – Bing Accounting Recall rate 2011

The graph show that's the recall rate in patents is 100%, treasury stock at 99.3%, and cost of goods sold at 100%.

1 word keywords	2 words keywords	3 words keywords
Insilicos	Trendelenburg Test	Guidelines International Network
Nutrition	Health science	Indirect DNA damage
Audiology	Healthcare today	Ancestry-informative marker
Nutrigenomics	Environmental health	Threshold Limit Value
OSHCA	Participatory Ergonomics	Body Area Network
Auxology	Social work	Health Science Descriptors
Photoprotection	Physical therapy	Physical fitness test
Psychoeducation	Pharmaceutical sciences	Trans-Proteomic Pipeline
Compounding	Biomedical technology	Direct DNA damage
HubMed	Biomedical research	
	Body Burden	

Table 2.4 – Health Science Keywords

2.4: Keyword Search Experiments in Health Science Area

And in Health Science keywords, Google have are ranks #1 on 1 keyword, 2 keywords and 3 keywords searches. Yahoo has better 2 keywords accurate rate than BING, but BING has higher accurate rate than Yahoo in 3 keywords search.

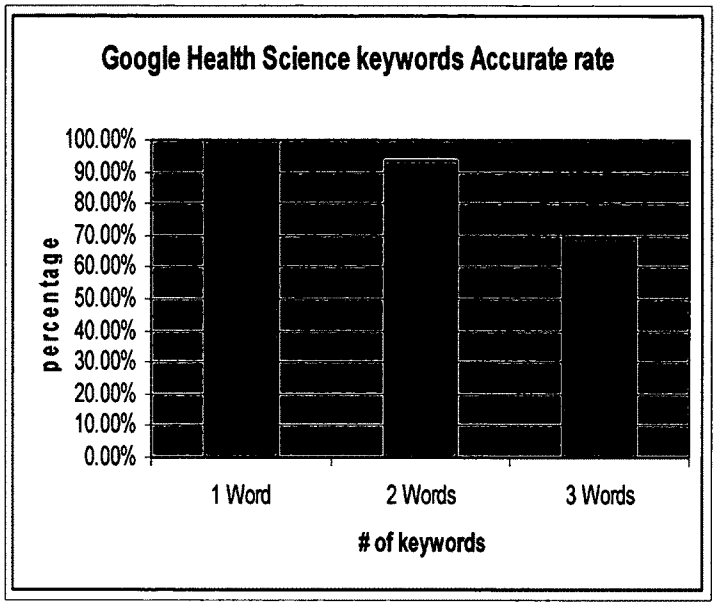


Figure 2.19 – Google accurate rate health science Keywords

In Google's Health Science keywords, the top 1 word keywords that gets 100% are Nutrition, Nutrigenomics, OSHCA, Auxology, and HubMed, and the top 2 words keywords is Body Burden, and top 3 of 3 word keywords gets 100% are Threshold Limit Value, and Trans-Proteomic Pipeline.

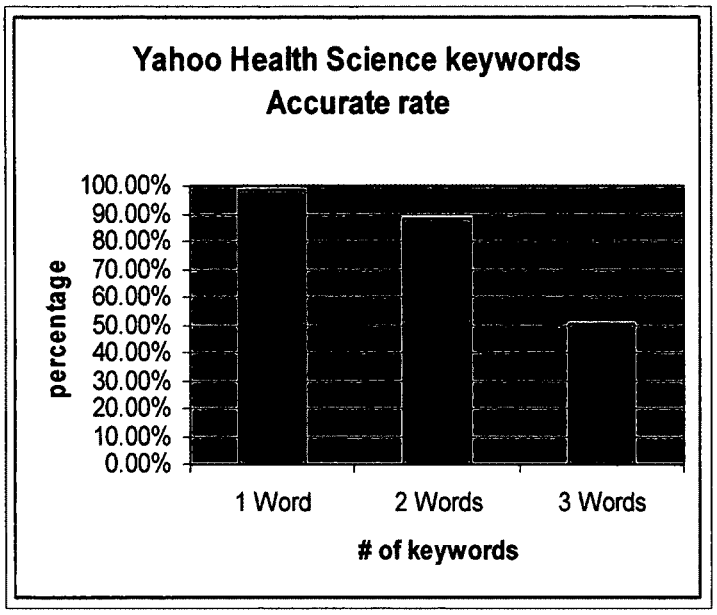


Figure 2.20 – Yahoo accurate rate health science Keywords

In Yahoo's Health Science keywords, the top 1 word keywords that gets highest accurate rate is Compounding, and the top 2 words keywords are Social work and Physical therapy, and 3 word keywords gets highest accurate rate is Threshold Limit Value.

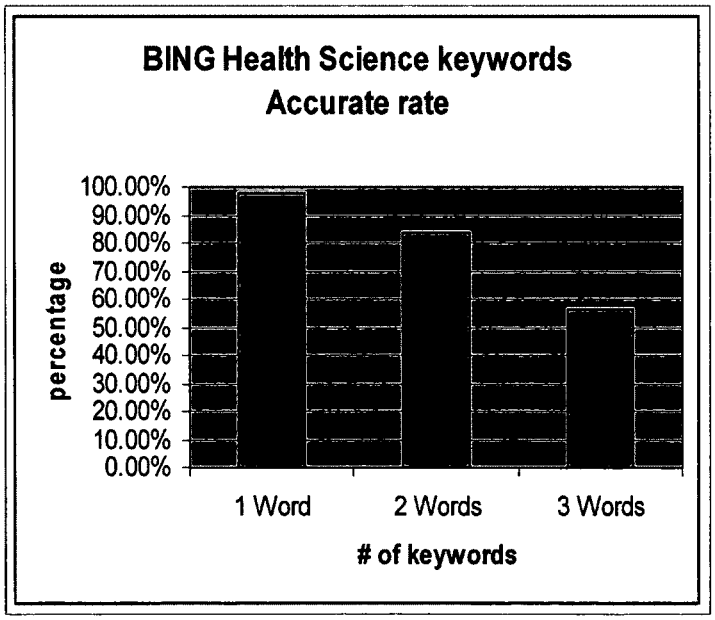


Figure 2.21 – Bing accurate rate health science Keywords

In Bing's Health Science keywords, the top 1 word keywords that gets highest accurate rate are Compounding, and HubMed, and the top 2 words keywords is Physical Therapy, and 3 word keywords gets highest accurate rate is Ancestry informative marker.

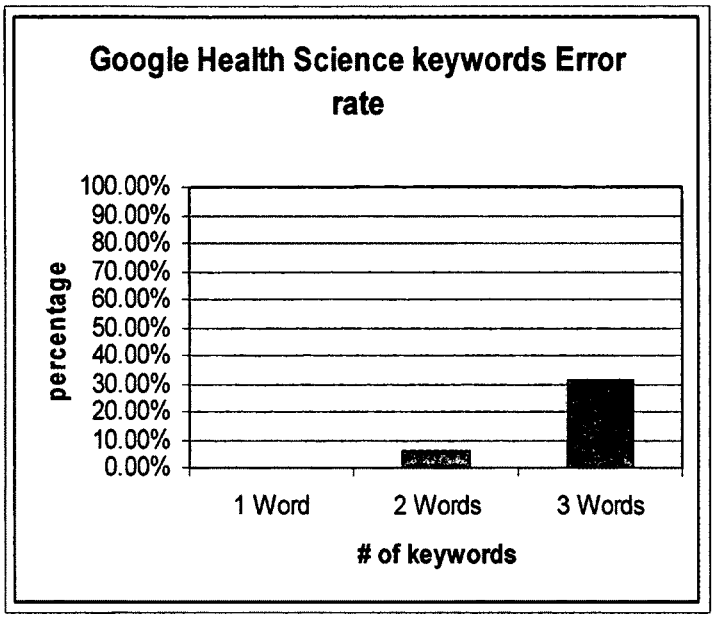


Figure 2.22– Google error rate health science Keywords

The worst keyword for 1 word keyword is Audiology at 99.3%, 2 word keyword is Healthcare today at 69.6%, and 3 word keywords is Health Sciences Descriptors at 18.0%.

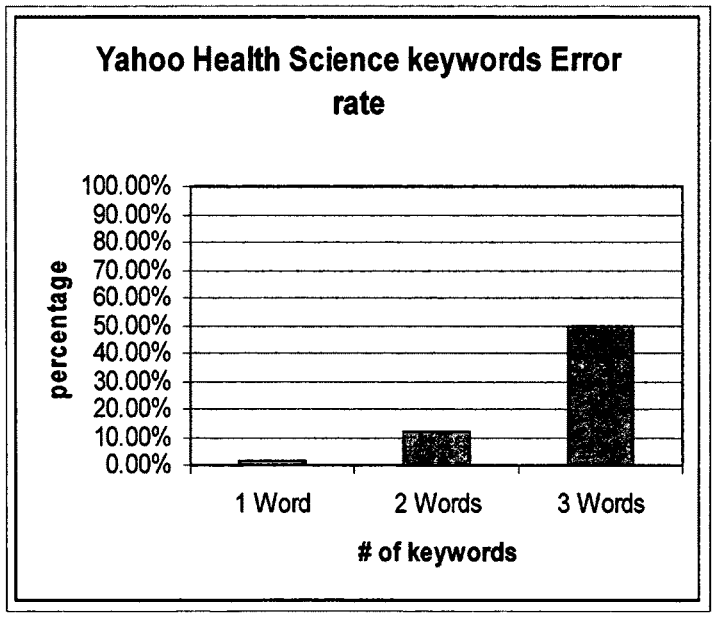


Figure 2.23 – Yahoo error rate health science keywords

The worst keyword for 1 word keyword is OSHCA at 96.6%, 2 word keywords is Biomedical technology at 65.0%, and 3 word keywords is Direct DNA damage at 14.3%.

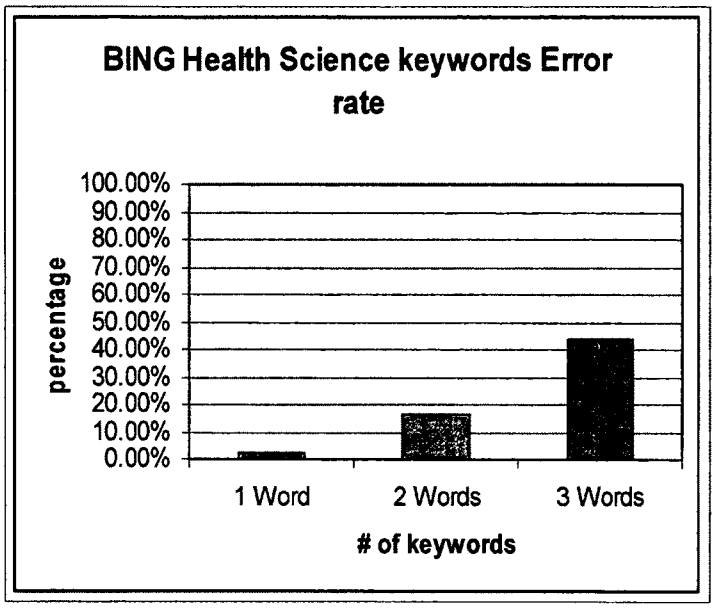


Figure 2.24– Bing error rate health science Keywords

The worst keyword for 1 word keyword is OSHCA at 93.6%, 2 word keywords is Healthcare today at 44.0%, and 3 word keywords is Health Sciences Descriptors at 9.6%.

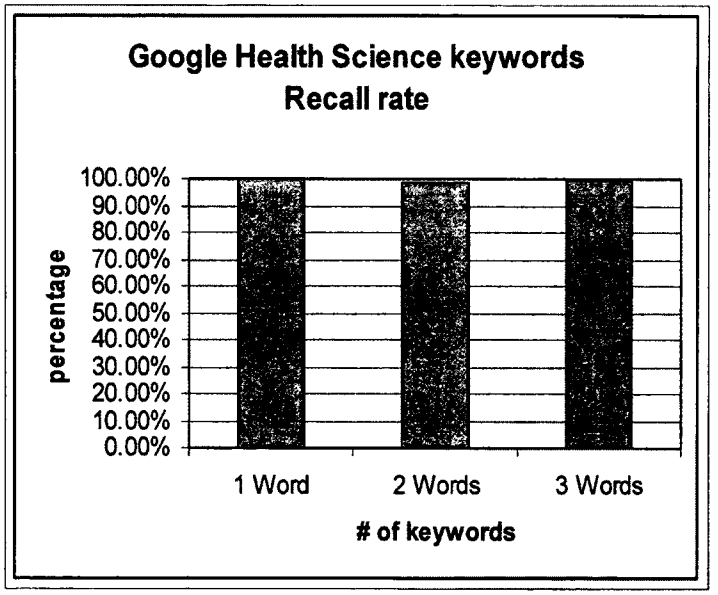


Figure 2.25 – Google recall rate health science keywords

Google has 100% on 1 word keyword recall rate is Nutrition, Nutrigenomics, OSHCA, Auxology, HubMed; Google has 100% on 2 word keyword recall rate is Body Burden. It has 100% on 3 word keyword recall rate on Ancestry informative marker, Trans-Proteomic Pipeline, and Direct DNA damage.

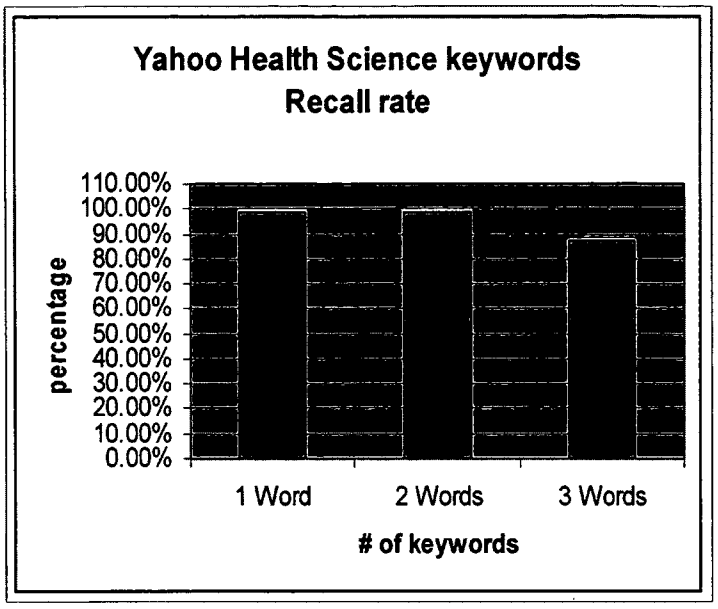


Figure 2.26 – Yahoo recall rate health science Keywords

Yahoo has the top 1 word keyword recall rate is Compounding; Google has 100% on 2 word keyword recall rate are Social work, and Physical therapy. It has top 3 word keyword recall rate on Health Science Descriptors.

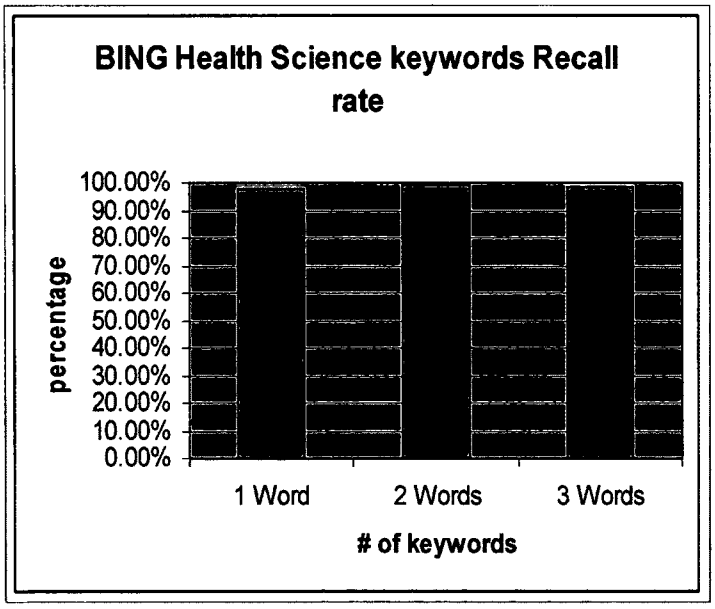


Figure 2.27 – Bing recall rate health science Keywords

Bing has the top 1 word keyword recall rate is Compounding; Google has 100% on 2 word keyword recall rate are Environmental Health, Social work, and Physical therapy, and Biomedical research. It has top 3 word keyword recall rate on Ancestry informative marker.

Health Science category:

In Health science category, we used the keywords OSHCA, Participatory Ergonomics, and Ancestry informative marker.

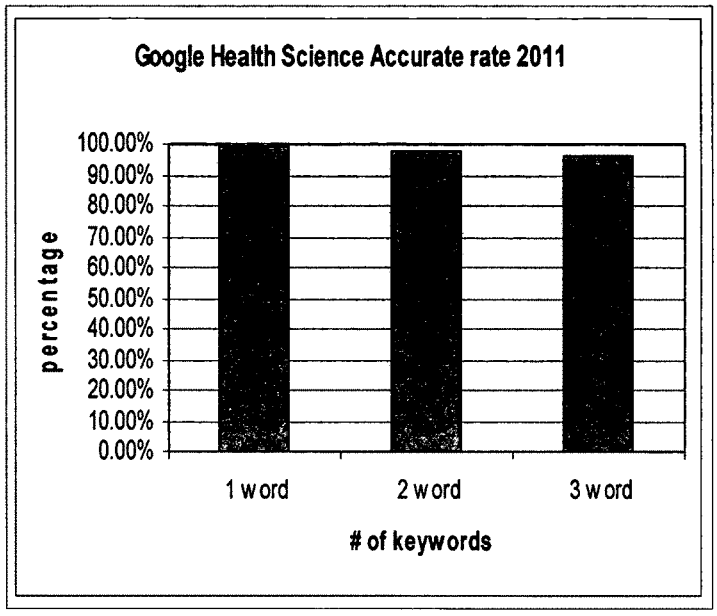


Figure 2.46 – Google Health Science Accurate rate 2011

The graph show that's the accurate rate in OSHCA is 99.6 %, Participatory Ergonomics at 97.6%, and Ancestry informative marker 96.3%.

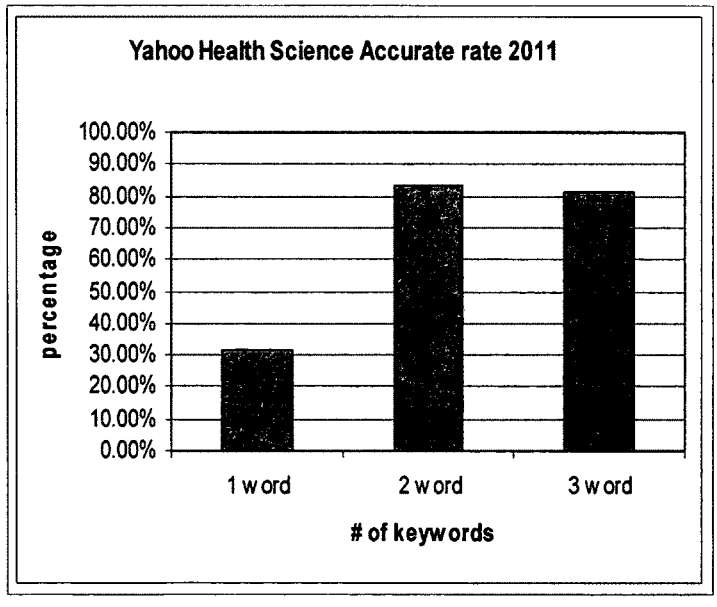


Figure 2.47 – Yahoo Health Science Accurate rate 2011

The graph show that's the accurate rate in OSHCA is 31.6%, Participatory Ergonomics at 83%, and Ancestry informative marker 81%.

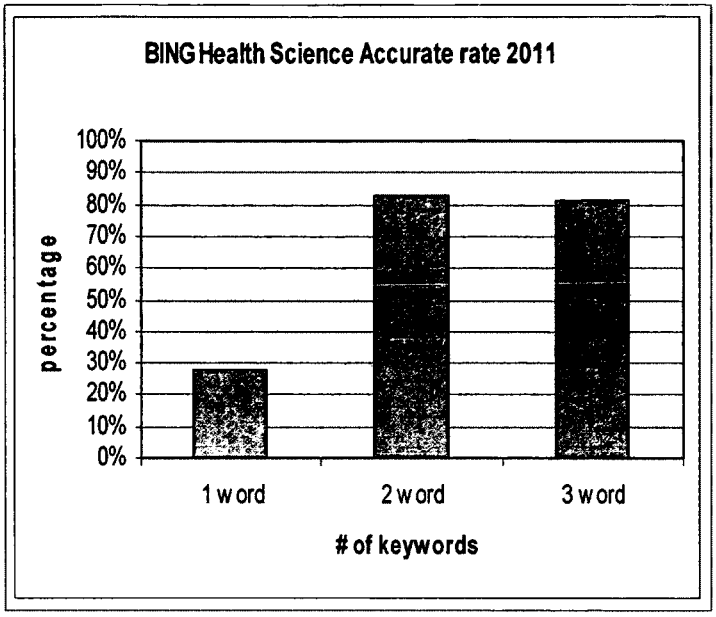


Figure 2.48 – Bing Health Science Accurate rate 2011

The graph show that's the accurate rate in OSHCA is 28%, Participatory Ergonomics at 83%, and Ancestry informative marker 81%.

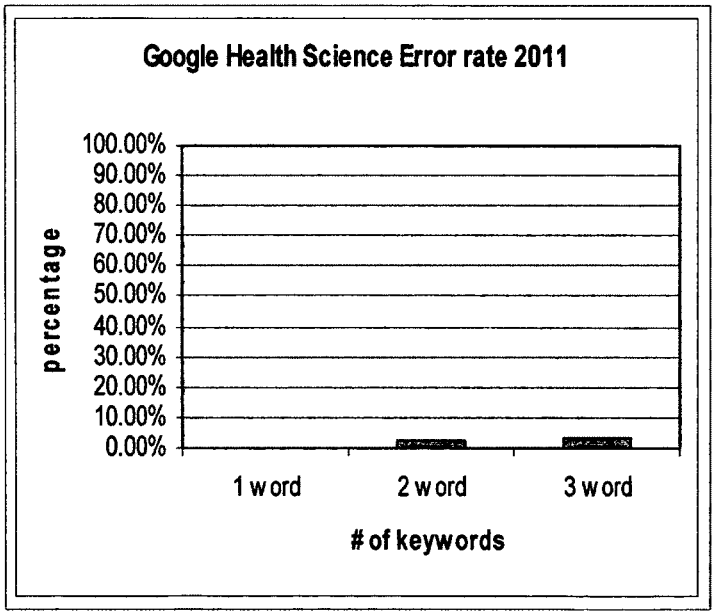


Figure 2.49 – Google Health Science Error rate 2011

The graph show that's the error rate in OSHCA is 0.4%, Participatory Ergonomics at 2.4%, and Ancestry informative marker 3.7%.

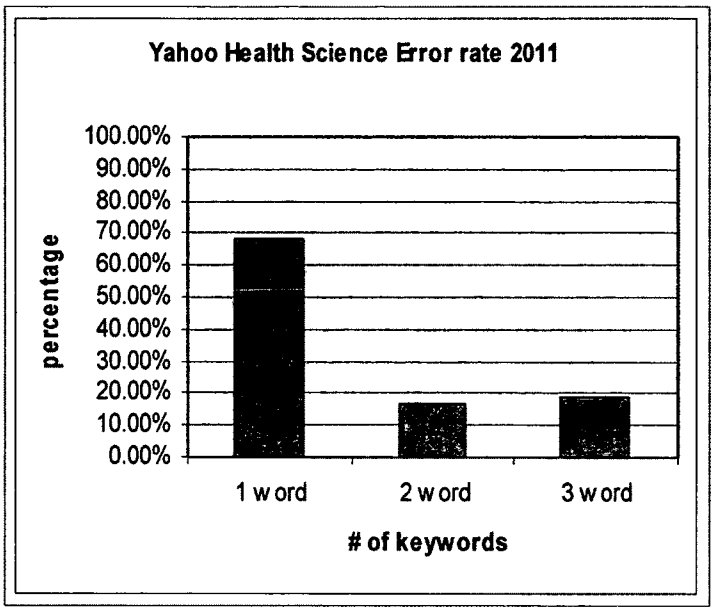


Figure 2.50 – Yahoo Health Science Error rate 2011

The graph show that's the error rate in OSHCA is 68.4%, Participatory Ergonomics at 17%, and Ancestry informative marker 19%.

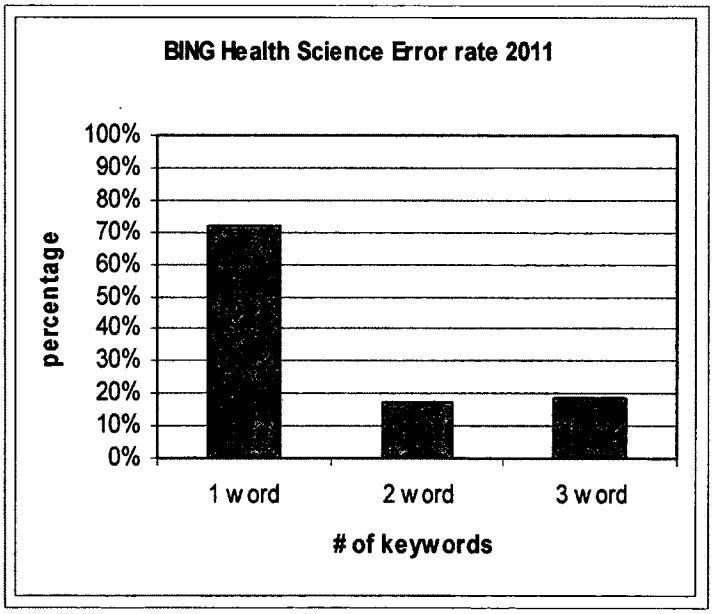


Figure 2.51 – Bing Health Science Error rate 2011

The graph show that's the error rate in OSHCA is 72%, Participatory Ergonomics at 17%, and Ancestry informative marker 19%.

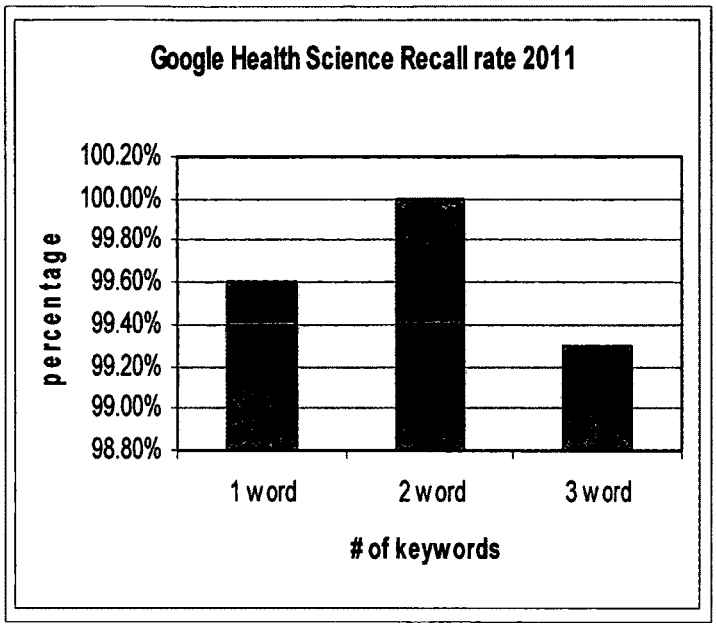


Figure 2.52 – Google Health Science Recall rate 2011

The graph show that's the recall rate in OSHCA is 99.6%, Participatory Ergonomics at 100%, and Ancestry informative marker 99.3%.

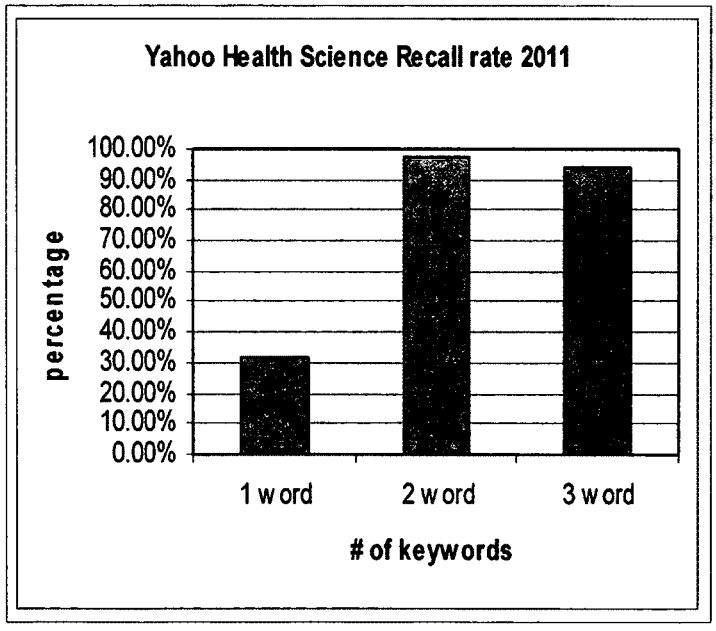


Figure 2.53 – Yahoo Health Science Recall rate 2011

The graph show that's the recall rate in OSHCA is 31.6%, Participatory Ergonomics at 97.6%, and Ancestry informative marker 94.3%.

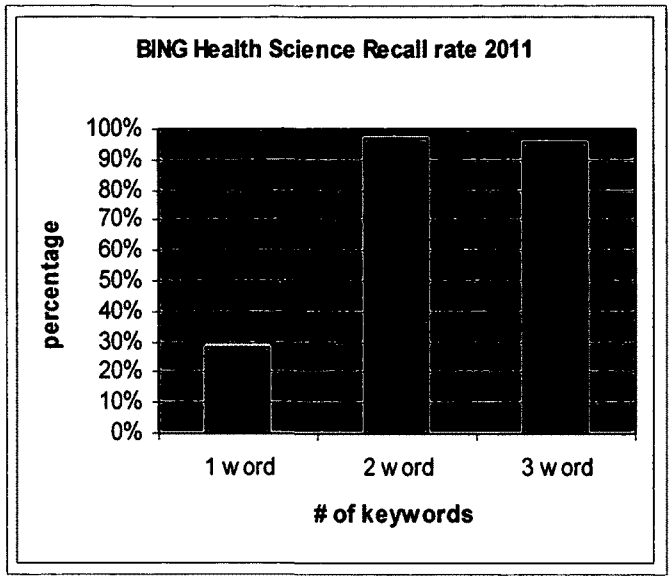


Figure 2.54 – Bing Health Science Recall rate 2011

The graph show that's the recall rate in OSHCA is 28%, Participatory Ergonomics at 97%, and Ancestry informative marker 95.6%.

2.5: Discovery Day Survey Form

Internet Search Engines Survey

Name (First name, Last name):

Dear Sir / Madam,

This **Internet Search Engine Survey** is for developing a Web-Based Mining Tool developments for Internet Searches. We would like to collect useful keywords in difference disciplines from faculty, domain experts, and students.

Our long-term goal is to apply the WMT.Internet.Searches in serving our LIU Community, The areas will be covered in different specialties such as Information Technology, Business, Bioinformatics, Health Sciences, Natural Sciences and Library Information Sciences.

Computer Science Department
Long Island University, Brooklyn Campus, New York

Please answer the following multiple choice Questions or Specify additional information:

Part I: Search Engine Questions

Question 1:

Which of these search engines {Google, Yahoo, MSN, ASK, Alexia, Others} do you think have the fastest, and most relevant search results?

Please enter the top 4 Search Engines in Order

1: _____

2: _____

3: _____

4: _____

Question 2:

How many times per week do you use Google as your search material?

☐ 0 to 5 times per week ☐ 6 to 10 times per week ☐ 11 to 15 times per week ☐ 16 or more times per week

Question 3:

How many times per week do you use Yahoo as your search material?

☐ 0 to 5 times per week ☐ 6 to 10 times per week ☐ 11 to 15 times per week ☐ 16 or more times per week

Question 4:

How many times per week do you use MSN as your search material?

☐ 0 to 5 times per week ☐ 6 to 10 times per week ☐ 11 to 15 times per week ☐ 16 or more times per week

Question 5:

How many times per week do you use ASK as your search material?

☐ 0 to 5 times per week ☐ 6 to 10 times per week ☐ 11 to 15 times per week ☐ 16 or more times per week

Question 6:

How many times per week do you use Alexia as your search material?

☐ 0 to 5 times per week ☐ 6 to 10 times per week ☐ 11 to 15 times per week ☐ 16 or more times per week

Question 7:

What are the reasons you choose Google as your search engine? Please put Never if you never heard of it in Others

☐ Everybody use it ☐ Google has the best search results ☐ Google has the fastest search result

☐ Google is more organize

☐ Others, please specify: _____

Question 8:

What are the reasons you choose Yahoo as your search engine? Please put Never if you never heard of it in Others

☐ Everybody use it ☐ Yahoo has the best search results ☐ Yahoo has the fastest search result

☐ Yahoo is more organize

☐ Others, please specify: _____

Question 9:

What are the reasons you choose MSN as your search engine? Please put Never if you never heard of it in Others

☐ Everybody use it ☐ MSN has the best search results ☐ MSN has the fastest search result

☐ MSN is more organize

☐ Others, please specify: _____

Question 10:

What are the reasons you choose ASK as your search engine? Please put Never if you never heard of it in Others

☐ Everybody use it ☐ ASK has the best search results ☐ ASK has the fastest search result

☐ ASK is more organize

☐ Others, please specify: _____

Question 11:

What are the reason you choose Alexia as your search engine? Please put Never if you never heard of it in Others

☐ Everybody use it ☐ Alexia has the best search results ☐ Alexia has the fastest search result

☐ Alexia is more organize

☐ Others, please specify: _____

Question 12:

How many years of experience do you have on the Internet?

☐ Less than 1 year ☐ 1 to 4 years of experience ☐ 5 to 9 years of experience ☐ 10 years or more years of experience

Question 13:

How many hours per week do you use the Search Engines?

Google: _____ Hours
Yahoo: _____ Hours
MSN: _____ Hours
ASK: _____ Hours
Alexia: _____ Hours

Question 14:

What is the average of search result pages would you stop on a search?

☐ After 1 page ☐ After 2 to 3 pages ☐ After 4 to 5 pages ☐ More than 6 pages

Question 15:

Which of the following search engines would you recommend your friends to use?

☐ Google ☐ Yahoo ☐ MSN ☐ ASK ☐ Alexia

☐ Others, please specify: _____

Question 16:

Please specify your gender?

☐ Male ☐ Female

Question 17:

What is the range of your age?

☐ 18 or younger ☐ 19 - 30 years old ☐ 31 - 55 years old ☐ 56 or older

Part II: Professional Questions

Question 18:

What is your professional area? Examples: Information Technology, Business, Sciences, Pharmacy, etc. Please specify below.

_____

Question 19:

What are the main purposes that you access the Internet Search Engines? For example, Travel, Find a map Do a research in your professional field, Entertainment, etc. Please specify at least 5 reasons

1: _____

2: _____

3: _____

4: _____

5: _____

Question 20:

Do you concern with the response time for the search results?

☐ 1: Extreme Concern ☐ 2: Very Concern ☐ 3: Moderately Concern

☐ 4: Fairly Concern ☐ 5: No Concern

Question 21:

Do you concern with the order of the search results?

☐ 1: Extreme Concern ☐ 2: Very Concern ☐ 3: Moderately Concern

☐ 4: Fairly Concern ☐ 5: No Concern

Question 22:

Do you concern that the search engine shows irrelevant information or only few relevant results?

☐ 1: Extreme Concern ☐ 2: Very Concern ☐ 3: Moderately Concern

☐ 4: Fairly Concern ☐ 5: No Concern

Question 23:

Consider the following Scenario. If you type your keyword in your search engine, do you consider it as accurate search result if it only shows relevant information but not exactly the keyword information that you want?

☐ I consider it as accurate search result ☐ I consider it as error search result ☐ Other Comments:

_____

_____

Question 24:

Which search engines do you use for your professional source?

☐ Google ☐ Yahoo ☐ MSN ☐ ASK ☐ Alexia

☐ Others, please specify: _____

Question 25:

Can you please list the most important keywords in your professional field? Minimum of five keywords

Keywords: _____

_____

_____

Thank you for your time taking the Survey

Best Regard, Department of Computing, Computer Science Research Department at Long Island University, Brooklyn Campus

2.6: Discovery Day Survey Report

There were a total of 29 Surveyors conducted the surveys on Discovery Day of 2008.

Question 1: Which of these search engines {Google, Yahoo, MSN, ASK, Alexia, Others} do you think have the fastest, and most relevant search results?

1: Google 1.10 point (29 Voters)
2: Wikipedia: 2.0 point (3 Voters)
3: Yahoo: 2.11 point (26 Voters)
4: MSN: 2.93 point (18 Voters)
5: Others: 3.3 point (11 Voters)
6: ASK: 3.75 point (8 Voters)
7: Alexia 4 point (1 Voter)

Question 2: How many times per week do you use Google as your search material?

1) 0 to 5 times per week (2 Voters)
2) 6 to 10 times per week (3 Voters)
3) 11 to 15 times per week (3 Voters)
4) 16 or more times per week (21 Voters)

Question 3: How many times per week do you use Yahoo as your search material?

1) 0 to 5 times per week (16 Voters)
2) 6 to 10 times per week (5 Voters)
3) 11 to 15 times per week (4 Voters)
4) 16 or more times per week (3 Voters)

Question 4: How many times per week do you use MSN as your search material?

1) 0 to 5 times per week (22 Voters)
2) 6 to 10 times per week (5 Voters)
3) 11 to 15 times per week (2 Voters)
4) 16 or more times per week (0 Voters)

Question 5: How many times per week do you use ASK as your search material?

1) 0 to 5 times per week (25 Voters)
2) 6 to 10 times per week (3 Voters)
3) 11 to 15 times per week (1 Voters)
4) 16 or more times per week (0 Voters)

Question 6: How many times per week do you use Alexia as your search material?

1) 0 to 5 times per week (28 Voters)
2) 6 to 10 times per week (1 Voters)
3) 11 to 15 times per week (0 Voters)
4) 16 or more times per week (0 Voters)

Question 7: What are the reasons you choose Google as your search engine? Please put Never if you never heard of it in others

1) Everybody uses it (4 Voters)
2) Google has the best search result (18 Voters)
3) Google has the fastest search result (9 Voters)
4) Google is more organize (7 Voters)

Question 8: What are the reasons you choose Yahoo as your search engine? Please put Never if you never heard of it in others

1) Everybody uses it (7 Voters)
2) Yahoo has the best search result (5 Voters)
3) Yahoo has the fastest search result (2 Voters)
4) Yahoo is more organize (4 Voters)
5) Others: Don't use (5 Voter)
6) For international news, news

Question 9: What are the reasons you choose MSN as your search engine? Please put Never if you never heard of it in others

1) Everybody uses it (2 Voters)
2) MSN has the best search result (5 Voters)
3) MSN has the fastest search result (3 Voters)
4) MSN is more organize (5 Voters)
5) Others: Never use it (18 Voters)
6) Interesting results

Question 10: What are the reasons you choose ASK as your search engine? Please put Never if you never heard of it in others

1) Everybody uses it (2 Voters)
2) ASK has the best search result (1 Voters)
3) ASK has the fastest search result (2 Voters)
4) ASK is more organize (1 Voters)
5) Others: Never use (22 Voters)
6) More easier search

Question 11: What are the reasons you choose Alexia as your search engine? Please put Never if you never heard of it in others

1) Everybody uses it	(3 Voters)
2) Alexia has the best search result	(0 Voters)
3) Alexia has the fastest search result	(0 Voters)
4) Alexia is more organize	(1 Voters)
5) Others: Never use	(25 Voters)

Question 12: How many years of experience do you have on the internet?

1) Less than 1 year	(0 people)
2) 1 to 4 years of experience	(4 people)
3) 5 to 9 years of experience	(10 people)
4) 10 years or more years of experience	(14 people)

Question 13: How many hours per week do you use the Search Engines?

Google: On Average (21Hours per week)
Yahoo: On Average (8.48 Hours per week)
MSN: On Average (3.44 Hours per week)
ASK: On Average (0.68 Hours per week)
Alexia: On Average (0.17 Hours per week)

Question 14: What is the average of search result pages would you stop on a search?

After 1 page	(7 people)
After 2 to 3 pages	(5 people)
After 4 to 5 pages	(9 people)
More than 6 pages	(4 people)

Question 15: Which of the following search engines would you recommend your friends to use?

Google	(25 people)
Yahoo	(3 people)
MSN	(0 people)
ASK	(0 people)
Alexia	(0 people)
Others	(0 people)

Question 16: Gender

Male: (17 people) Female (12 people)

Question 17: What is your range of your age?

18 or younger	(0 people)
19 – 30 years old	(21 people)
31 – 55 years old	(8 people)
56 or older	(0 people)

Question 18:
What is your professional area?

Information Technology	(15 people)
Programmer	(2 people)
Database Analyst	(2 people)
QA/Desktop Support	(1 people)
Business Science	(2 people)
Operational Analyst	(1 people)
Pharmacy	(2 people)
Art	(1 people)
Public Administrator	(2 people)
Science	(2 people)

Question 19: What is the main purpose that you access the Internet Search Engines?

Entertainment:	15 people
Subject Search/ Research:	16 people
Travel	7 people
Classwork	8 people
Map	7 people
Music	4 people
Shopping	3 people
Professional field	5 people
General Information new	6 people
Software	2 people
Movies	2 people
Programming	1 people
Business	1 people
Reviews	2 people
Games	1 people
Cooking	2 people
Dictionary	1 people

Question 20: Do you concern with the response time for the search results?

1: Extreme Concern (7 people)
2: Very Concern (11 people)
3: Moderately Concern (6 people)
4: Fairly Concern (1 people)
5: No Concern (1 people)

Question 21: Do you concern with the order of the search results?

1: Extreme Concern (12 people)
2: Very Concern (11 people)
3: Moderately Concern (3 people)
4: Fairly Concern (0 people)
5: No Concern (0 people)

Question 22: Do you concern that the search engines shows irrelevant information or only few relevant results?

1: Extreme Concern (10 people)
2: Very Concern (8 people)
3: Moderately Concern (6 people)
4: Fairly Concern (1 people)
5: No Concern (1 people)

Question 23: Consider the following Scenario. If you type your keyword in your search engine, do you consider it as accurate search result if it only shows relevant information but not exactly the keyword information that you want?

I consider it as accurate search result	(16 people)
I consider it as error search result	(10 people)
Other comments:	It depends what I get as a search result, Not sure, try with different keyword

Question 24: Which search engines do you use for your professional source?

Google	(25 people)
Yahoo	(3 people)
MSN	(2 people)
ASK	(0 people)
Alexia	(0 people)
Others:	(Wikipedia – 1 people), LIU Library online database-1 people, Proquest – 1 people

Question 25:
Keywords: provided on discovery day were {Networking, Java programming, Database, SQL, Oracle, Programming, Computer, teach, C++, Algorithm, Raiser Edge, User Graphs, Certification, Database, Database Management, Networking Management, Java, Architecture, Information Technology, Programming, Security, Apache, Linux, Programming Languages, PHP Pear, Homework, Syntax Language, Dedication Management, Zelif, Program, mp3, Asp.net, JavaScript, Performance evolution, universal, healthcare, hospital, Periodical, book, e-book, e-journal, Pharmacology, Disease Condition, Indication, treatment, current research, health, aging, Public service, microbiology, cancer, polyphones, Sarbanes-Oxley, pension fund, stock market, capital market, future market, financial statement, annual report, 10k report, Dissolution, Solubility, half-life, laboratory, chemicals, chemistry, biology, hypothesis, Art, Ceramics, and Exhibition}

On April 23, 2008 discovery day at Long Island University, Brooklyn Campus, we conducted surveys on user experience on the worldwide search engines. We had professionals from Information Technology, Programmer, Database Analyst, QA/Desktop Support, Business Science, Operational Analyst, Pharmacist conducted on the survey. In the survey, 90% of users recommend using Google to friends and Yahoo in 10%.

In the experiments of Chapter 2, we found that the shorter the keyword, the better the accurate rate. Second, it depends on the popularity of the keywords, for example: in accounting category in 2011, we can see in Yahoo and BING shows the keyword "cost of goods sold" has a better accurate rate than "treasury stock" by 25 percent.

CHAPTER 3 COMPARATIVE EXPERIMENTS ON IMAGE SEARCHES OF SEARCH ENGINES

3.1: Definition of Image Search

What is an image search? An image search is pictures that were post on the websites that can be query in the search engines. When a user search image from search engines, they still must type the words in the search bar in order for the search engine to query. A user can't just drag a picture in the search bar to search; only texts are allow. When you search image using search engine, the name of the image you define will be index in the search engines. So, it's important when you name your image in your website if you want the users to search your pictures. It is even more accurate when you search image than searching keywords on the web, because you might get unrelated information when you search keywords on the website.

	Computer Science Keywords - Google Image Search Results Averages				
	Accurate Rate	Error Rate	Recall Rate		
1 Word	53.40%	46.60%	53.40%		
2 Words	34.20%	65.80%	34.20%		
3 Words	27.70%	72.30%	27.70%		
	Computer Science Keywords - Yahoo Image Search Result Averages				
	Accurate Rate	Error Rate	Recall Rate		
1 Word	75.20%	24.80%	75.20%		
2 Words	29.30%	70.70%	29.30%		
3 Words	13.70%	86.30%	13.70%		
	Computer Science Keywords - Bing Image Search Result Averages				
	Accurate Rate	Error Rate	Recall Rate		
1 Word	85.10%	24.90%	85.10%		
2 Words	53.90%	46.10%	53.90%		
3 Words	47.70%	52.30%	47.70%		

Table 3.1 Google & Yahoo Image Search Computer Science Keywords Results

3.2: Image Search Experiments in IT (i,e., Computer Science) Area

Google Image Search Computer Science keywords search result:

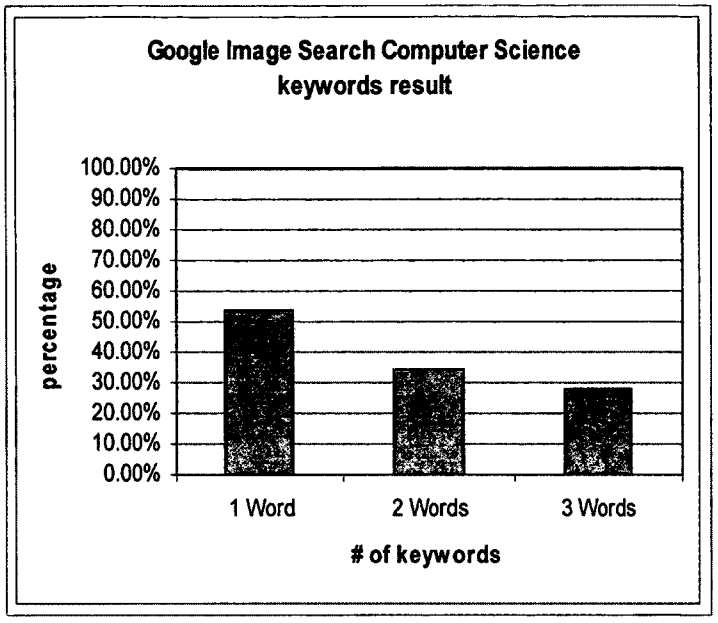


Figure 3.1 – Google Image Search Computer Science keywords accurate rate

In Google's Computer Science keywords Image Search, the top keywords for 1 word keyword is metadata at 68%. The top 2 words keywords is computer graphic at 55%, and top 3 word keywords is Extensible Markup Language at 62%.

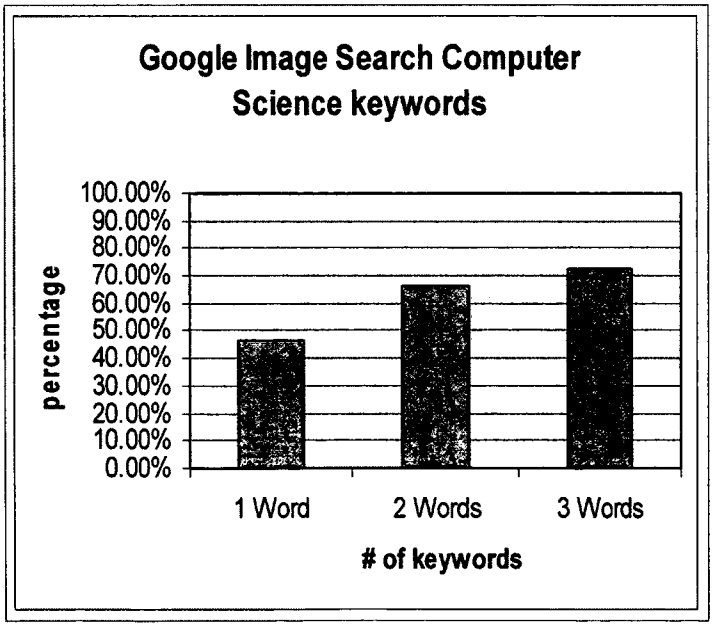


Figure 3.2 – Google Image Search Computer Science keywords error rate

The worst keyword for 1 word keyword is cryptography at 38%, 2 word keyword is computer architecture at 0%, and 3 word keywords is object oriented programming, personal identification number, and unified markup language at 0%.

Yahoo Image Search Computer Science keywords search result:

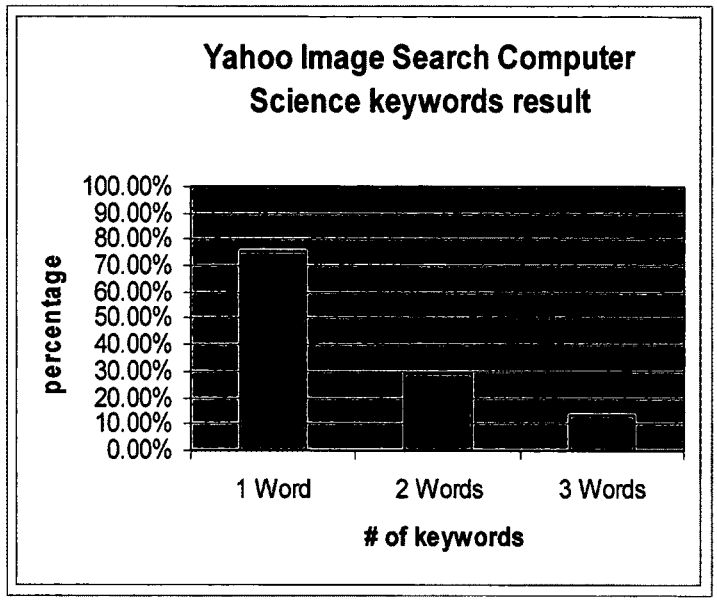


Figure 3.3 – Yahoo Image Search Computer Science keywords accurate rate

In Yahoo's Computer Science keywords Image Search, the top keywords for 1 word keyword is inheritance at 98%. The top 2 words keywords is sequence diagram at 73%, and top 3 word keywords is PL-SQL at 69%.

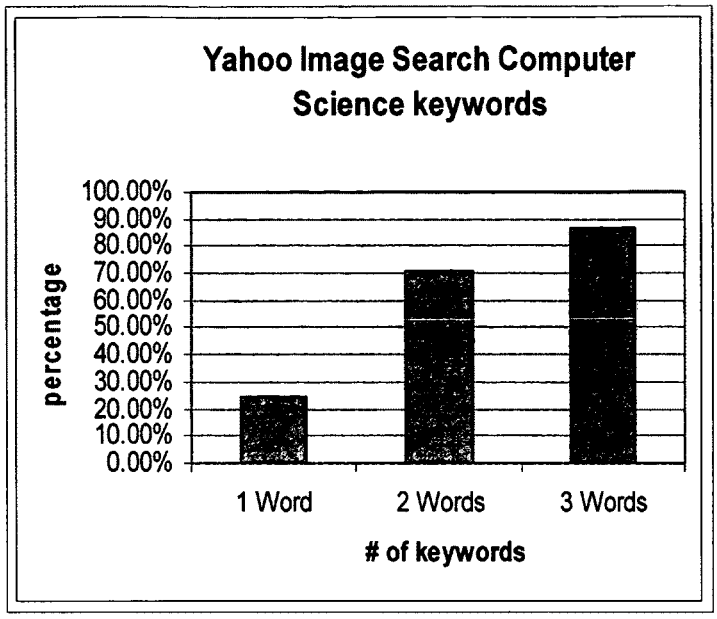


Figure 3.4 – Yahoo Image Search Computer Science keywords error rate

The worst keyword for 1 word keyword is cryptography at 36%, 2 word keyword is computer architecture at 0%, and 3 word keywords is object oriented programming, personal identification number, and unified markup language at 0%.

Bing Image Search Computer Science keywords search result:

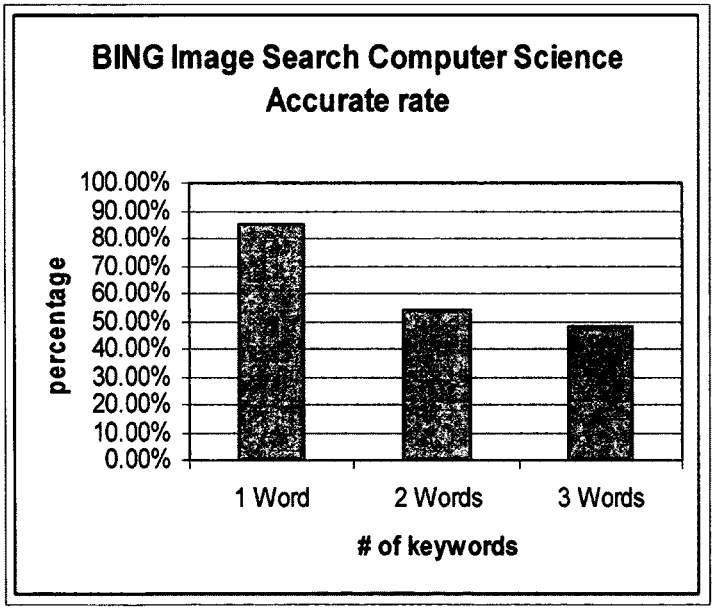


Figure 3.5 – Bing Image Search Computer Science keywords accurate rate

In Bing's Computer Science keywords Image Search, the top keywords for 1 word keyword is inheritance at 96\%. The top 2 words keywords is artificial intelligence at 93%, and top 3 word keywords is Extensible Markup Language at 80%.

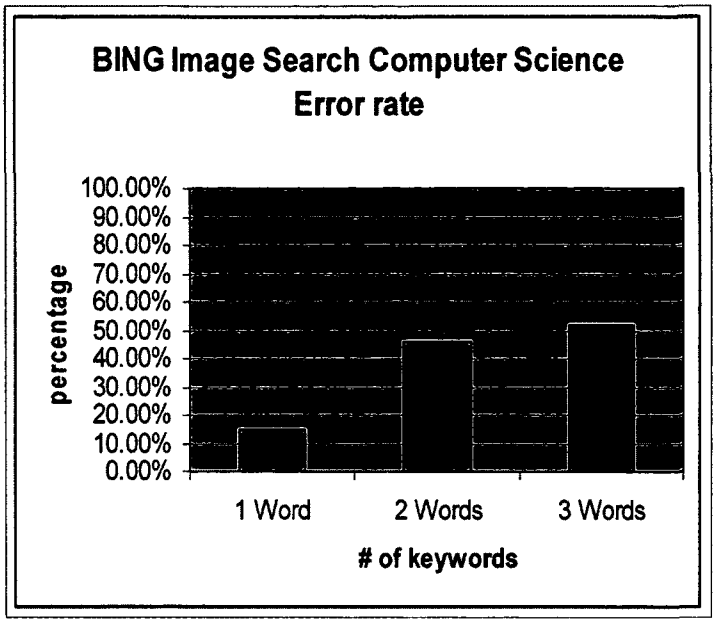


Figure 3.6 – Bing Image Search Computer Science keywords error rate

The worst keyword for 1 word keyword is algorithm at 78%, 2 word keyword is class diagram and sequence diagram at 3%, and 3 word keywords is application program interface, personal identification number, and unified markup language at 0%.

	Accounting Keywords -Google Image Search Results Averages		
	Accurate Rate	Errror Rate	Recall Rate
1 Word	56.80%	43.20%	56.80%
2 Words	33.50%	66.50%	33.50%
3 Words	11.30%	88.70%	11.30%
	Accounting Keywords - Yahoo Image Search Results Averages		
	Accurate Rate	Error Rate	Recall Rate
1 Word	61.40%	38.60%	61.40%
2 Words	14.50%	85.50%	14.50%
3 Words	5.10%	94.90%	5.10%
	Accounting Keywords - Bing Image Search Results Averages		
	Accurate Rate	Error Rate	Recall Rate
1 Word	76.20%	23.80%	76.20%
2 Words	50.60%	49.40%	50.60%
3 Words	35.40%	64.60%	35.40%

Table 3.2 Google & Yahoo Image Search Accounting Keywords Results

3.3: Image Search Experiments in Business (i,e., Accounting) Area

Google Image Search Accounting keywords search result:

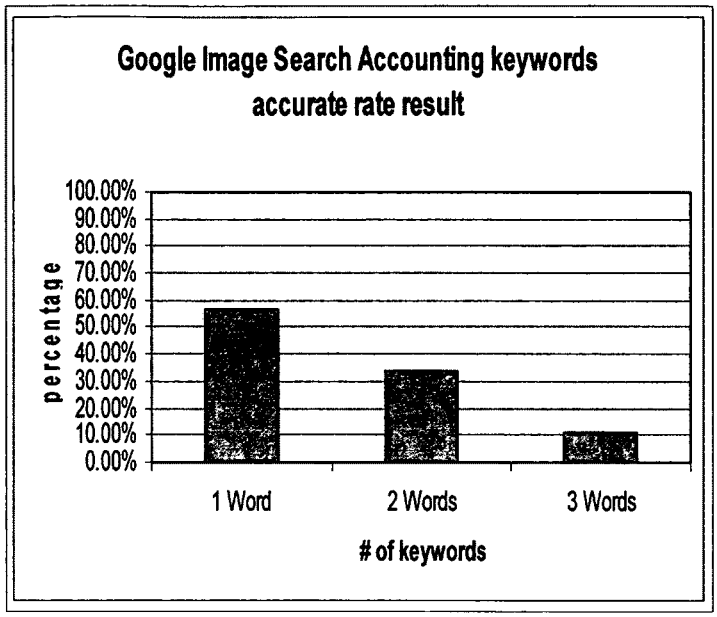


Figure 3.7– Google Image Search Accounting keywords accurate rate

In Google's Accounting keywords Image Search, the top keywords for 1 word keyword is liabilities at 75%. The top 2 words keywords is fiscal year at 61%, and top 3 word keywords is internal revenue service at 37%.

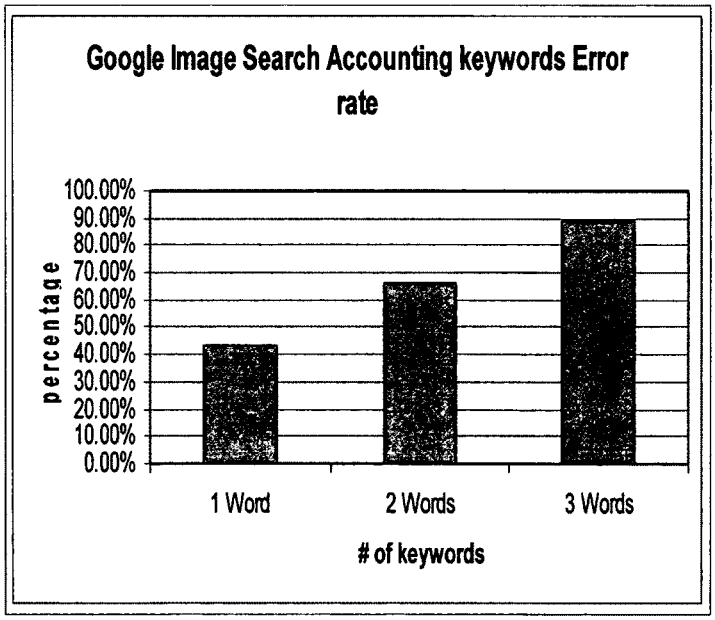


Figure 3.8 – Google Image Search Accounting keywords error rate

The worst keyword for 1 word keyword is expenditure at 38%, 2 word keyword is account receivable at 3%, and 3 word keywords are cost of goods sold and process value analysis at 0%.

Yahoo Image Search Accounting keywords search result:

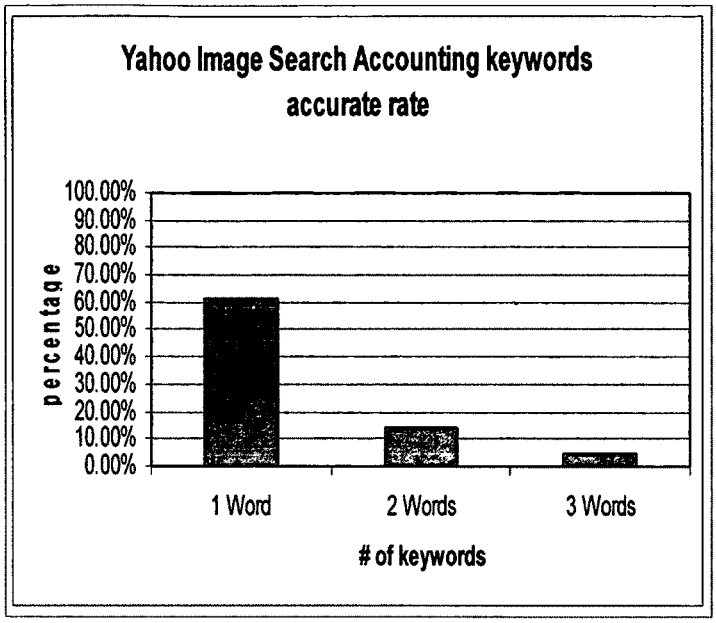


Figure 3.9 – Yahoo Image Search Accounting keywords accurate rate

In Yahoo's Accounting keywords Image Search, the top keywords for 1 word keyword is revenue at 90%. The top 2 words keywords is supply chain at 51%, and top 3 word keywords is internal revenue service at 33%.

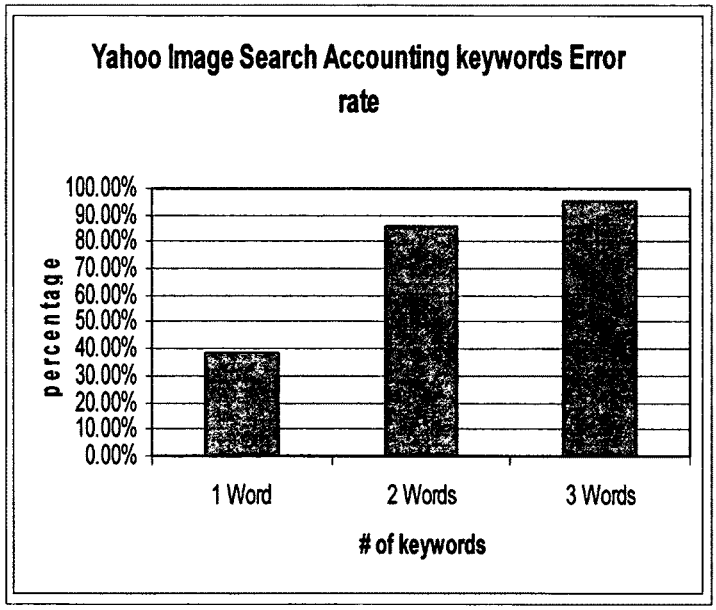


Figure 3.10 – Yahoo Image Search Accounting keywords error rate

The worst keyword for 1 word keyword is periodicity at 20%, 2 word keyword are dividend income and treasury stock at 0%, and 3 word keywords are market interest rate, materials inventory account, total quality management, and process value analysis at 0%.

Bing Image Search Accounting keywords search result:

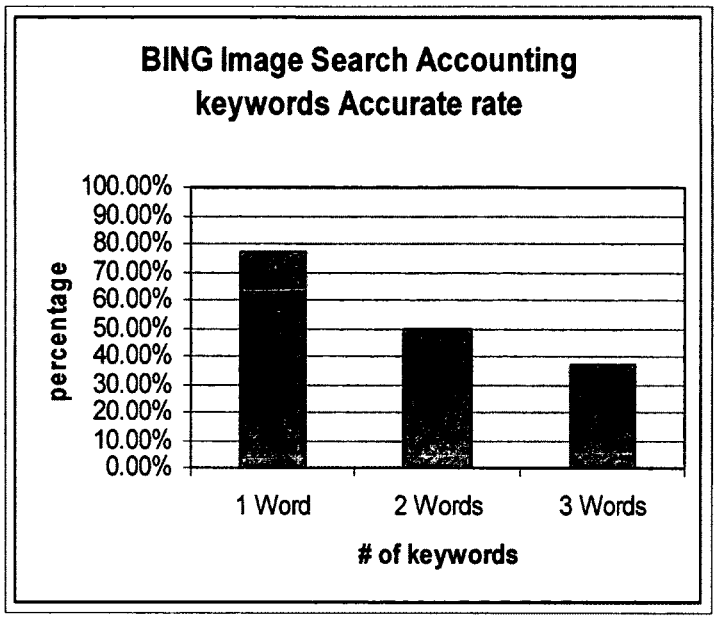


Figure 3.11 – Bing Image Search Accounting keywords accurate rate

In Bing's Accounting keywords Image Search, the top keywords for 1 word keyword is mortgage at 97%. The top 2 words keywords is account receivable at 99%, and top 3 word keywords is theory of constraints at 86%.

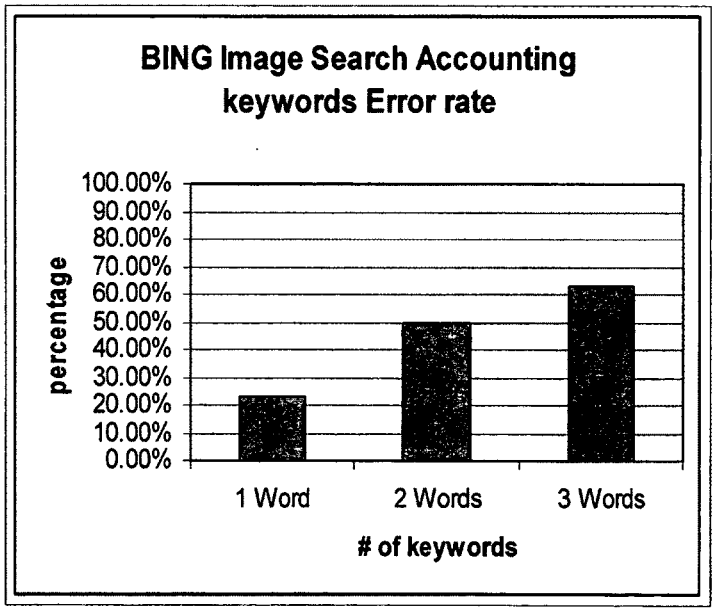


Figure 3.12 – Bing Image Search Accounting keywords error rate

The worst keyword for 1 word keyword is periodicity at 0%, 2 word keyword is scattered diagram at 0%, and 3 word keywords are market materials inventory account, and process value analysis at 0%.

3.4: Image Search Experiments in Health Science Area

	Health Science Keywords -Google Image Search Results Averages		
	Accurate Rate	Errror Rate	Recall Rate
1 Word	52.30%	47.70%	52.30%
2 Words	22.09%	77.91%	22.09%
3 Words	8.13%	91.87%	8.13%
	Health Science Keywords - Yahoo Image Search Results Averages		
	Accurate Rate	Error Rate	Recall Rate
1 Word	25.00%	75.00%	25.00%
2 Words	7.09%	92.91%	7.09%
3 Words	2.37%	97.63%	2.37%
	Health Science Keywords - Bing Image Search Results Averages		
	Accurate Rate	Error Rate	Recall Rate
1 Word	60.80%	39.20%	60.80%
2 Words	46.72%	53.28%	46.72%
3 Words	14.77%	85.23%	14.77%

Table 3.3 Google & Yahoo Image Search Health Science Keywords Results

Google Image Search Health Science keywords search result:

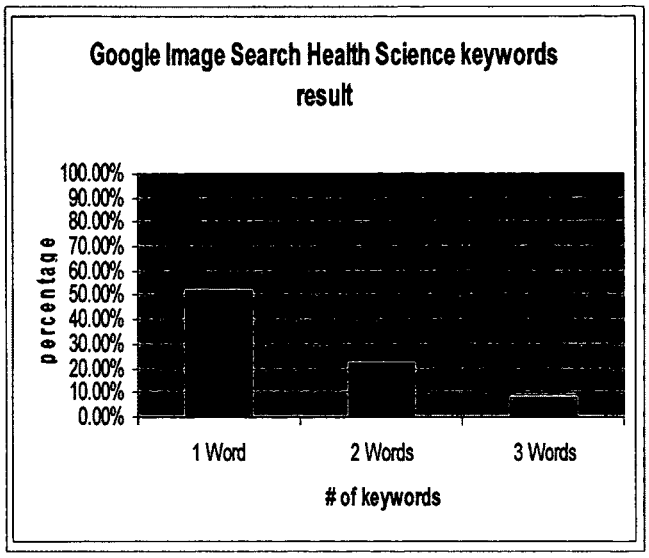


Figure 3.13– Google Image Search Health Science keywords accurate rate

In Google's Health Science keywords Image Search, the top keywords for 1 word keyword is oshca at 85%. The top 2 words keywords is social work at 62%, and top 3 word keywords is body area network at 22%.

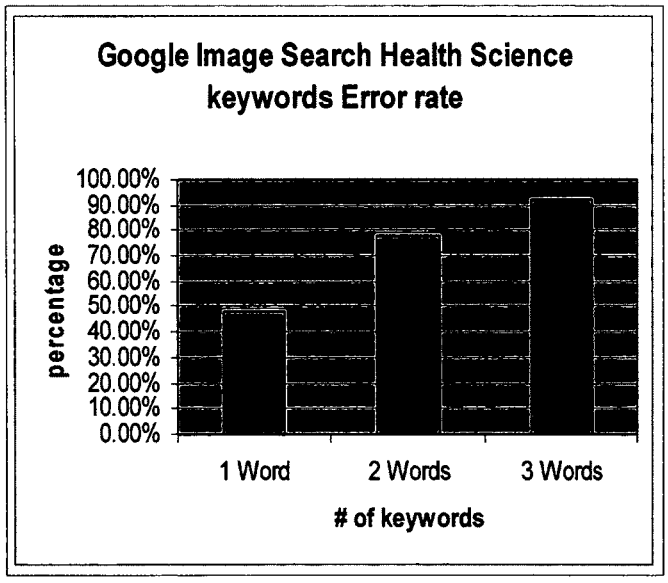


Figure 3.14– Google Image Search Health Science keywords error rate

The worst keyword for 1 word keyword is auxology at 26%, 2 word keyword is environmental health, participatory ergonomics, pharmaceutical sciences, biomedical technology, biomedical research at 0%, and 3 word keywords are guideline international network, indirect dna damage, ancestry informative marker, health sciences descriptors, physical fitness test, trans-proteomic pipeline, and direct dna damage at 0%.

Yahoo Image Search Health Science keywords search result:

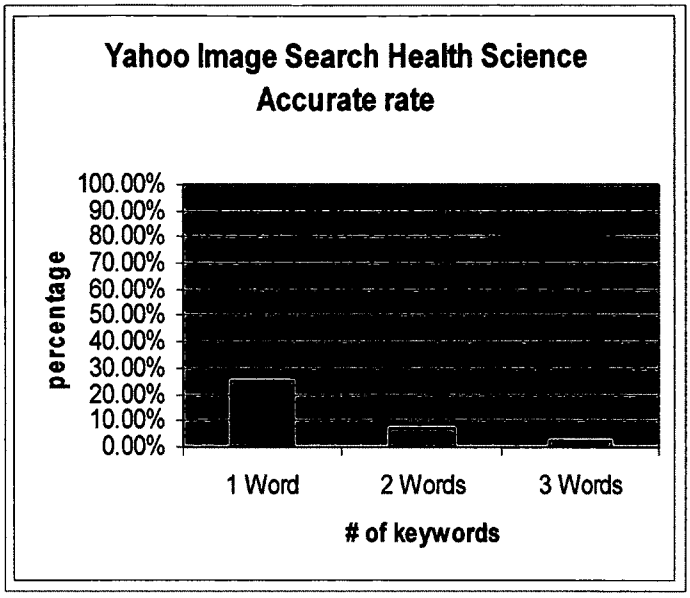


Figure 3.15 – Yahoo Image Search Health Science keywords accurate rate

In Yahoo's Health Science keywords Image Search, the top keywords for 1 word keyword is nutrition at 94%. The top 2 words keywords is physical therapy at 38%, and top 3 word keywords is indirect dna damage at 7%.

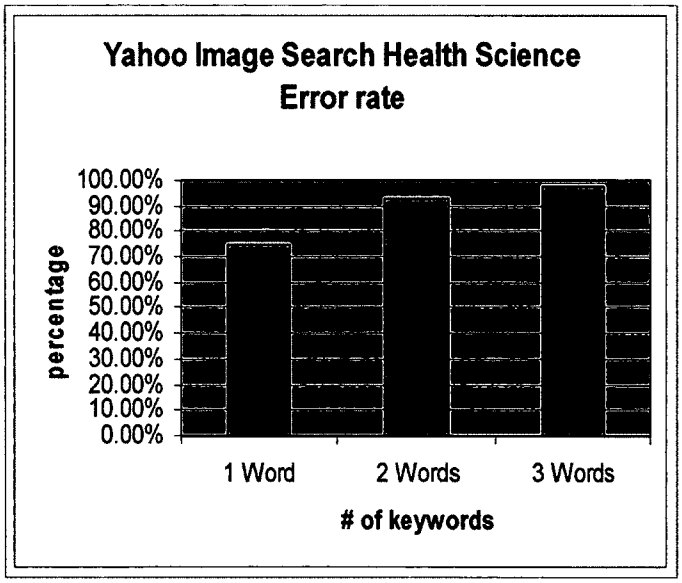


Figure 3.16 – Yahoo Image Search Health Science keywords error rate

The worst keyword for 1 word keyword are auxology, and physcoeducation at 1%, 2 word keyword are healthcare today, pharmaceutical sciences, biomedical technology, biomedical research at 0%, and 3 word keywords are guideline international network, ancestry informative marker, threshold limit value, health sciences descriptors, physical fitness test, and trans-proteomic pipeline at 0%.

Bing Image Search Health Science keywords search result:

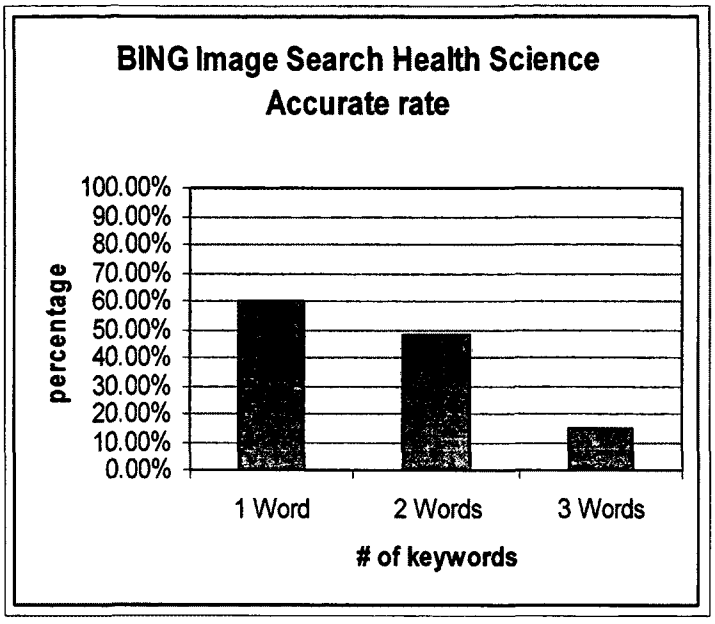


Figure 3.17 – Bing Image Search Health Science keywords accurate rate

In Bing's Health Science keywords Image Search, the top keywords for 1 word keyword is nutrigenomics at 98%. The top 2 words keywords is physical therapy at 98%, and top 3 word keywords is physical fitness test at 52%.

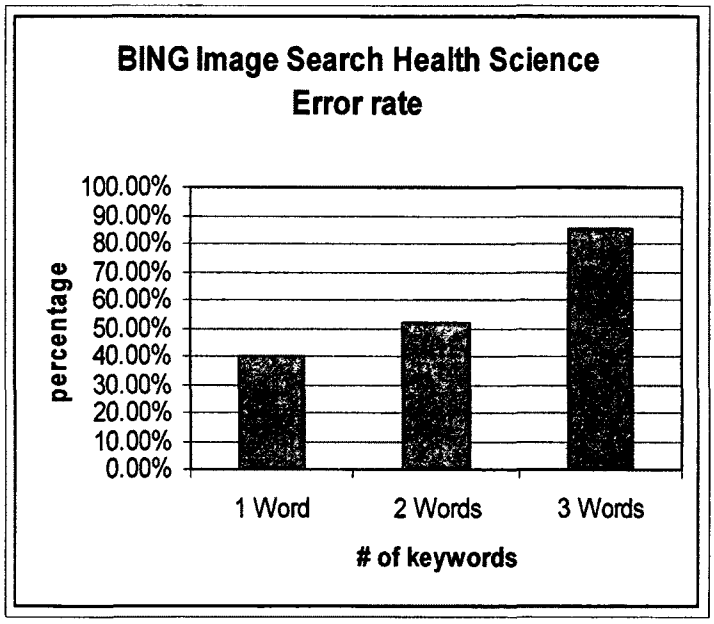


Figure 3.18 – Bing Image Search Health Science keywords error rate

The worst keyword for 1 word keyword is oscha at 0%, 2 word keyword are healthcare today, at 1%, and 3 word keywords are guideline international network, direct dna damage at 0%.

Bing Image Search Health Science keywords search result:

2011 Image Search Result:

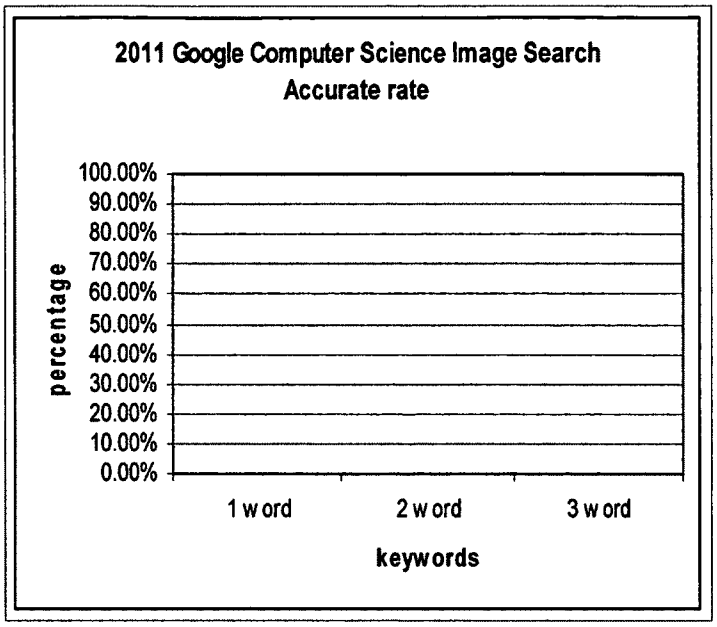


Figure 3.19 – Google Image Search Computer Science keywords accurate rate 2011

In the result, Google has accurate rate of 0% in image search.

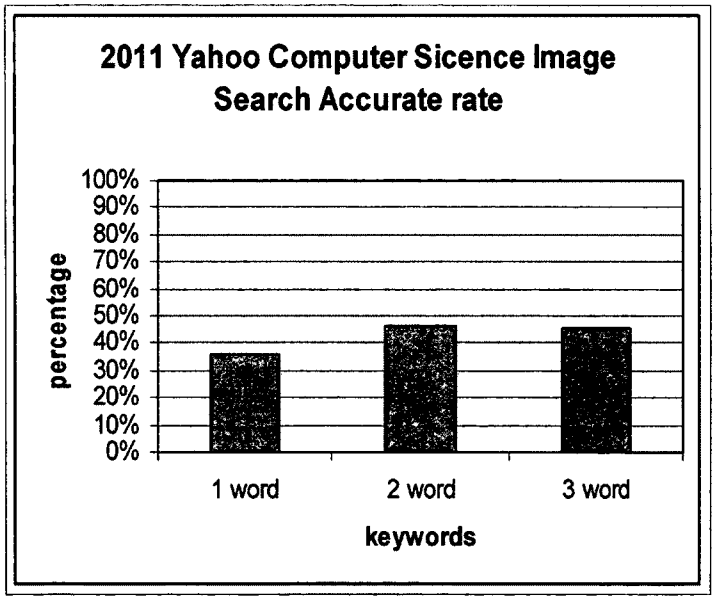


Figure 3.20 – Yahoo Image Search Computer Science keywords accurate rate 2011

In the Yahoo result, it has pseudocode at 36 percent, network security at 46%, and advanced encryption standard at 45.6%.

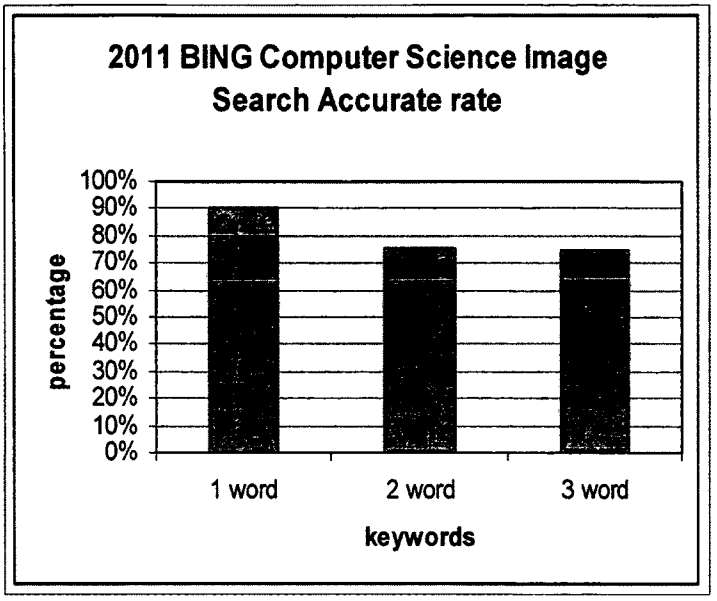


Figure 3.21 –Bing Image Search Computer Science keywords accurate rate 2011

In the Bing result, it has pseudocode at 90 percent, network security at 75.6%, and advanced encryption standard at 75%.

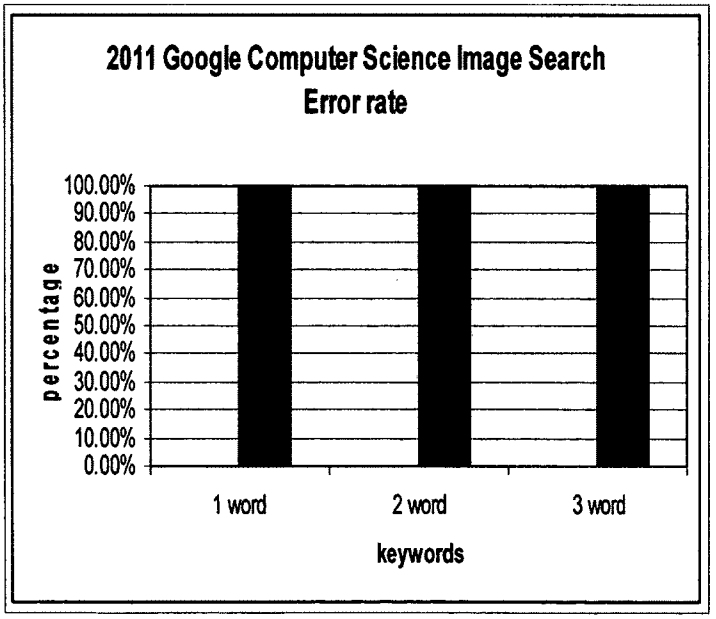


Figure 3.22 –Google Image Search Computer Science keywords error rate 2011

In the result, Google has error rate of 100% in image search.

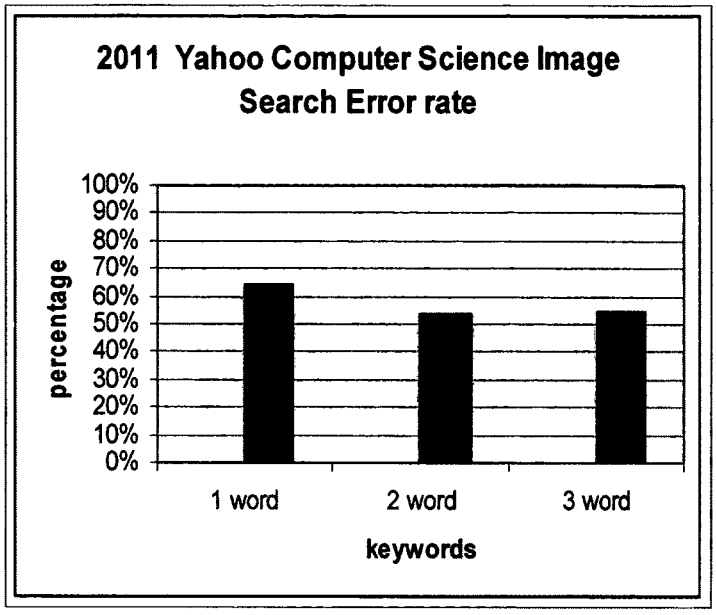


Figure 3.23 –Yahoo Image Search Computer Science keywords error rate 2011

In the Yahoo result, it has error rate on keywords pseudocode at 64 percent, network security at 54%, and advanced encryption standard at 54.4%.

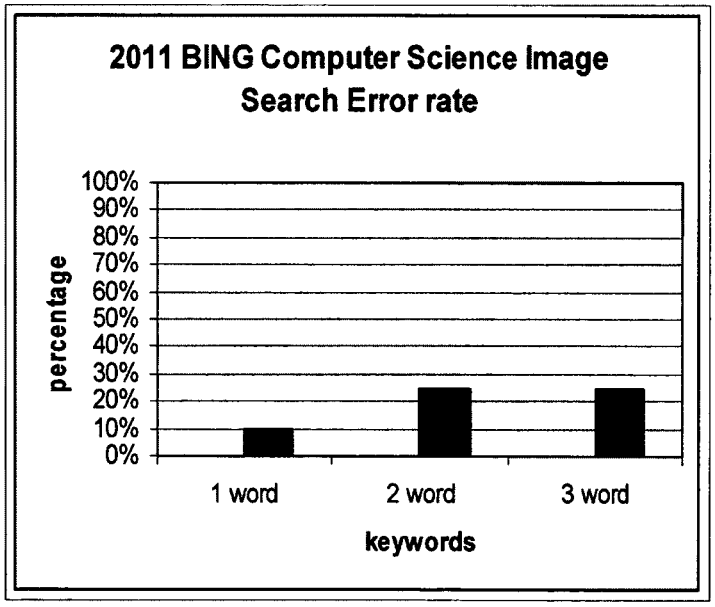


Figure 3.24 - Bing Image Search Computer Science keywords error rate 2011

In the Bing result, it has error rate on keywords pseudocode at 10 percent, network security at 24.6%, and advanced encryption standard at 25%.

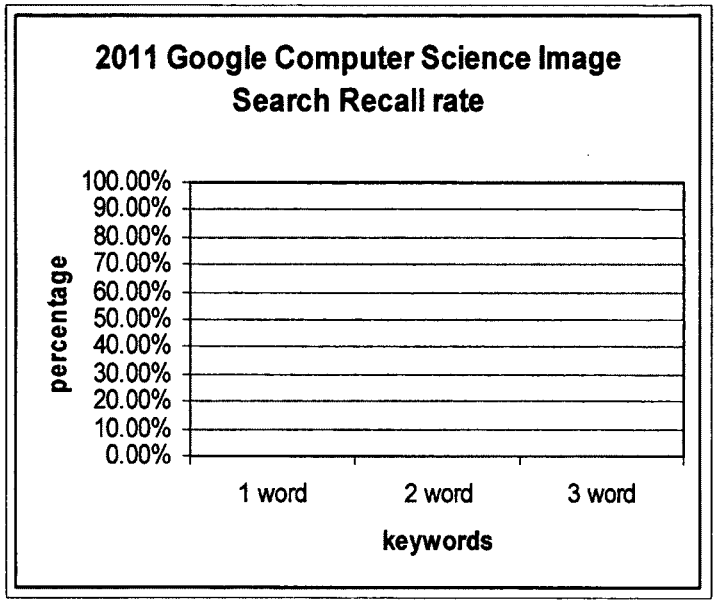


Figure 3.25 - Google Image Search Computer Science keywords recall rate 2011

In the result, Google has recall rate of 100% in image search.

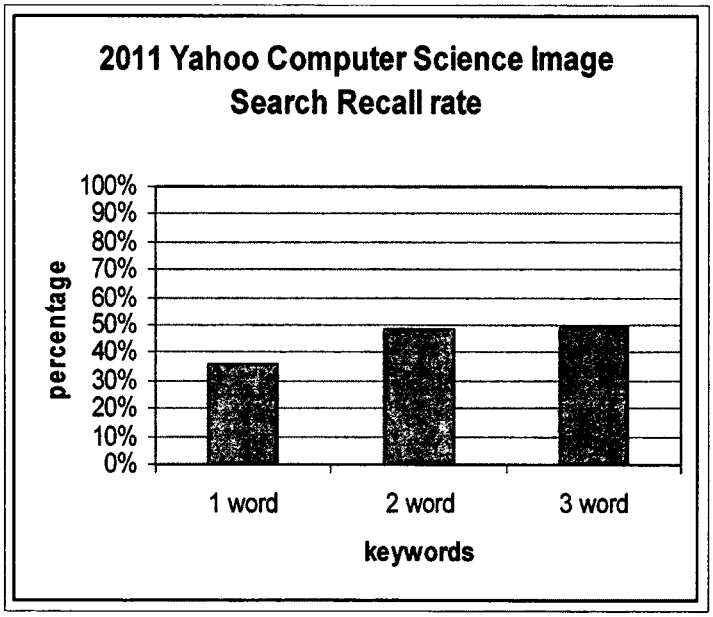


Figure 3.26 - Yahoo Image Search Computer Science keywords recall rate 2011

In the Yahoo result, it has recall rate on keywords pseudocode at 36 percent, network security at 48.3%, and advanced encryption standard at 49%.

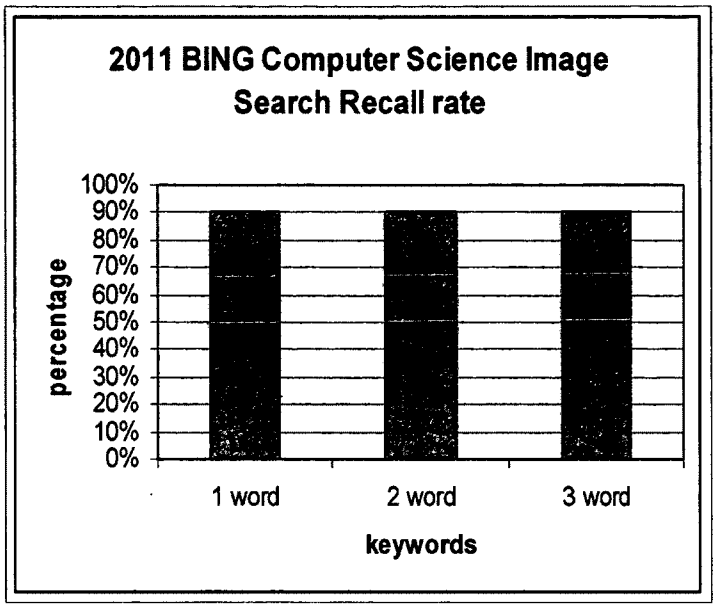


Figure 3.27 - Bing Image Search Computer Science keywords recall rate 2011

In the Bing result, it has recall rate on keywords pseudocode at 90 percent, network security at 90%, and advanced encryption standard at 90%.

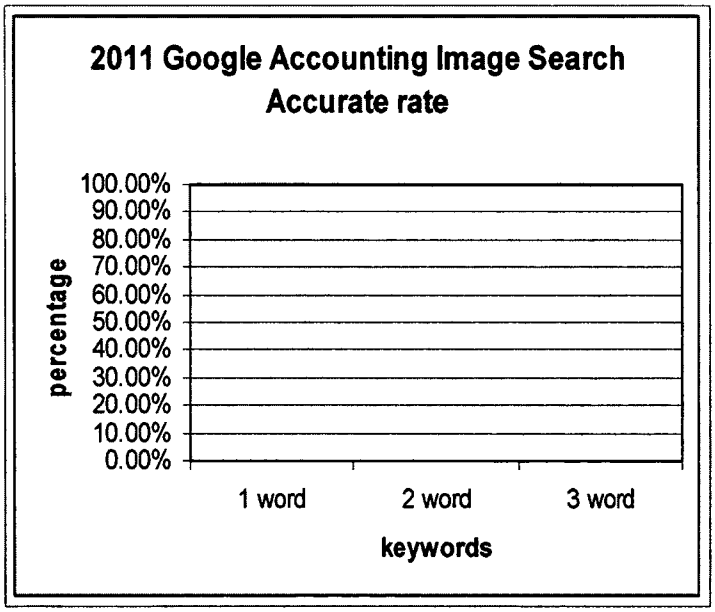


Figure 3.28 – Google Image Search Accounting keywords accurate rate 2011

In the result, Google has accurate rate of 0% in image search.

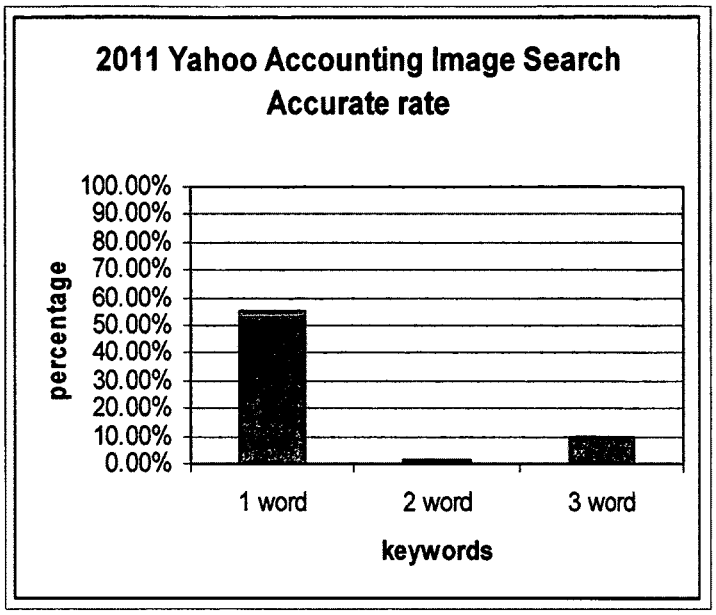


Figure 3.29 – Yahoo Image Search Accounting keywords accurate rate 2011

In the Yahoo result, it has accurate rate on keywords patents at 55.3 percent, treasury stocks at 1.6%, and cost of goods sold at 9.6%.

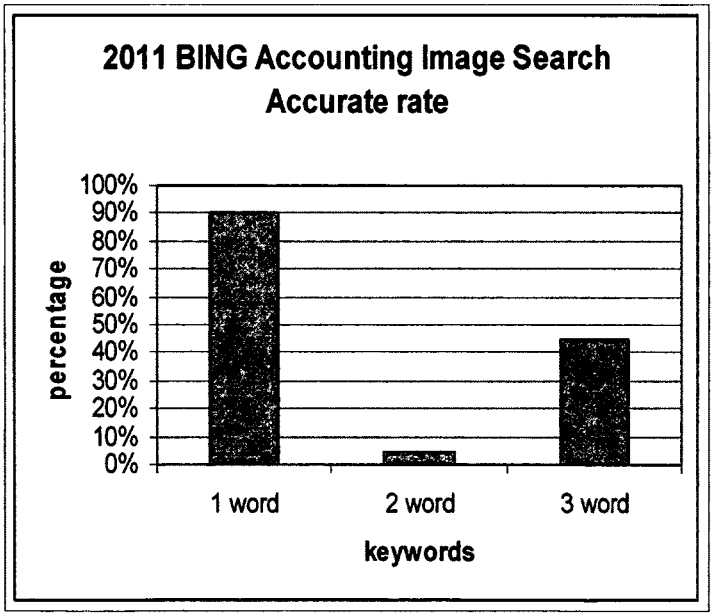


Figure 3.30 – Bing Image Search Accounting keywords accurate rate 2011

In the Bing result, it has accurate rate on keywords patents at 90 percent, treasury stocks at 4.3%, and cost of goods sold at 44.6%.

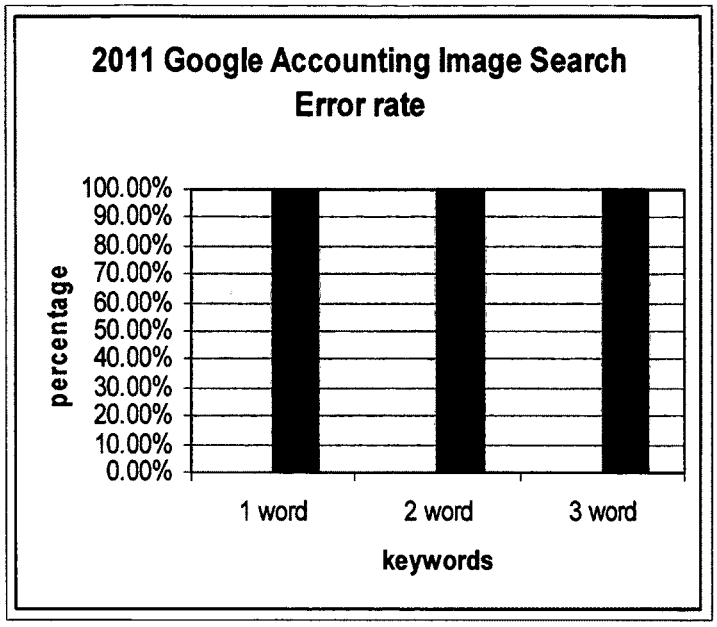


Figure 3.31 – Google Image Search Accounting keywords error rate 2011

In the result, Google has error rate of 100% in image search.

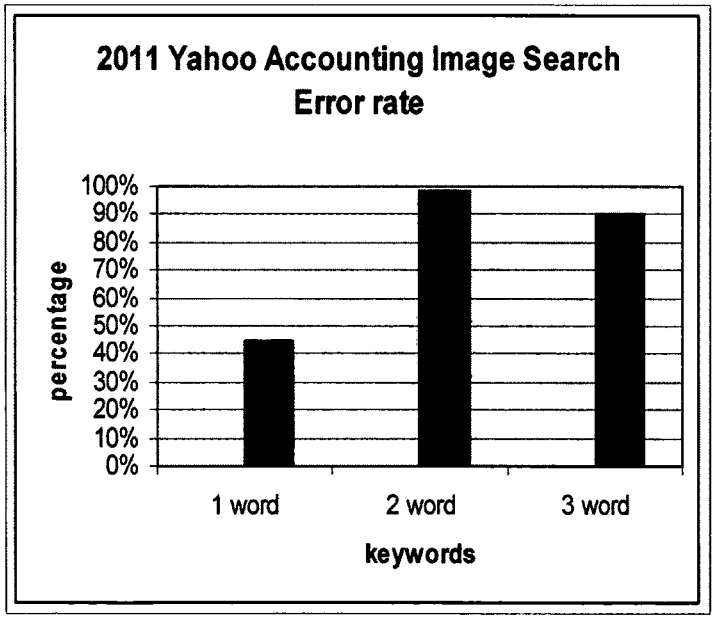


Figure 3.32 – Yahoo Image Search Accounting keywords error rate 2011

In the Yahoo result, it has error rate on keywords patents at 44.7 percent, treasury stocks at 98.4%, and cost of goods sold at 90.4%.

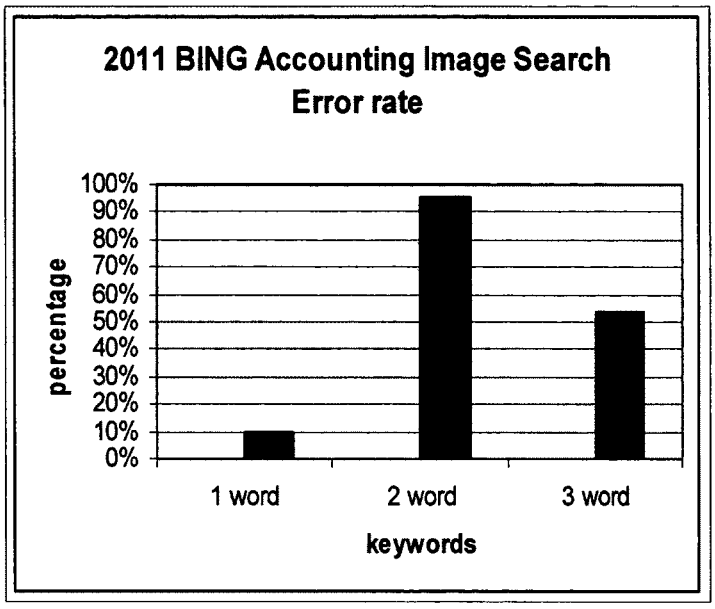


Figure 3.33 – Bing Image Search Accounting keywords error rate 2011

In the Bing result, it has error rate on keywords patents at 10 percent, treasury stocks at 95.7%, and cost of goods sold at 53.4%.

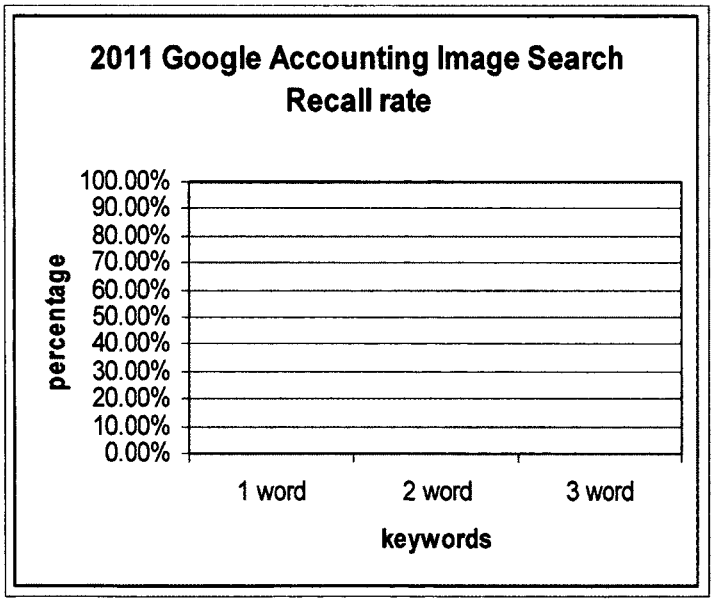


Figure 3.34 – Google Image Search Accounting keywords recall rate 2011

In the result, Google has recall rate of 0% in image search.

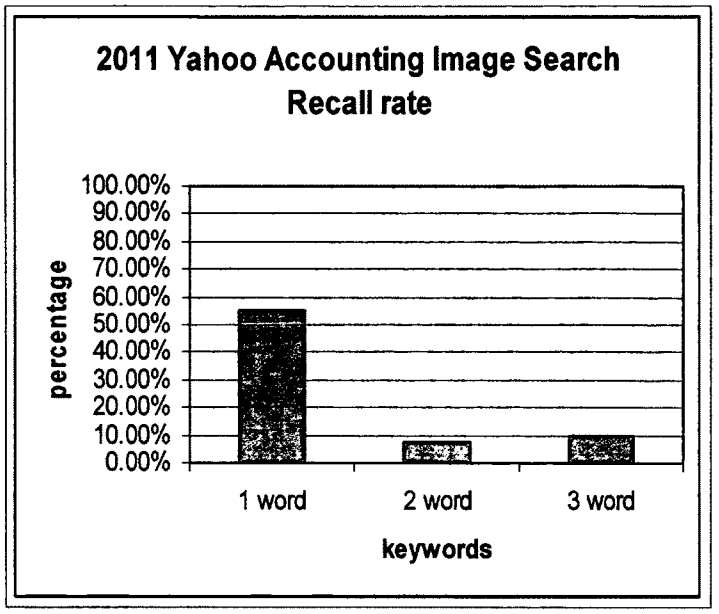


Figure 3.35 – Yahoo Image Search Accounting keywords recall rate 2011

In the Yahoo result, it has error rate on keywords patents at 55.3 percent, treasury stocks at 7.3%, and cost of goods sold at 10%.

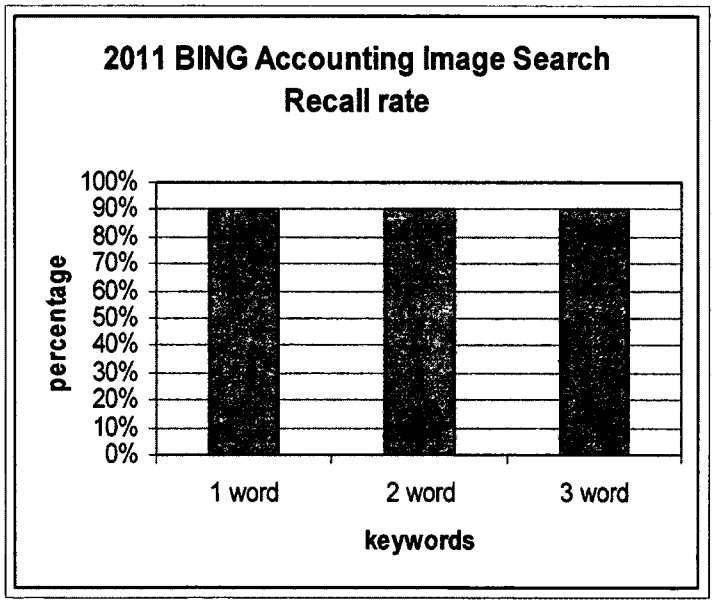


Figure 3.36 – Bing Image Search Accounting keywords recall rate 2011

In the Bing result, it has error rate on keywords patents at 90 percent, treasury stocks at 90%, and cost of goods sold at 90%.

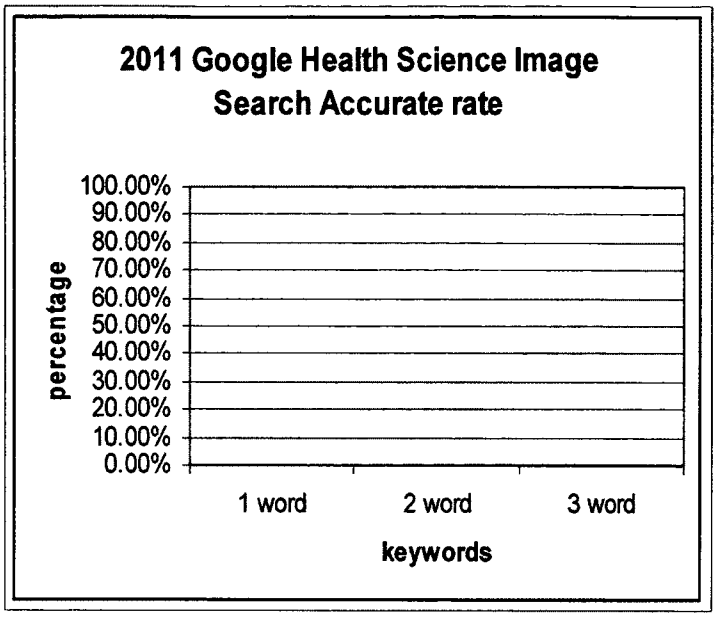


Figure 3.37 – Google Image Search Health Science keywords accurate rate 2011

In the result, Google has accurate rate of 0% in image search.

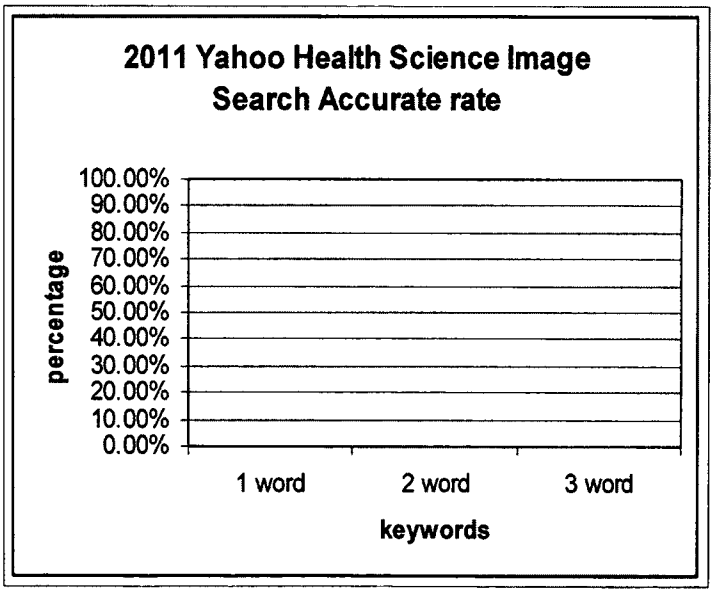


Figure 3.38 – Yahoo Image Search Health Science keywords accurate rate 2011

In the result, Yahoo has accurate rate of 0% in image search.

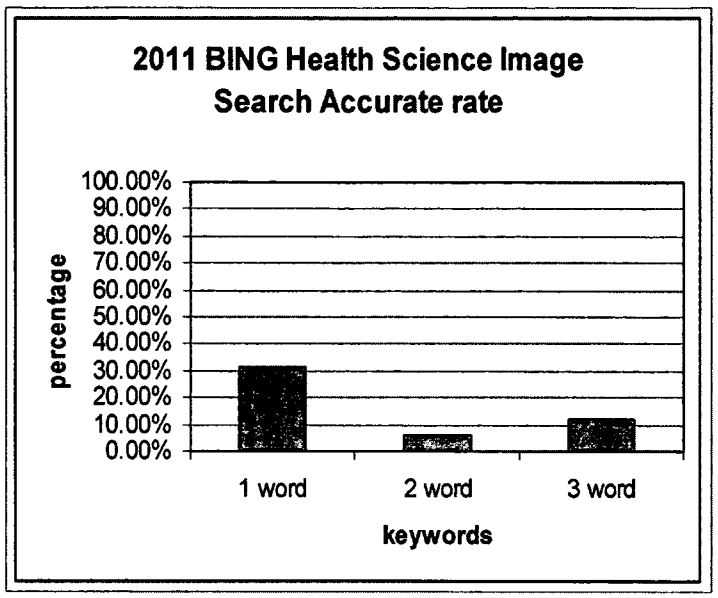


Figure 3.39 – Bing Image Search Health Science keywords accurate rate 2011

In the Bing result, it has accurate rate on keywords oshca at 31.6 percent, participatory ergonomics at 5.6%, and ancestry-informative marker at 12%.

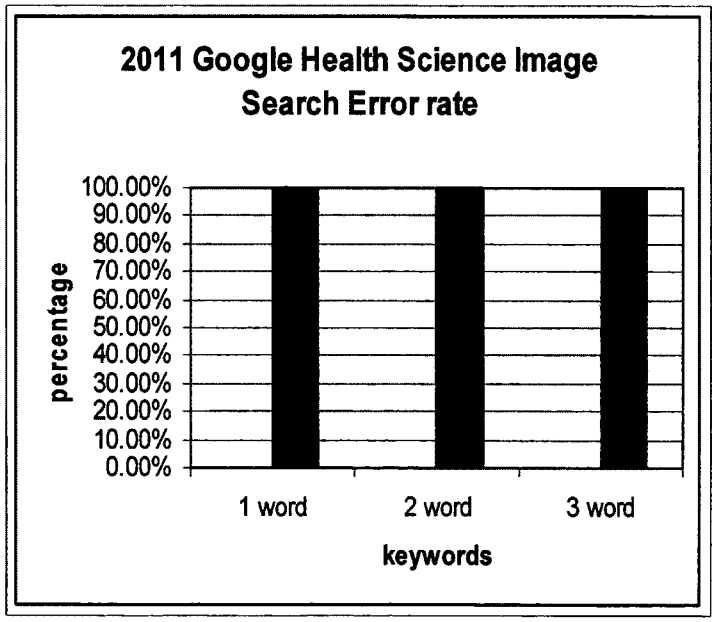


Figure 3.40 – Google Image Search Health Science keywords error rate 2011

In the result, Google has error rate of 100% in image search.

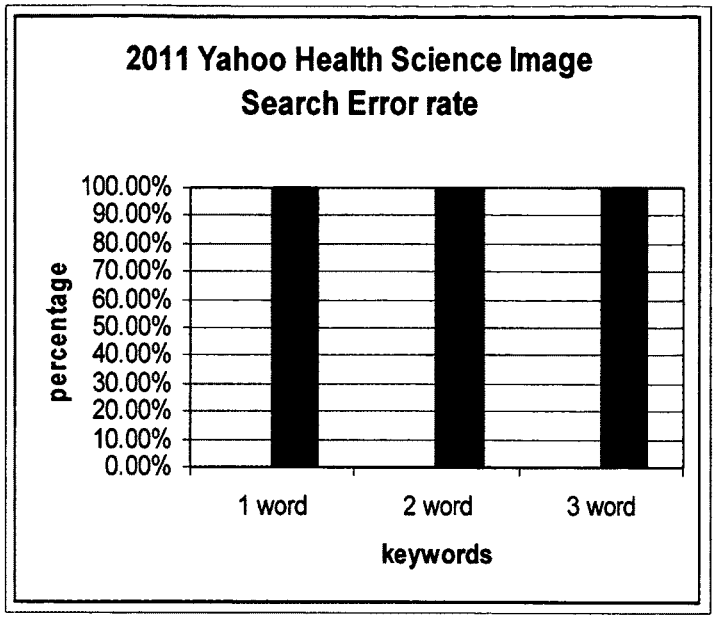


Figure 3.41 – Yahoo Image Search Health Science keywords error rate 2011

In the result, Yahoo has error rate of 100% in image search.

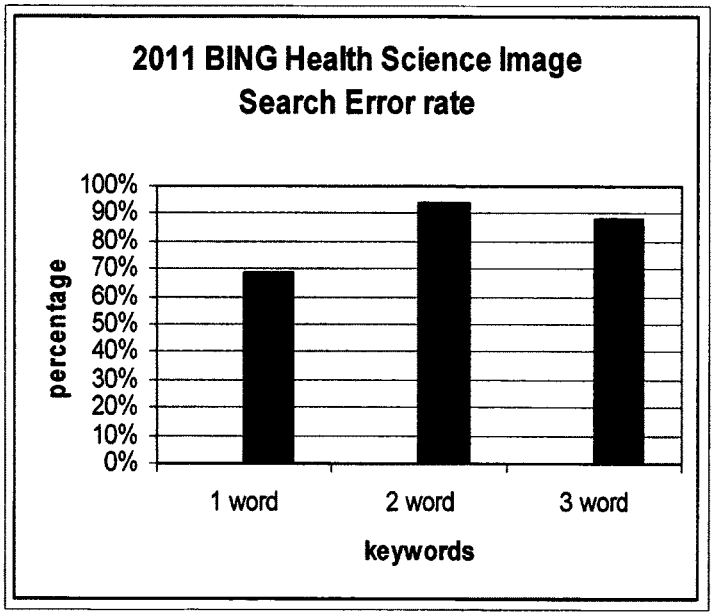


Figure 3.42 – Bing Image Search Health Science keywords error rate

In the Bing result, it has error rate on keywords oshca at 68.4percent, participatory ergonomics at 94.4%, and ancestry-informative marker at 88%.

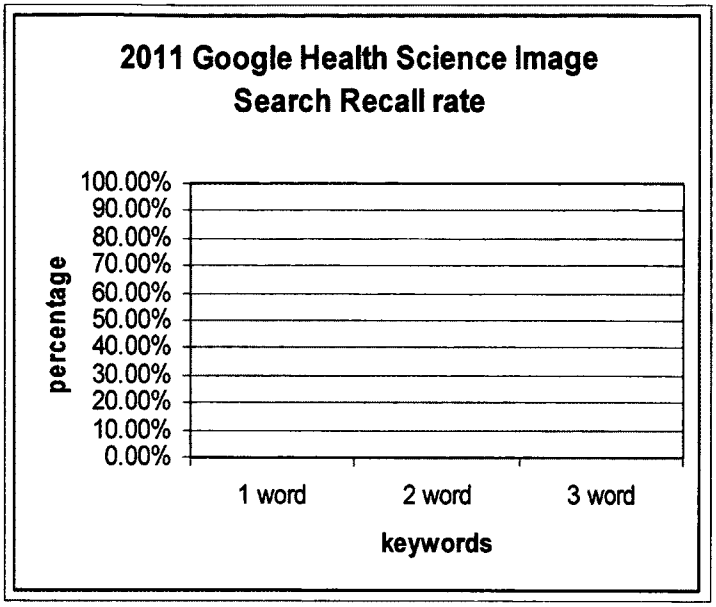


Figure 3.43 – Google Image Search Health Science keywords recall rate 2011

In the result, Google has recall rate of 0% in image search.

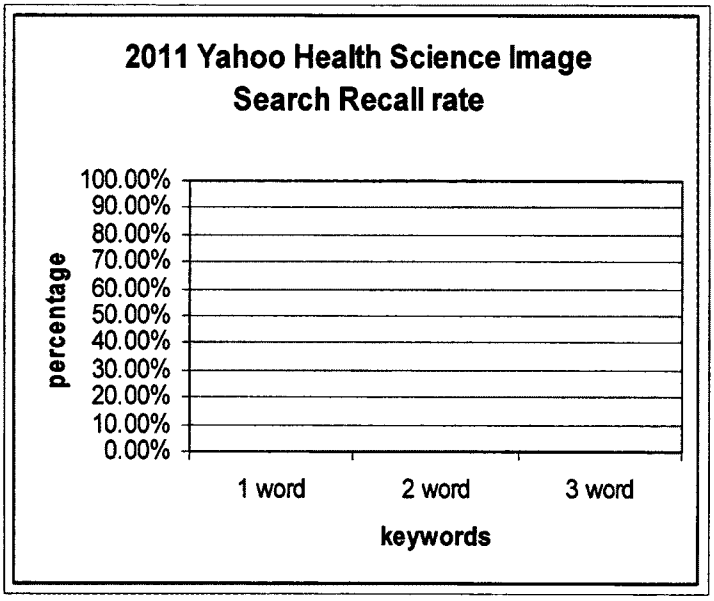


Figure 3.44 – Yahoo Image Search Health Science keywords recall rate 2011

In the result, Yahoo has recall rate of 0% in image search.

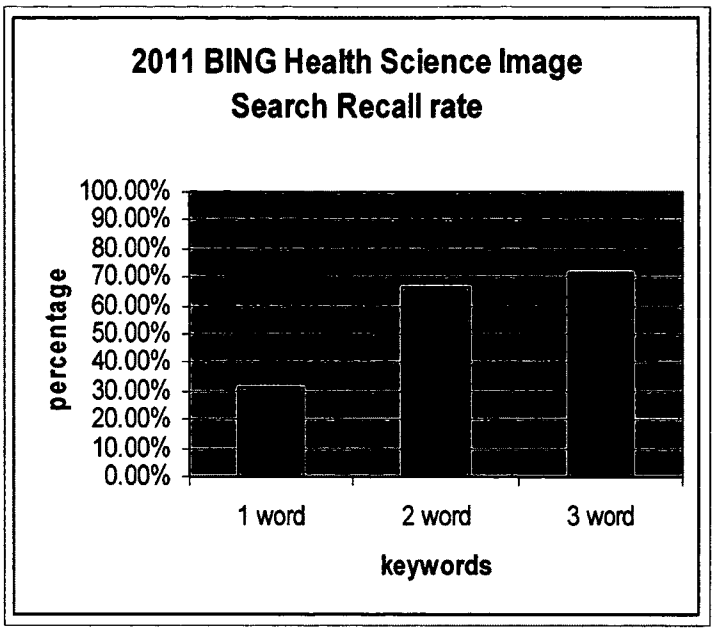


Figure 3.45 – Bing Image Search Health Science keywords recall rate 2011

In the Bing result, it has recall rate on keywords oshca at 31.6percent, participatory ergonomics at 66.3%, and ancestry-informative marker at 72%.

In Chapter 3, we did experiments in images. We did experiments in Google, Yahoo, and Bing engines with the same keywords we used in Chapter 2. The search engines index the image search against the name the users provide in the image. It means that most likely, the user don't type a long image name and provide in the search engine. Also, we can conclude that BING has the best overall image search, and Yahoo is 2nd, and Google is last in the Image Search in 2011 result. The comparison was based on accurate rate, error rate and recall rate.

CHAPTER 4 COMPARATIVE EXPERIMENTS ON SEMANTIC PROCESSING CABABILITIES OF SEARCH ENGINES

4.1: Introduction and Definitions of Similar Keywords

Similar keyword helps to optimize the webpage. The similarity of the keywords helps to index the client side's search input. When you use similar keywords, you can promote the website's traffic and productivity.

Computer Science similar keywords results:

The similar keywords in Computer Science are c++ constructor, computer architecture tutorial, object oriented, user interface, computer software engineering, sql, multiple inheritance, data mining tools, xml, pseudocode examples, network security threats, binary search, oracle metadata, artificial intelligence programs, PIN, database software, internet search engines, UML, configuration definition, sequence diagram, JVM, cryptograms, application software, LAN topology, sorting algorithm, activity diagram, aes algorithm, string destructor, computer graphic design, API.

4.2: Semantic Search Experiments in IT (i.e., Computer Science) Area

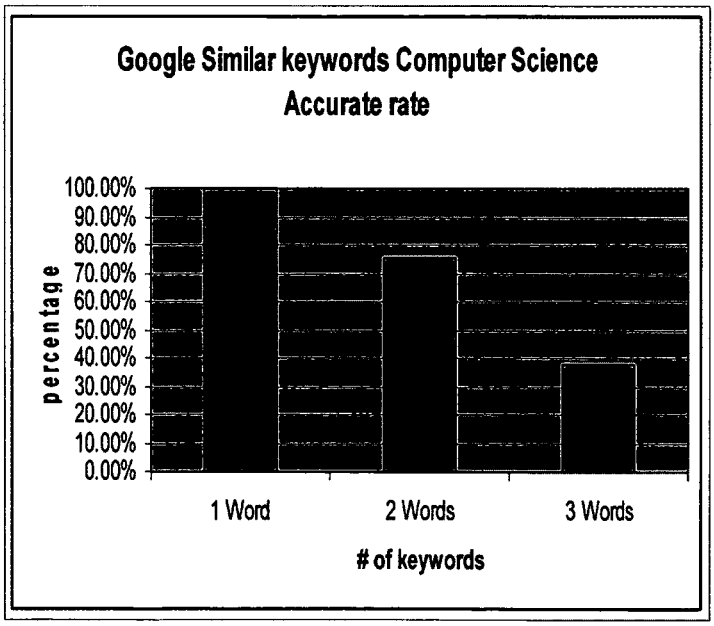


Figure 4.1 – Google Semantic Search Computer Science accurate rate

In Google's Computer Science keywords, the top word keywords that gets 100% are xml, PIN, UML, and API, and the top 2 words keywords get 100% is multiple inheritance, and top 3 word keywords is data mining tools at 72%.

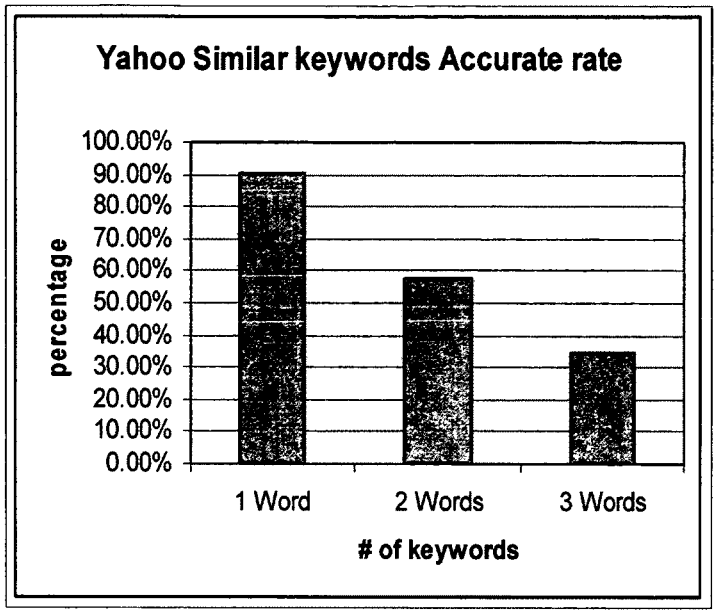


Figure 4.2 – Yahoo Semantic Search Computer Science accurate rate

In Yahoo's Computer Science keywords, the top word keywords that gets 100% are sql, xml, and UML, , and the top 2 words keywords get 100% are object oriented, and user interface, and top 3 word keywords is data mining tools at 63.6%.

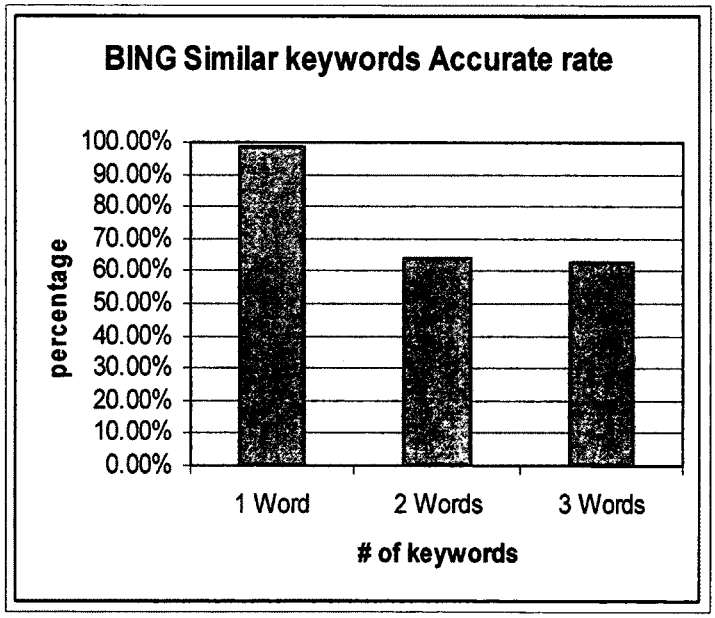


Figure 4.3 – Bing Semantic Search Computer Science accurate rate

In Bing's Computer Science keywords, the top word keywords that gets 100% are sql, xml, and PIN, and the top 2 words keywords get 99.6% is user interface, and top 3 word keywords is data mining tools at 61.6%.

Google has better accurate rate than Yahoo and BING, but on 2 keywords searches, Yahoo has a better accurate rate than Google. Overall, BING has the lowest accurate rate between them.

Computer Science Similar keywords Recall rate:

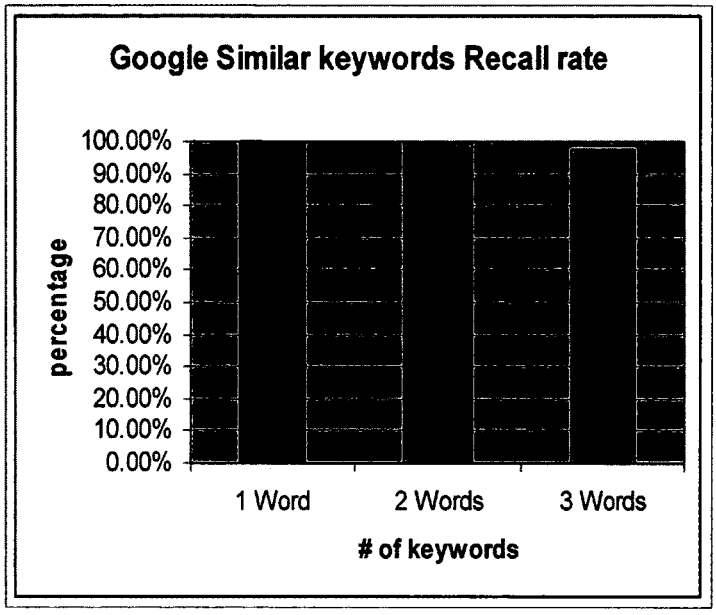


Figure 4.4 – Google Semantic Search Computer Science recall rate

Google has 100% on 1 word keyword recall rate in xml, PIN, UML, and API. Google has 100% on 2 word keyword recall rate with computer architecture and artificial intelligence, and software engineering. It has 100% on 3 word keyword recall rate on object oriented programming, and local area network.

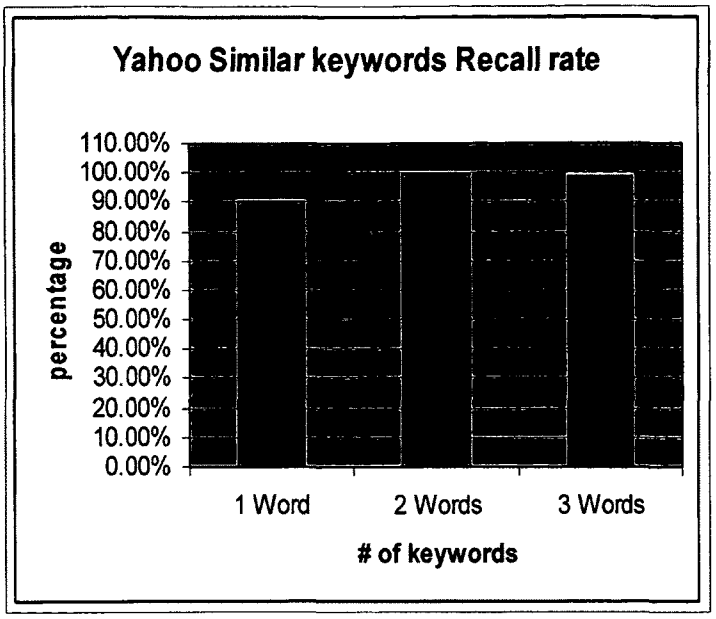


Figure 4.5 – Yahoo Semantic Search Computer Science recall rate

Yahoo has 100% on 1 word keyword recall rate in sql, xml, and UML. Yahoo has 100% on 2 word keyword recall rate with object oriented, multiple inheritance, oracle metadata, and user interface. It has top 3 word keyword recall rate on network security threats.

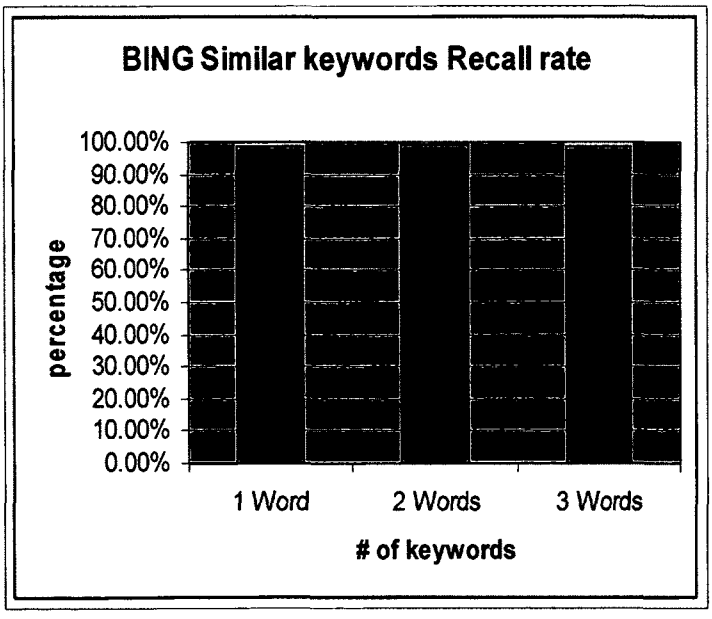


Figure 4.6 – Bing Semantic Search Computer Science recall rate

Bing has 100% on 1 word keyword recall rate in sql, xml, and PIN. Bing has 100% on 2 word keyword recall rate with object oriented, multiple inheritance, sequence diagram, and string destructor. It has top 3 word keyword recall rate on computer architecture tutorial.

4.3: Semantic Search Experiments in Business (i.e., Accounting) Area

Similar Keywords in accounting keywords:

The keywords used for similar keywords are depreciation calculation, business financial statement, IRS, owners equity, account receivable management, Collateralized Loan Obligation, Mortgage foreclosure, Account Payable Process, critical chain, loan underwriters, logistics, market value added, accounting period, theoretical accounting, interest rate, partnership dissolution, dividends, accounts payable inventory, capital expenditure, qualified opinion, cost of sales, liquidation time, federal fiscal year, rate of return, copyright, scatter plot, TQM, economic profit, capital stock, value management process.

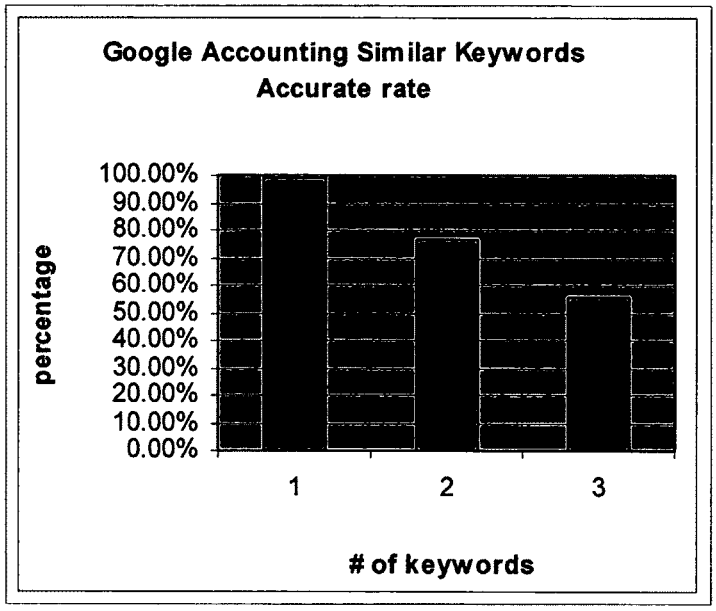


Figure 4.7 – Google Semantic Search Accounting accurate rate

In Google's similar accounting keywords accurate rate, the top 1 word keyword are logistics, and TQM at 100%. The top 2 words keywords is scatter plot at 99.3%, and top 3 word keywords is rate of return at 96%.

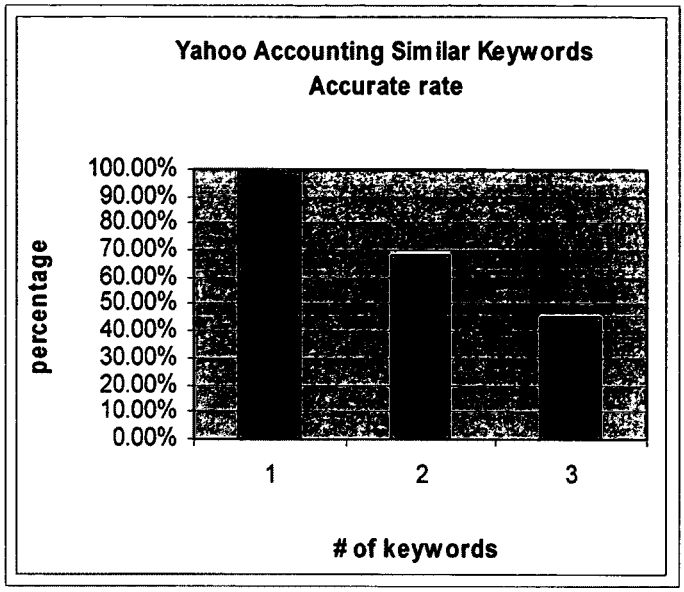


Figure 4.8 – Yahoo Semantic Search Accounting accurate rate

In Yahoo's similar accounting keywords accurate rate, the top 1 word keywords are dividends and TQM at 100%. The top 2 words keywords is capital expenditure at 99.3%, and top 3 word keywords is rate of return at 97%.

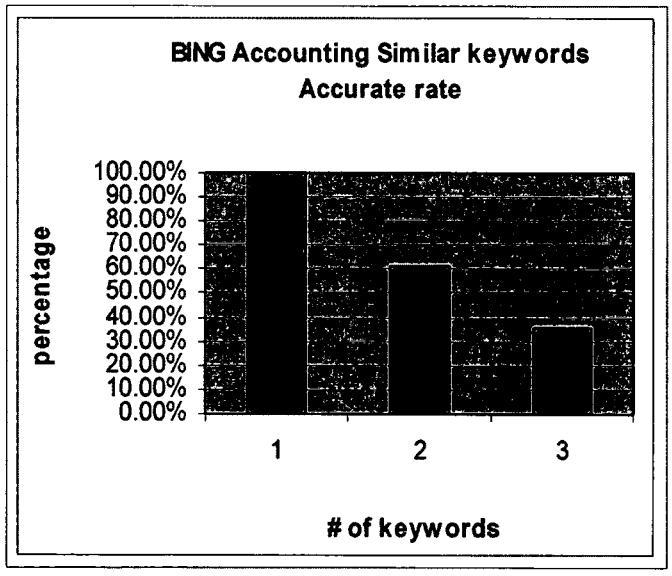


Figure 4.9 – Bing Semantic Search Accounting accurate rate

In Bing's similar accounting keywords accurate rate, the top 1 word keywords are dividends and TQM at 100%. The top 2 words keywords is capital expenditure at 97.3%, and top 3 word keywords is rate of return at 97%.

In this graph, we can see Bing has more error rate between Google and Yahoo, 1 keyword, 2 keywords and 3 keywords.

Similar keywords Accounting Recall rate

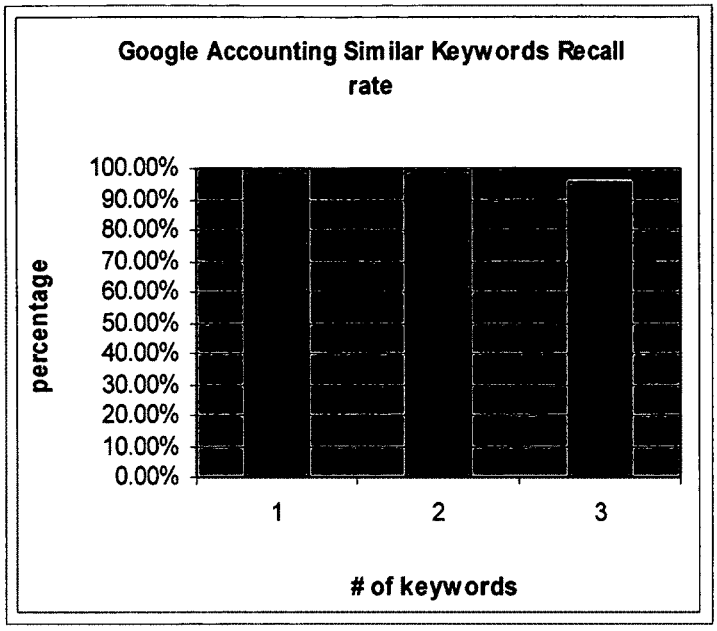


Figure 4.10 – Google Semantic Search Accounting recall rate

Google has 100% on 1 word keyword recall rate in logistics, and TQM. Google has 100% on 2 word keyword recall rate with owners equity, accounting period, theoretical accounting, and scatter plot. It has 100% on 3 word keyword recall rate on accounts payable inventory, and federal fiscal year.

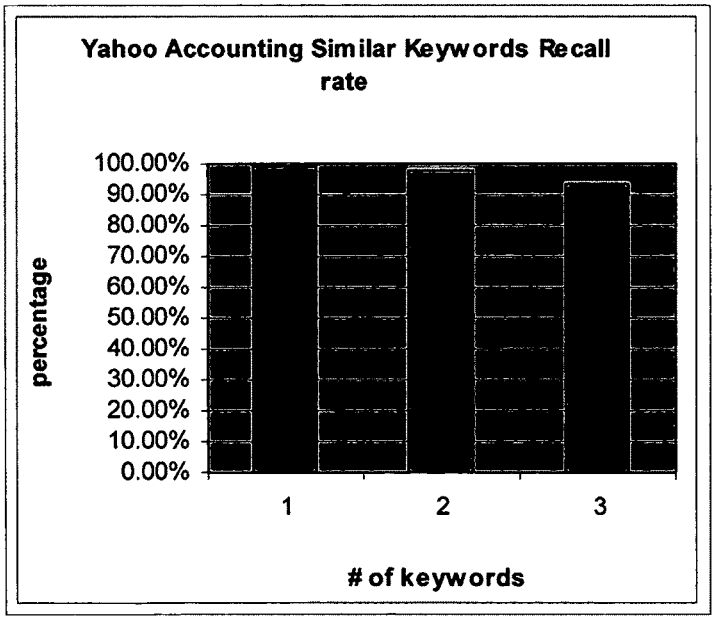


Figure 4.11 – Yahoo Semantic Search Accounting recall rate

Yahoo has 100% on 1 word keyword recall rate in dividends, and TQM. Yahoo has 100% on 2 word keyword recall rate with owners equity. It has 3 word keyword recall rate on value management process at 99.3%.

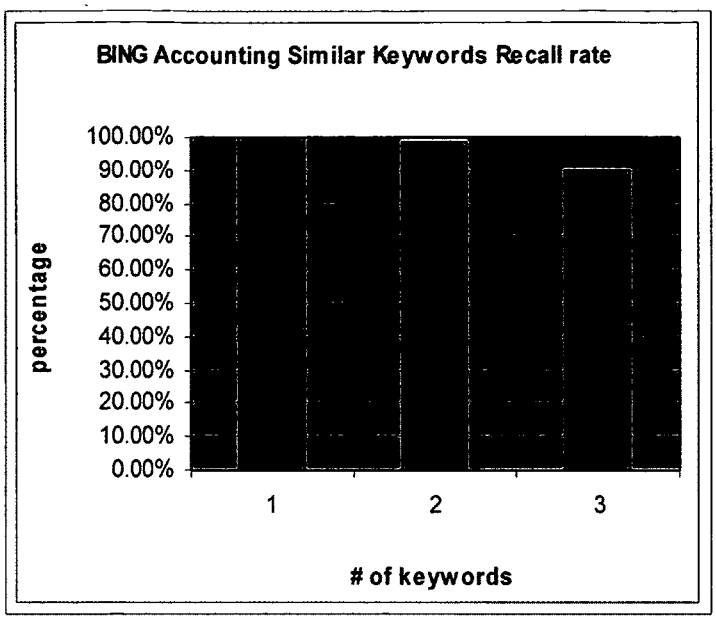


Figure 4.12 – Bing Semantic Search Accounting recall rate

Bing has 100% on 1 word keyword recall rate in logistics, dividends, copyrights, and TQM. Yahoo has 100% on 2 word keyword recall rate with accounting period. It has 3 word keyword recall rate on account payable process, and market value added at 99.3%.

Health Science Similar keywords results:

In the Health Science similar keywords, we used international network, indirect DNA, trendelenburg sign, ancestry-informative, physical science, threshold limit, insilicos viewer, nutritionist, body surface area, healthcare reform, environmental health issues, ergonomics, social work pm, audacity, nutrigenetics, health administration, mental health descriptors, occupational therapy, auxologia, dow pharmaceutical sciences, photocarcinogen, psychoeducational intervention, compounding pharmacy, physical education, hubmedia, biomedical technology solution, biomedical science, trans-proteomic, chemical body burden, and direct dna.

4.4: Semantic Search Experiments in Health Science Area

Health Science Similar keywords Accurate rate:

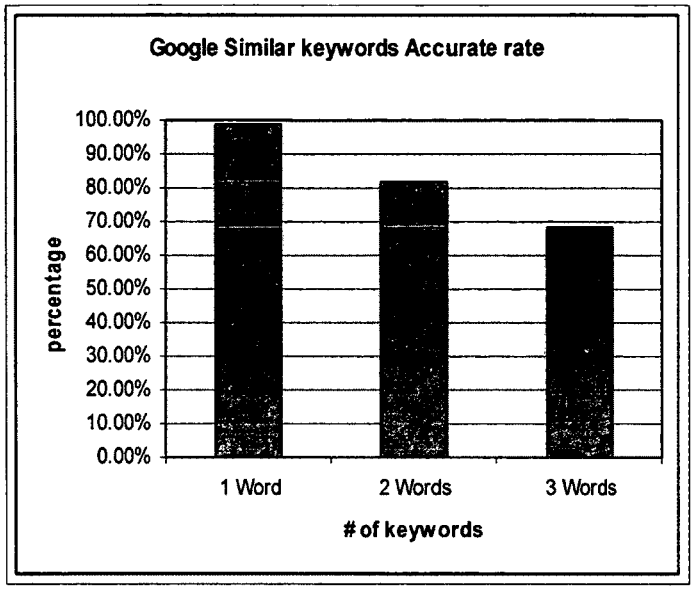


Figure 4.13 – Google Semantic Search Health Science accurate rate

In Google's Health Science keywords, the top word keywords that gets 100% are photocarcinogen, and the top 2 words keywords get 100% is occupational therapy, and top 3 word keywords is dow pharmaceutical sciences at 99%.

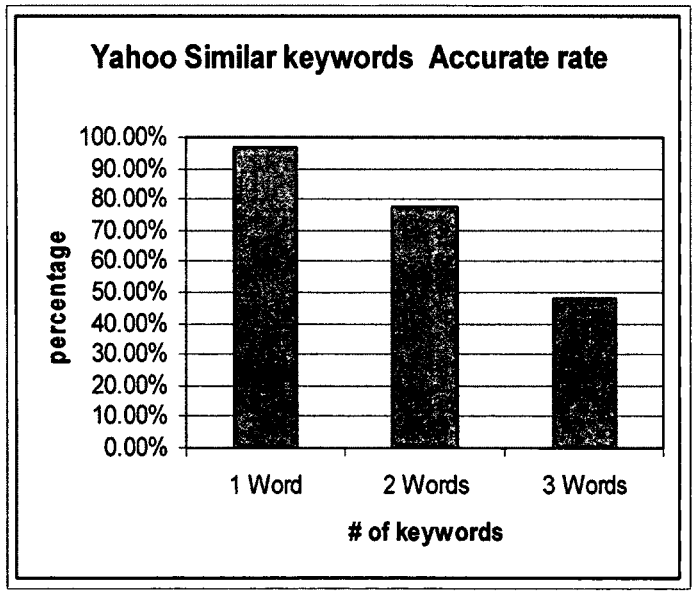


Figure 4.14 – Yahoo Semantic Search Health Science accurate rate

In Yahoo's Health Science keywords, the top word keywords that gets 100% are ergonomics, audacity and the top 2 words keywords get 100% is physical education, and top 3 word keywords is body surface area at 92%.

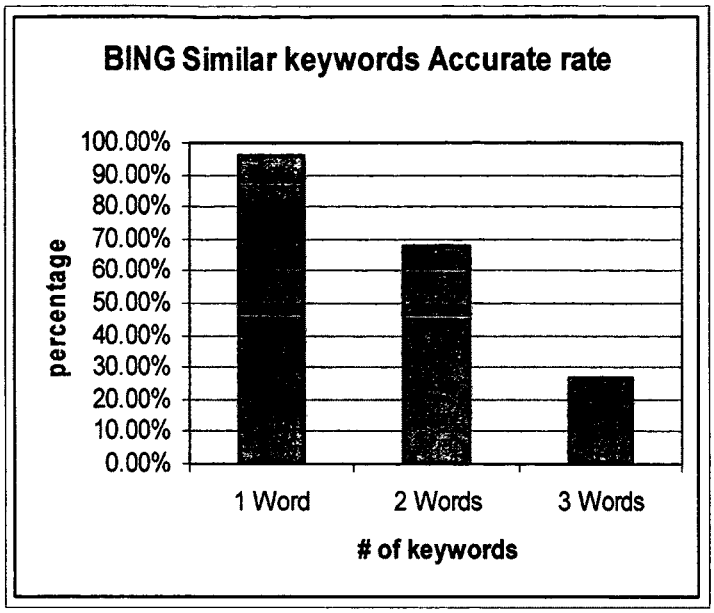


Figure 4.15– Bing Semantic Search Health Science accurate rate

In Bing's Health Science keywords, the top word keywords that gets 99.6% are ergonomics, audacity and the top 2 words keywords get 99.3% is occupational therapy, and top 3 word keywords is body surface area at 70.6%.

Health Science Similar keywords Recall rate:

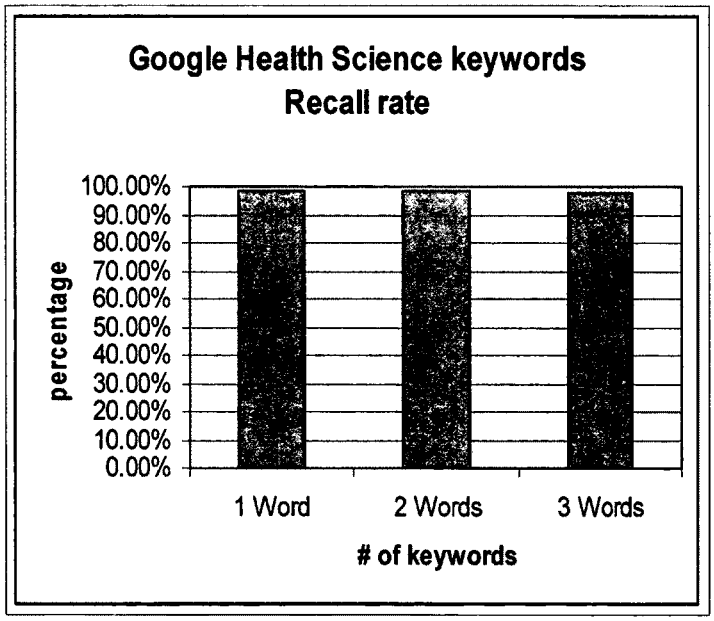


Figure 4.16 – Google Semantic Search Health Science recall rate

Google has 100% on 1 word keyword recall rate in photocarcinogen. Google has 100% on 2 word keyword recall rate with Indirect DNA, Ancestry-informative, threshold limit, occupational therapy. It has top 3 word keyword recall rate on body surface area at 99.6%.

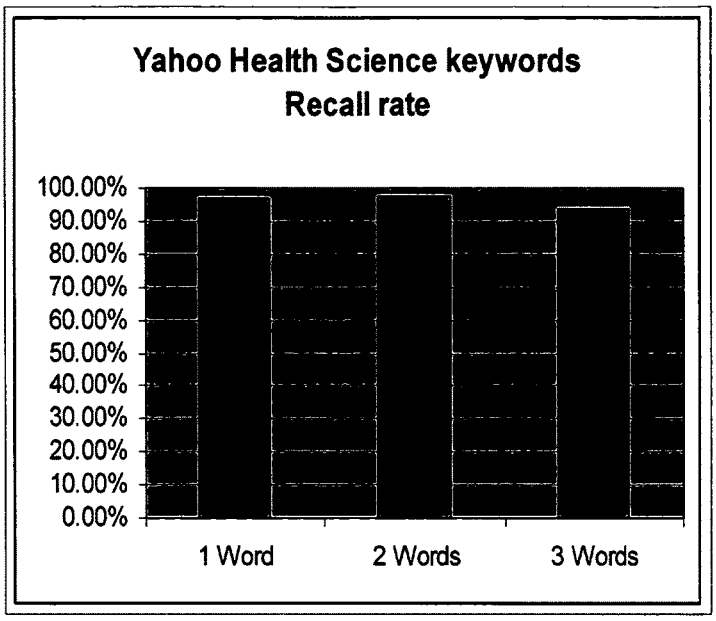


Figure 4.17 – Yahoo Semantic Search Health Science recall rate

Yahoo has 100% on 1 word keyword recall rate in ergonomics, audacity. Google has 100% on 2 word keyword recall rate with physical science, physical education. It has top 3 word keyword recall rate on environmental health issue, and chemicals body burden at 97.0%.

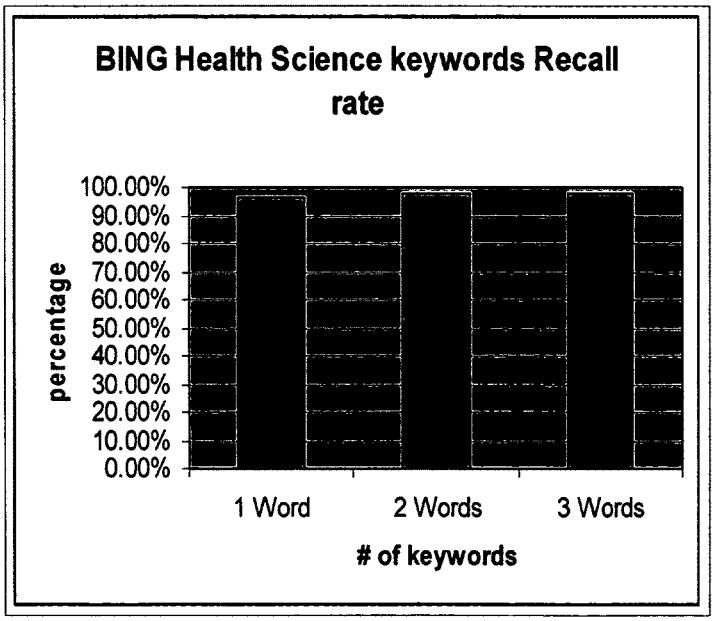


Figure 4.18 – Bing Semantic Search Health Science recall rate

Bing has 99.6% on 1 word keyword recall rate in ergonomics, audacity, nutrigenetics. Google has 100% on 2 word keyword recall rate with occupational therapy. It has top 3 word keyword recall rate on mental health description, and chemical body burden at 99.0%

The Semantic keywords comparison experiments are used to test the similarity of the keywords. If the result is close to 0%, it means the original keywords and the semantic keywords are very closely related.

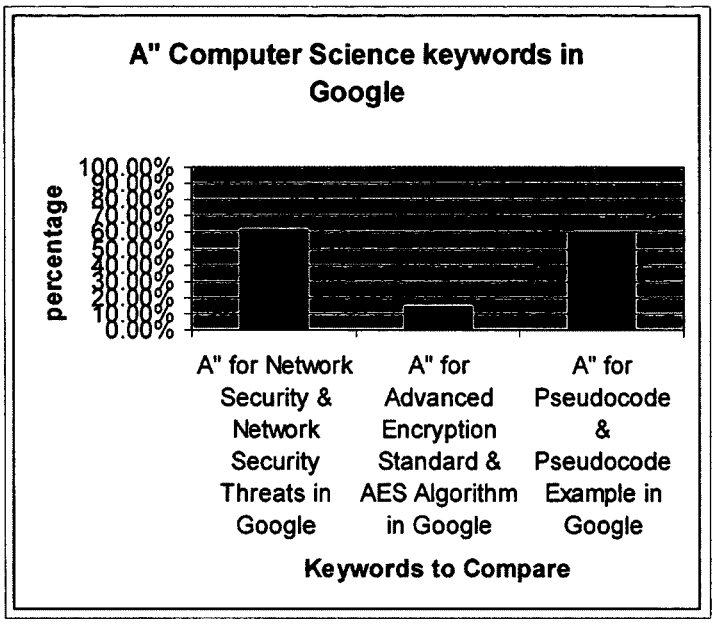


Figure 4.19 - A – A" Keywords for Computer Science Keywords in Google

The keywords used in the semantic search are network security against network security threats, advanced encryption standard against aes algorithm, and pseudocode against pseudocode example. The results for network security & network security threats is A" is 92% - 61.4% = 61.4%.. The result for advanced encryption standard & aes algorithm is 99.60% - 85.60 = 14.0%. And result for pseudocode & pseudocode examples is 100% - 59.7% = 59.7%. We can conclude that the comparison of advanced encryption standard versus aes algorithm has alot of similarities.

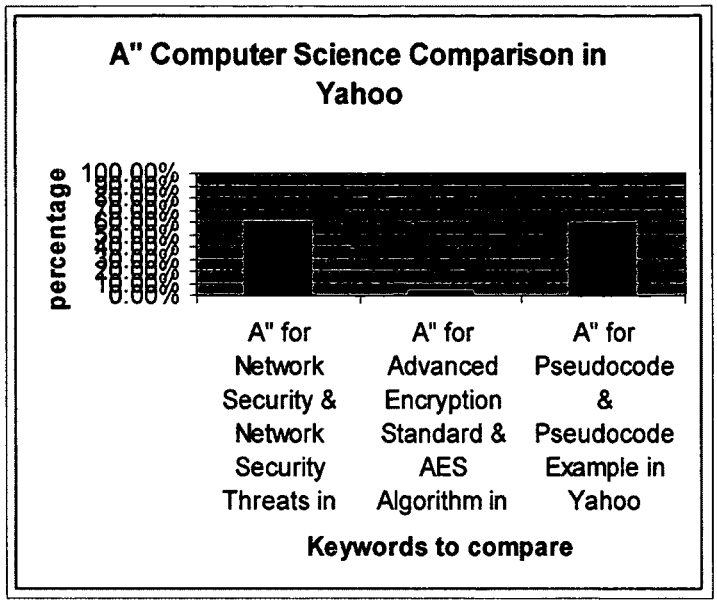


Figure 4.20 - A – A" Keywords for Computer Science Keywords in Yahoo

The keywords used in the semantic search are network security against network security threats, advanced encryption standard against aes algorithm, and pseudocode against pseudocode example. The results for network security & network security threats is A" is 94.6% - 35% = 59.6%.. The result for advanced encryption standard & aes algorithm is 97% - 94.60 = 2.4%. And result for pseudocode & pseudocode examples is 99% - 40.3% = 58.7%. We can conclude that the comparison of advanced encryption standard versus aes algorithm has alot of similarities.

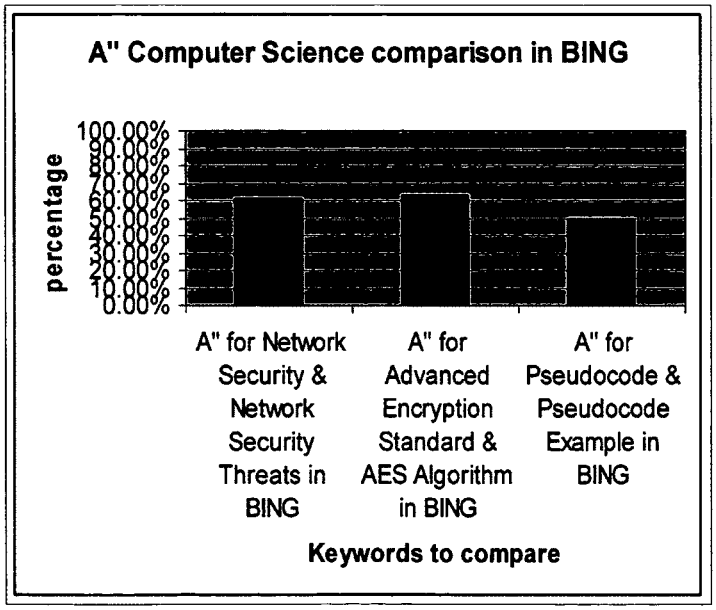


Figure 4.21 - A – A" Keywords for Computer Science Keywords in Bing

The keywords used in the semantic search are network security against network security threats, advanced encryption standard against aes algorithm, and pseudocode against pseudocode example. The results for network security & network security threats is A" is 94% - 33% = 61%.. The result for advanced encryption standard & aes algorithm is 99.30% - 36% = 63.3%. And result for pseudocode & pseudocode examples is 97% - 48% = 49%. We can conclude that the comparison of pseudocode versus pseudocode example has alot of similarities.

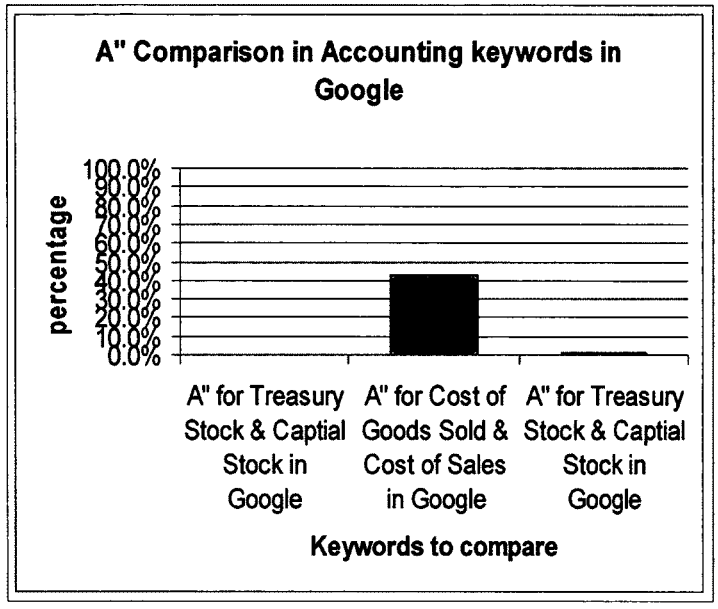


Figure 4.22 - A – A" Keywords for Accounting Keywords in Google

The keywords used in the semantic search are treasury stock against capital stock, cost of goods sold against cost of sales, and patents against copyright. The results for treasury stock & capital stock is A" is 99.3% - 99% = 0.3%.. The result for cost of goods sold & cost of sales is 100% - 57.6% = 42.4%. And result for patents & copyright is 100% - 99% = 1%. We can conclude that the comparison of patents versus copyright has alot of similarities.

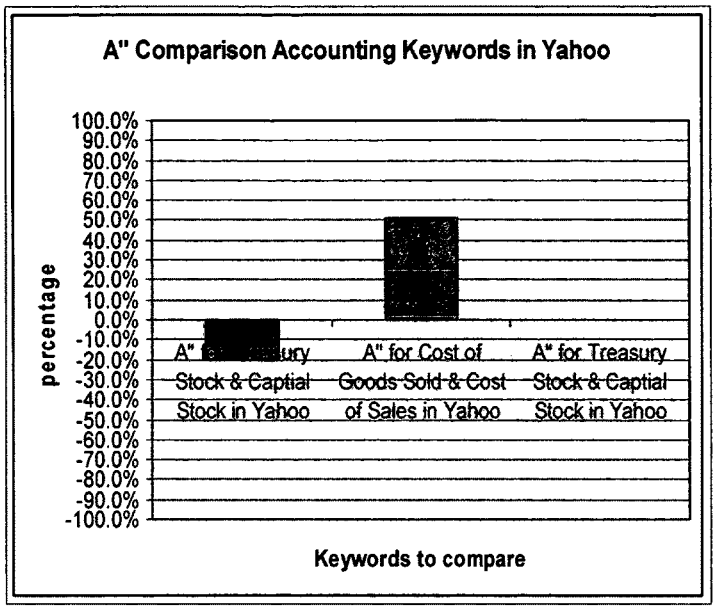


Figure 4.23 - A – A" Keywords for Accounting Keywords in Yahoo

The keywords used in the semantic search are treasury stock against capital stock, cost of goods sold against cost of sales, and patents against copyright. The results for treasury stock & capital stock is A" is 40.3% - 60.6% = -20.3%.. The result for cost of goods sold & cost of sales is 99.6% - 48.6% = 51%. And result for patents & copyright is 99.6% - 99.3% = 0.3%. We can conclude that the comparison of patents versus copyright has alot of similarities.

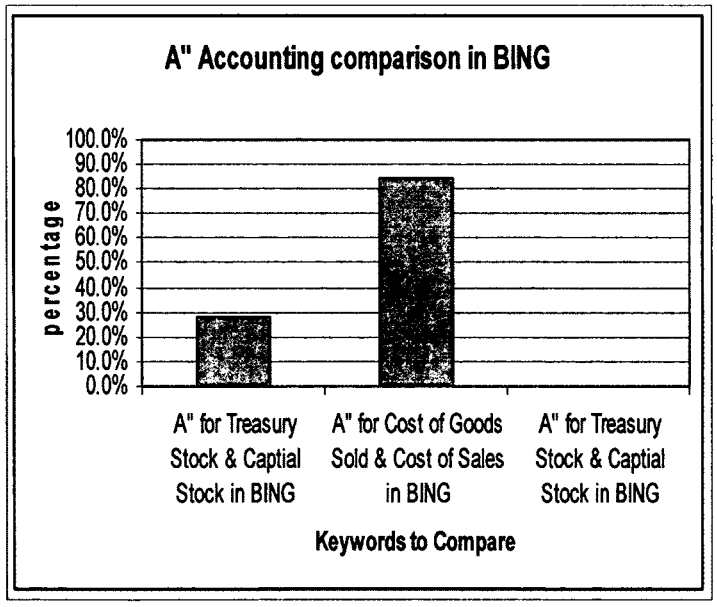


Figure 4.24 - A – A" Keywords for Accounting Keywords in Bing

The keywords used in the semantic search are treasury stock against capital stock, cost of goods sold against cost of sales, and patents against copyright. The results for treasury stock & capital stock is A" is 73% - 45% = 28%.. The result for cost of goods sold & cost of sales is 93.6% - 9.6% = 84%. And result for patents & copyright is 100% - 100% = 0%. We can conclude that the comparison of patents versus copyright has alot of similarities.

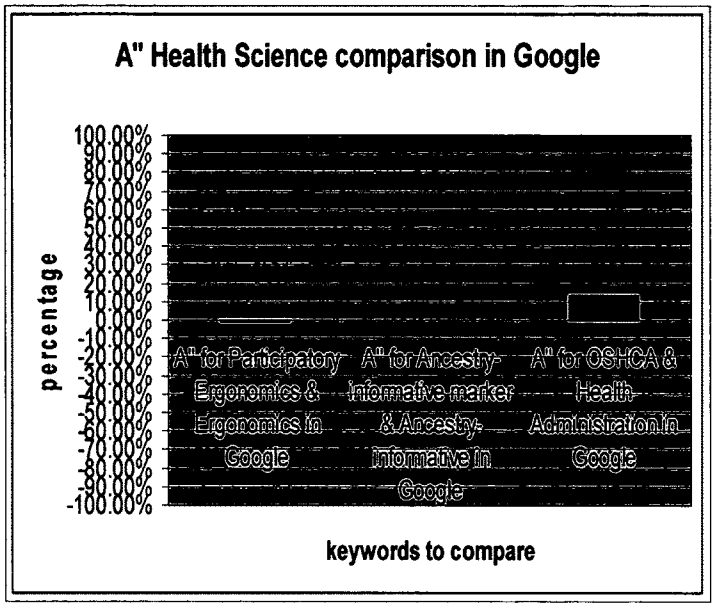


Figure 4.25 - A – A" Keywords for Health Science Keywords in Google

The keywords used in the semantic search are participatory ergonomics against ergonomics, ancestry-informative marker against ancestry-informative, and oshca against health administration. The results for participatory ergonomics & ergonomics is A" is 98.3% - 99.3% = -1%.. The result for ancestry-informative marker & ancestry-informative is 97.3% - 97.3% = 0%. And result for oshca & health administration is 100% - 86.6% = 13.4%. We can conclude that the comparison of oshca versus health science has alot of similarities.

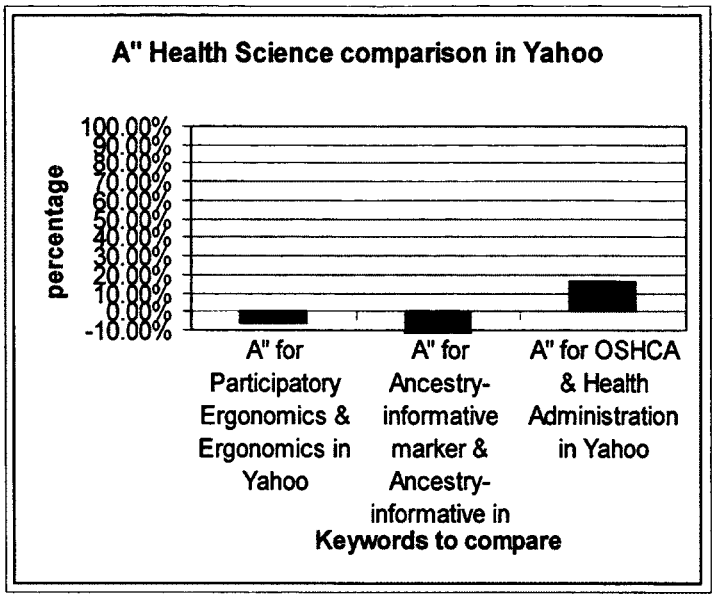


Figure 4.26 - A – A" Keywords for Health Science Keywords in Yahoo

The keywords used in the semantic search are participatory ergonomics against ergonomics, ancestry-informative marker against ancestry-informative, and oshca against health administration. The results for participatory ergonomics & ergonomics is A" is 93.3% - 100% = -6.7%.. The result for ancestry-informative marker & ancestry-informative is 74.3% -92.6% = -18.3%. And result for oshca & health administration is 96.6% - 80.6% = 16%. We can conclude that the comparison of participatory ergonomics versus ergonomics has alot of similarities.

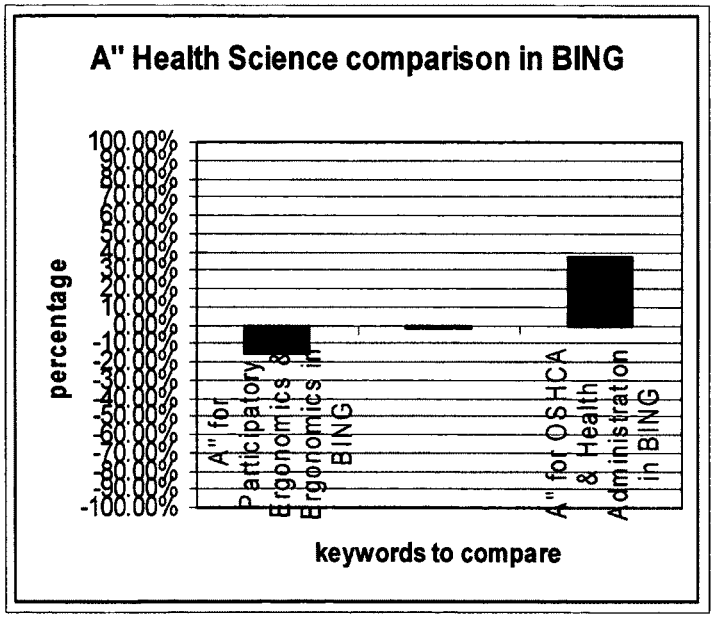


Figure 4.27 - A – A" Keywords for Health Science Keywords in Bing

The keywords used in the semantic search are participatory ergonomics against ergonomics, ancestry-informative marker against ancestry-informative, and oshca against health administration. The results for participatory ergonomics & ergonomics is A" is 84% - 99.6% = --15.6%.. The result for ancestry-informative marker & ancestry-informative is 97.6% -99% = -1.4%. And result for oshca & health administration is 93.6% - 56.3% = 37.3%. We can conclude that the comparison of ancestry-informative marker versus ancestry-informative has alot of similarities.

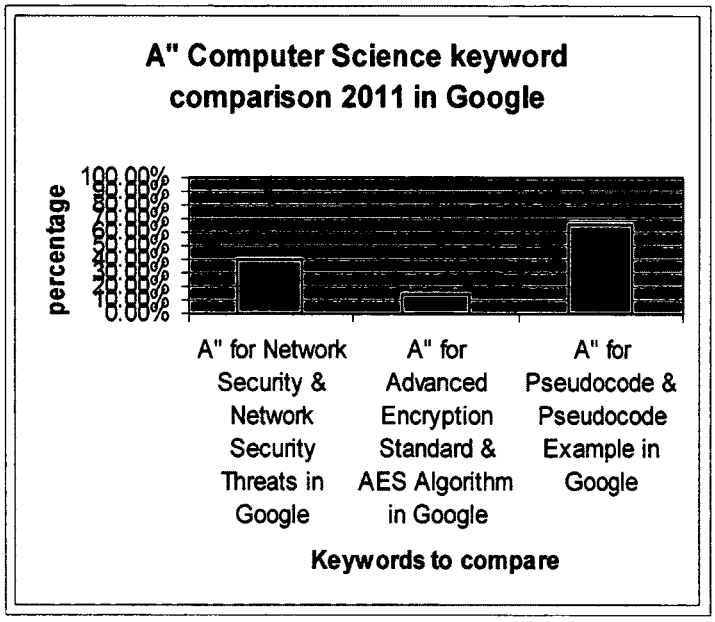


Figure 4.28 – Similar Keywords for Computer Science Keywords in Google 2011

The keywords used in the semantic search are network security against network security threats, advanced encryption standard against aes algorithm, and pseudocode against pseudocode example. The results for network security & network security threats is A" is 93% - 52.6% = 40.4%.. The result for advanced encryption standard & aes algorithm is 99.3% - 84.3% = 15%. And result for pseudocode & pseudocode examples is 99.6% - 34.3% = 65.3%. We can conclude that the comparison of advanced encryption standard versus aes algorithm has alot of similarities.

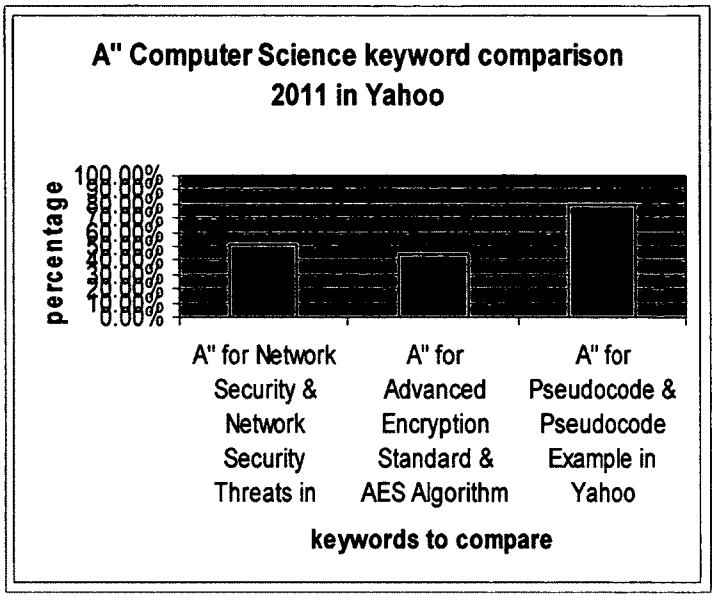


Figure 4.29 - Similar Keywords for Computer Science Keywords in Yahoo 2011

The keywords used in the semantic search are network security against network security threats, advanced encryption standard against aes algorithm, and pseudocode against pseudocode example. The results for network security & network security threats is A" is 85.3% - 34.3% = 51%.. The result for advanced encryption standard & aes algorithm is 97.3% - 52.3% = 45%. And result for pseudocode & pseudocode examples is 100% - 20.3% = 79.7%. We can conclude that the comparison of advanced encryption standard versus aes algorithm has alot of similarities.

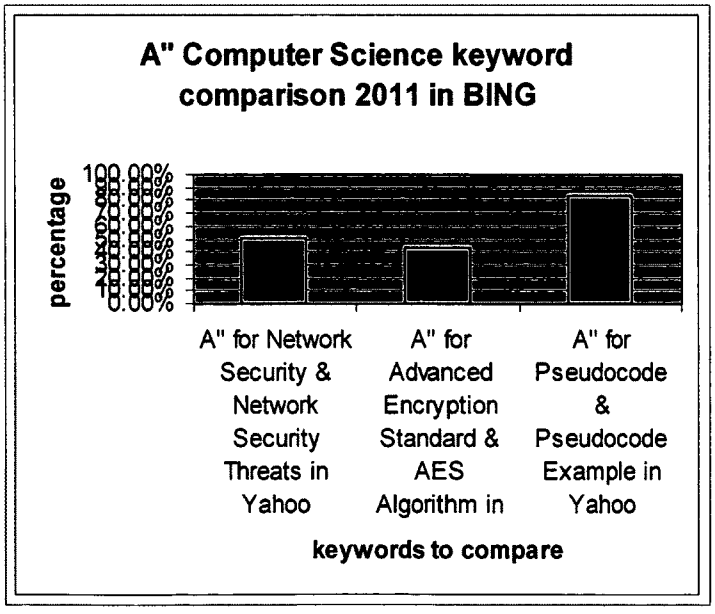


Figure 4.30 - Similar Keywords for Computer Science Keywords in Bing 2011

The keywords used in the semantic search are network security against network security threats, advanced encryption standard against aes algorithm, and pseudocode against pseudocode example. The results for network security & network security threats is A" is 88.3% - 37.3% = 51%.. The result for advanced encryption standard & aes algorithm is 98% - 54% = 44%. And result for pseudocode & pseudocode examples is 100% - 17% = 83%. We can conclude that the comparison of advanced encryption standard versus aes algorithm has alot of similarities.

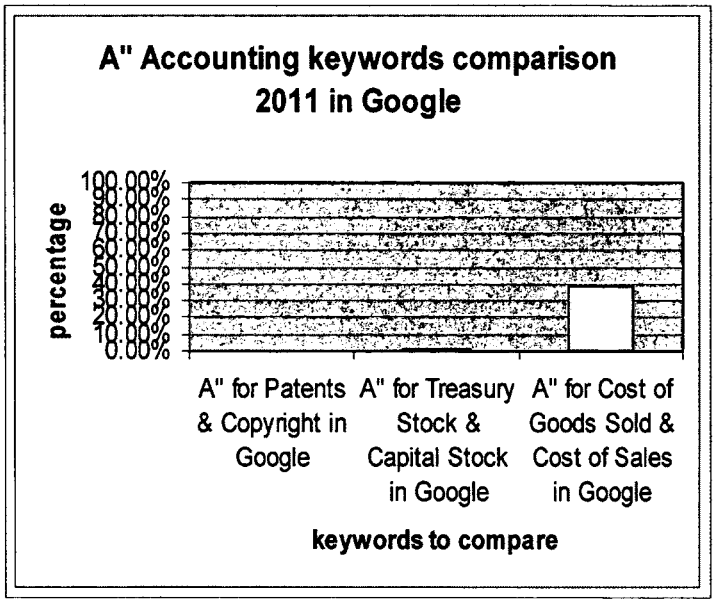


Figure 4.31 - Similar Keywords for Accounting Keywords in Google 2011

The keywords used in the semantic search are treasury stock against capital stock, cost of goods sold against cost of sales, and patents against copyright. The results for treasury stock & capital stock is A" is 98.3% - 97.6% = 0.7%.. The result for cost of goods sold & cost of sales is 100% - 61% = 39%. And result for patents & copyright is 99.3% - 99.3% = 0%. We can conclude that the comparison of patents versus copyright has alot of similarities.

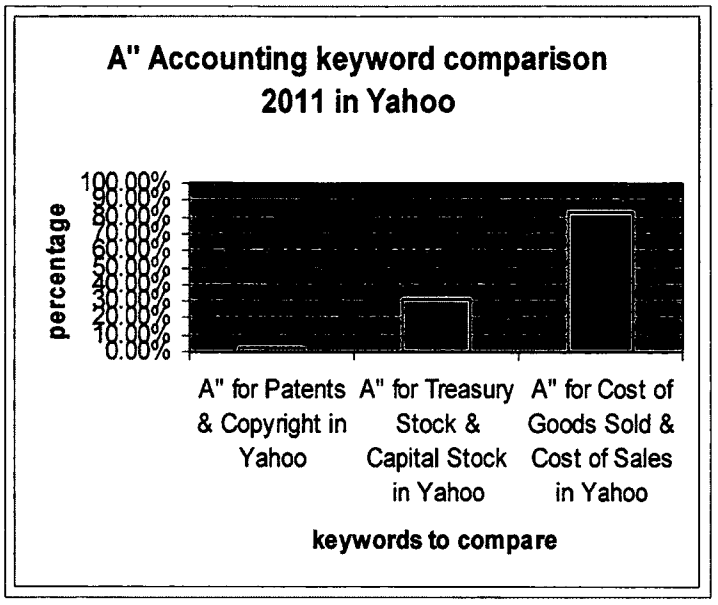


Figure 4.32 - Similar Keywords for Accounting Keywords in Yahoo 2011

The keywords used in the semantic search are treasury stock against capital stock, cost of goods sold against cost of sales, and patents against copyright. The results for treasury stock & capital stock is A" is 71% - 40% = 31%.. The result for cost of goods sold & cost of sales is 99% - 16% = 83%. And result for patents & copyright is 100% - 97.3% = 2.7%. We can conclude that the comparison of patents versus copyright has alot of similarities.

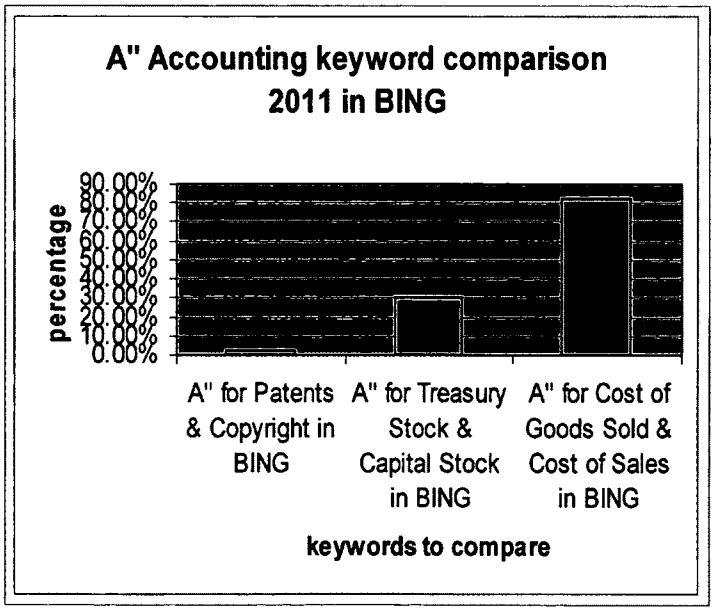


Figure 4.33 - Similar Keywords for Accounting Keywords in Bing 2011

The keywords used in the semantic search are treasury stock against capital stock, cost of goods sold against cost of sales, and patents against copyright. The results for treasury stock & capital stock is A" is 71% - 41% = 30%.. The result for cost of goods sold & cost of sales is 99% - 16.6% = 82.4%. And result for patents & copyright is 100% - 97.6% = 2.4%. We can conclude that the comparison of patents versus copyright has alot of similarities.

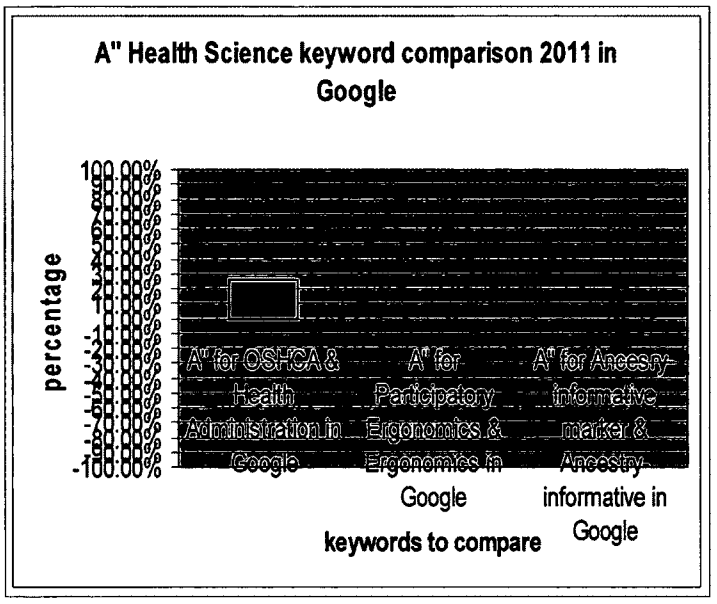


Figure 4.34 - Similar Keywords for Health Science Keywords in Google 2011

The keywords used in the semantic search are participatory ergonomics against ergonomics, ancestry-informative marker against ancestry-informative, and oshca against health administration. The results for participatory ergonomics & ergonomics is A" is 97.6% - 98.3% = -0.7%.. The result for ancestry-informative marker & ancestry-informative is 96.3% - 96.3% = 0%. And result for oshca & health administration is 99.6% - 73.3% = 26.3%. We can conclude that the comparison of ancestry-informative marker versus ancestry-informative has alot of similarities.

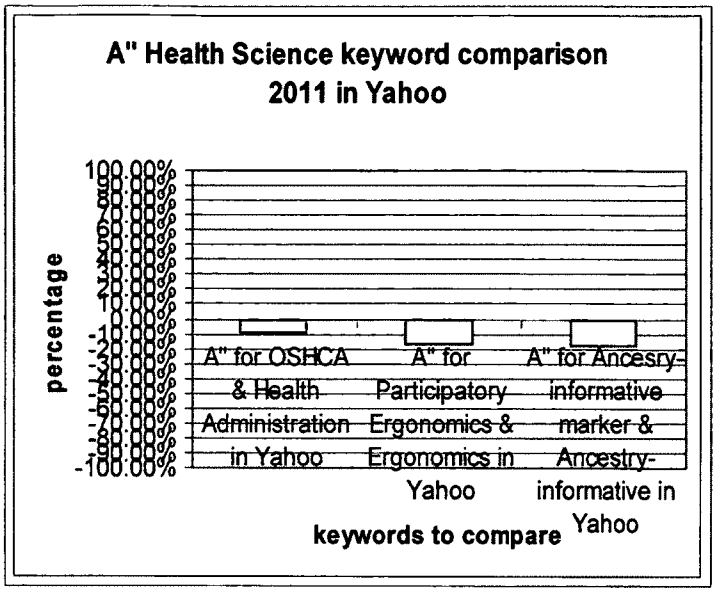


Figure 4.35 - Similar Keywords for Health Science Keywords in Yahoo 2011

The keywords used in the semantic search are participatory ergonomics against ergonomics, ancestry-informative marker against ancestry-informative, and oshca against health administration. The results for participatory ergonomics & ergonomics is A" is 83% - 99.3% = -16.3%.. The result for ancestry-informative marker & ancestry-informative is 81% - 99% = -18%. And result for oshca & health administration is 31.6% - 41% = -9.4%. We can conclude that the comparison of oshca versus health administration has alot of similarities.

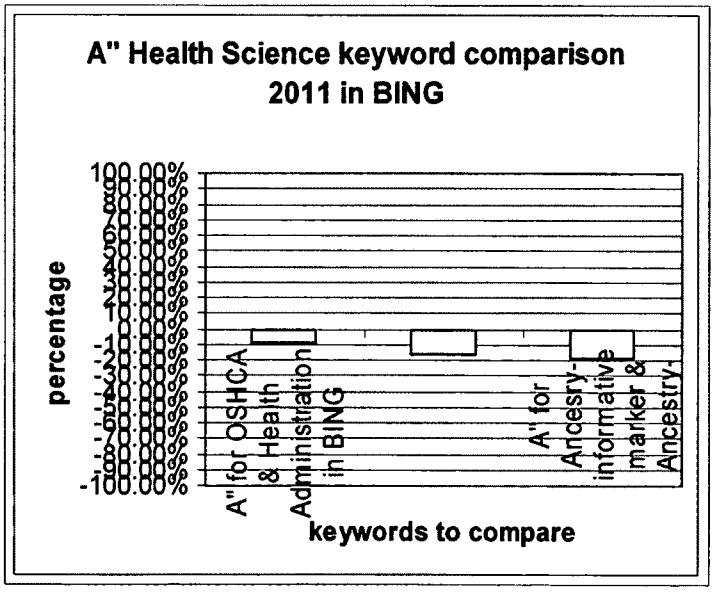


Figure 4.36 - Similar Keywords for Health Science Keywords in Bing 2011

The keywords used in the semantic search are participatory ergonomics against ergonomics, ancestry-informative marker against ancestry-informative, and oshca against health administration. The results for participatory ergonomics & ergonomics is A" is 83% - 99.3% = -16.3%.. The result for ancestry-informative marker & ancestry-informative is 81% - 99.6% = -18.6%. And result for oshca & health administration is 28% - 37.3% = -9.3%. We can conclude that the comparison of oshca versus health administration has alot of similarities.

In chapter 4, we used semantic keywords methods to compare the similar keywords in computer science, accounting and health science categories. First, we can conclude again that the shorter the keyword, the accurate rate is still at higher rate than keywords with 2 or more keyword terms. We use semantic keywords so we can improve the website design later in the chapter. The results of keyword searches, semantic searches, and image searches are useful for the Web design because we can include those higher accurate rate keywords into the website and it will generate higher visibility in the search engine indexes. The higher the accurate rate, the more likely the search engines' indexes will be able to find you when you include those keywords in your website.

CHAPTER 5 SEO & WEB INTELLIGENCE FOR WEB PAGE, AND BUSINESS INTELLIGENCE

5.1: Strategies on improving Search Engine Optimization

The goal of using Search Engine Optimization is to improve the attractiveness of customers to visit the webpage, the actions on the webpage and keywords used. The research areas used were Computer Science, Accounting, and Health Science keywords from Wikipedia categories.

5.2: SEO, WI, WA, and BI

First of all, what is Search Engine Optimization? Search Engine Optimization is the process of improving the page ranking and visibility in the search engines using the natural way. Search Engine Optimization is important in our current World Wide Web because everybody uses the search engines to gather information for source. When you understand or know what people are search for in your website, you gather those keywords and display throughout your website for better page ranking.

Moreover, [4] "Web Intelligence is a combination of web analytics, which examines how website visitors view and interact with a site's pages and features, and Business Intelligence, which allows a corporation's management to use data on customer purchasing patterns, demographics, and demand trends to make effective strategic decisions. For example, the web analysis need to use the formula conversion rate to calculate what actions they will make on your website. There is a tool, called Google Analytics, which it can tell you what search keywords they use and what actions they did in your website.

Web Analytics – [5] "is the measurement, collection, and analysis and reporting of internet data for purposes of understanding and optimizing web usage on the website. There are two categories of web analytics, off-site and on-site web analytics. Off-site web analytics refers to whether you own or maintain the website; it includes the potential customers, visibility of the website. On the other hand, on-site web analytics measures the performance of your website in a commercial context. The data is compared against key performance indicator for performance and used to improve a website or marketing audience's response."

5.3: Web Design using SEO

For the following, there are web pages using the Search Engine Optimization techniques.

Version A:

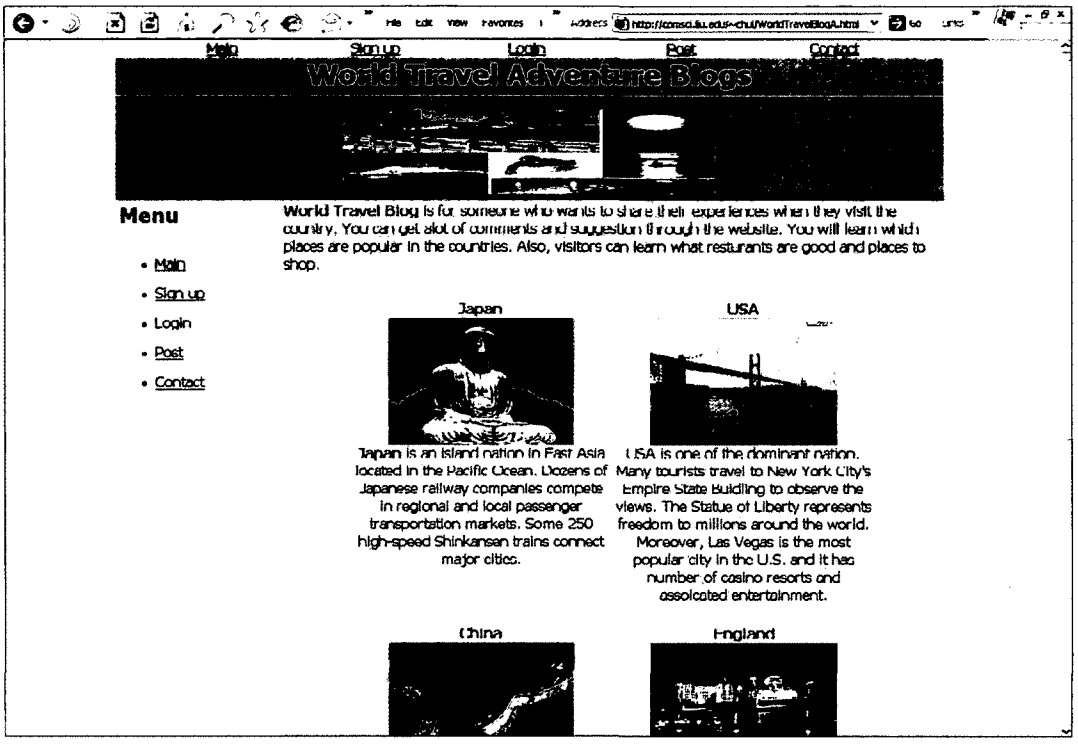


Figure 5.1 – Version A: World Travel Adventure Blog

Version B:

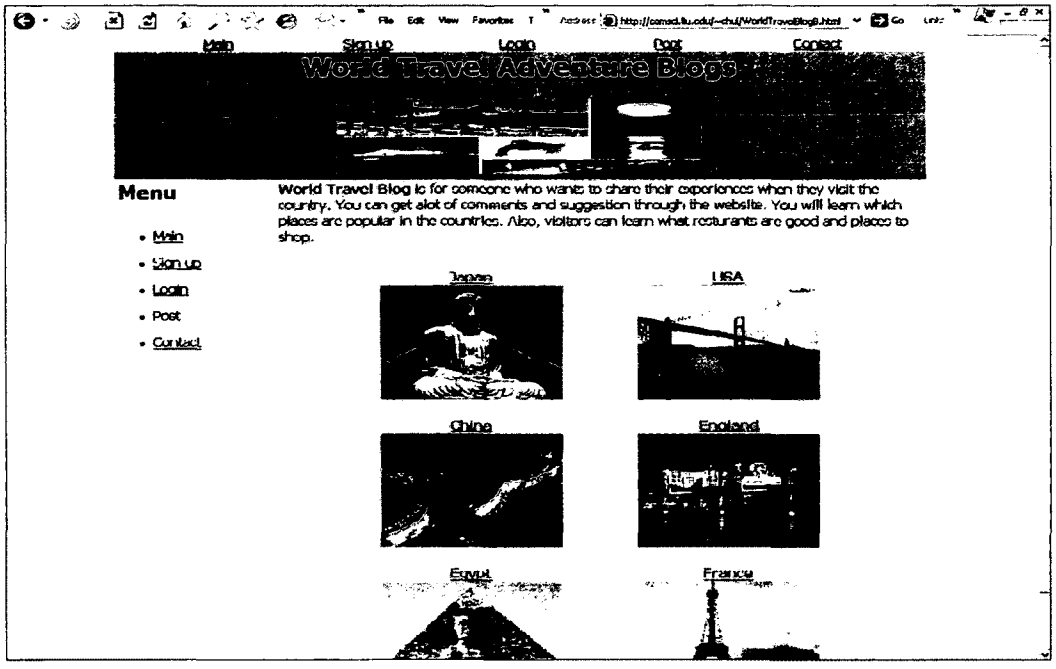


Figure 5.2 – Version B: World Travel Adventure Blog

Version C:

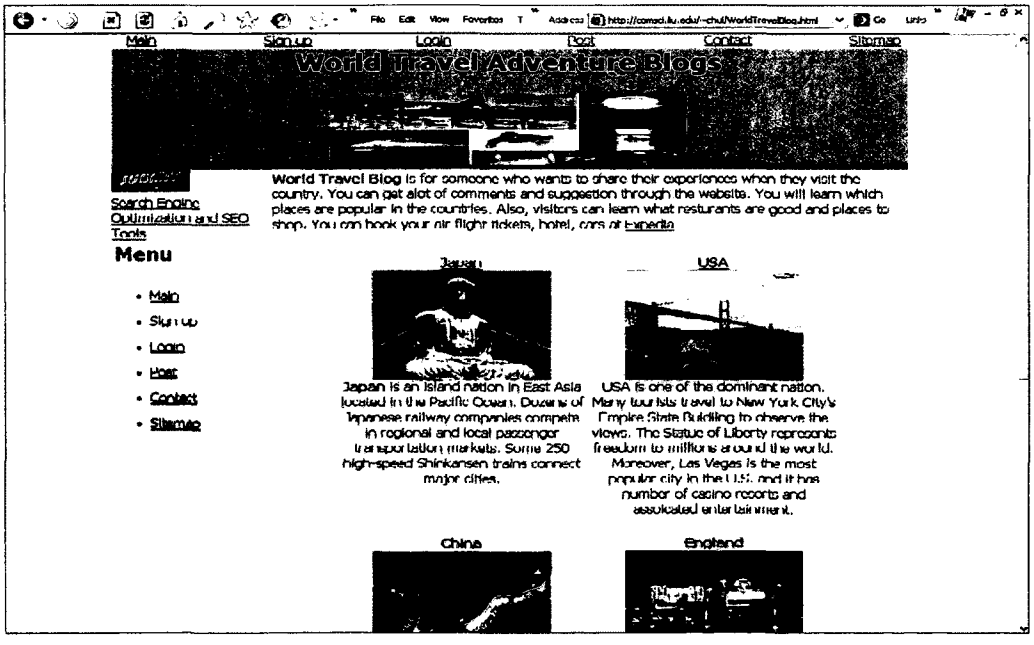


Figure 5.3 – Version C: World Travel Adventure Blog

In the WebPages, we can conclude that Version C Web Design outperformed Version A and Version B because:

1. Version A shows text but it doesn't show links
2. Version B focus on pictures instead of text, and search engines can only indexed text
3. Version C includes more text, and links than Version A, B, that's why Version C outperformed Version A, and B.

Note: 1. Increase conversion rate

2. Increase # of visitors, provide more links
3. But some useful keywords on the image, and keywords, shows which search engines is better on this travel agency.

The travel agency website is www.travel4share.org, it is built in asp.net, and it uses winhost as the webhost. We choose the critical keywords using the Google Ad keywords tool and add the keyword travel to provide the best keywords sorted by Global Monthly Searchers, and sorted by high competition rate. The keywords includes; travel in, i travel, travel tour, go travel, travel tours, tickets flights, flights for cheap, flights cheap, and where to get cheap flights. In the high competition keywords, we get; cheap flights & hotels, cheap airfare flights, hotels deal, cheap hotel dealers, airline cheapest, cheap airfare deals, cheap airline tickets and hotels, where to find the cheapest flights, flights and hotel deals, flight cheap. We applied the shorter keywords in the meta tag and register the website in Google, it should index our webpage when the user enter the keywords in the search bar and improve the rating of the website.

In Chapter 5, we learn the usage of search engine optimization and the techniques to attract customers to come back to our website. We learned that SEO is the process of improving the visibility in the search engine in its natural way. We also learned that web intelligence and web analytics techniques are used to provide examination of the visitors, the value and the purpose of your website. On discovery day of 2009, at Long Island University, Brooklyn Campus, we presented 3 webpage designs for visitors to choose which designs were most effective on the market. Most of the faculties and students got the idea that more text and links provide better index in the search engines than with image, or fewer text on the website.

CHAPTER 6 GOOGLE ANALYTIC TOOLS

6.1: Introduction

Google Analytic Tools gives you the website traffic and marketing effectiveness. It is a powerful, flexible, and easy to use features that let you see and analyze your traffic data. With Google Analytics, you will be able to strengthen your marketing initiatives and create higher converting websites. We will analyze the webpage http://travel4share.org/ and see the traffic rates, the pages visit, the average time the client stay on the page, the browser and the operating system they are using.

Google Analytics helps to make informed site and content decisions, increase conversions for attracting customers, and measure the keywords effectiveness, and track metrics.

Google Analytics provides answer to 1) How are the visitors using the site, how can it make the marketing campaigns more effective and accountable, is it effective content, and where and why visitors avoiding the shopping cart, and how to improve the site interaction.

6.2: How does Google Analytic works?

When a visitor accesses a page on your site, a request is made to the webserver to display the page. The page is served and the Google Analytics Tracking Code Javascript is executed. The Google Analytics Tracking Code, which is a snippet of code that you place on each page of your site, calls the trackPageView() method, at this point, the Google Analytics first-party cookies are read and / or written. The webpage then sends an invisible request containing all the data to the secure Google Analytics reporting server, where the data is captured and processed. Data is processed regularly throughout the day and you can see the result in your reports.

6.3: Google Analytics definitions

- **Visits:** The number of visits to your site during a given time period.
- **Pageviews:** The number of pages these visitors viewed.
- **Pages/Visit:** The average visit in terms of page views.
- **Bounce Rate:** The percentage of people who only visited one page on your site before they "bounced" somewhere else.
- **Avg. Time on Site:** The average amount of time a visitor spends at your site.

- **% of New Visits:** The percentage of new visitors to your site as compared to all visitors. Some businesses might want lots of new traffic, while others might want generate repeat visits, driving down this percentage.

6.4: Experiment and Results

First, you login to the google analytic site; http://www.google.com/analytics. You'll see a list of any website or blog you're tracking. Google allows tracking of multiple sites within an account. Click on "View Reports" next to the site you wish to review and you'll be taken to the dashboard. The dashboard includes visitors, traffic sources, map overlap and content. The site usage includes the following metrics; visits, pageviews, page/visit, bounce rate, average time on site, % of new visits.

I used my website; www.worldtravelshare.com. When we click on visitor overview, we can see the total visitors for the website is 8 people, 5 absolute unique visitors, 33 pageviews, meaning on average of 4.12 page, the average time on the website is 8 minutes and 19 seconds, 25 percents of bounce rate, and 62.50 percent of new visits.

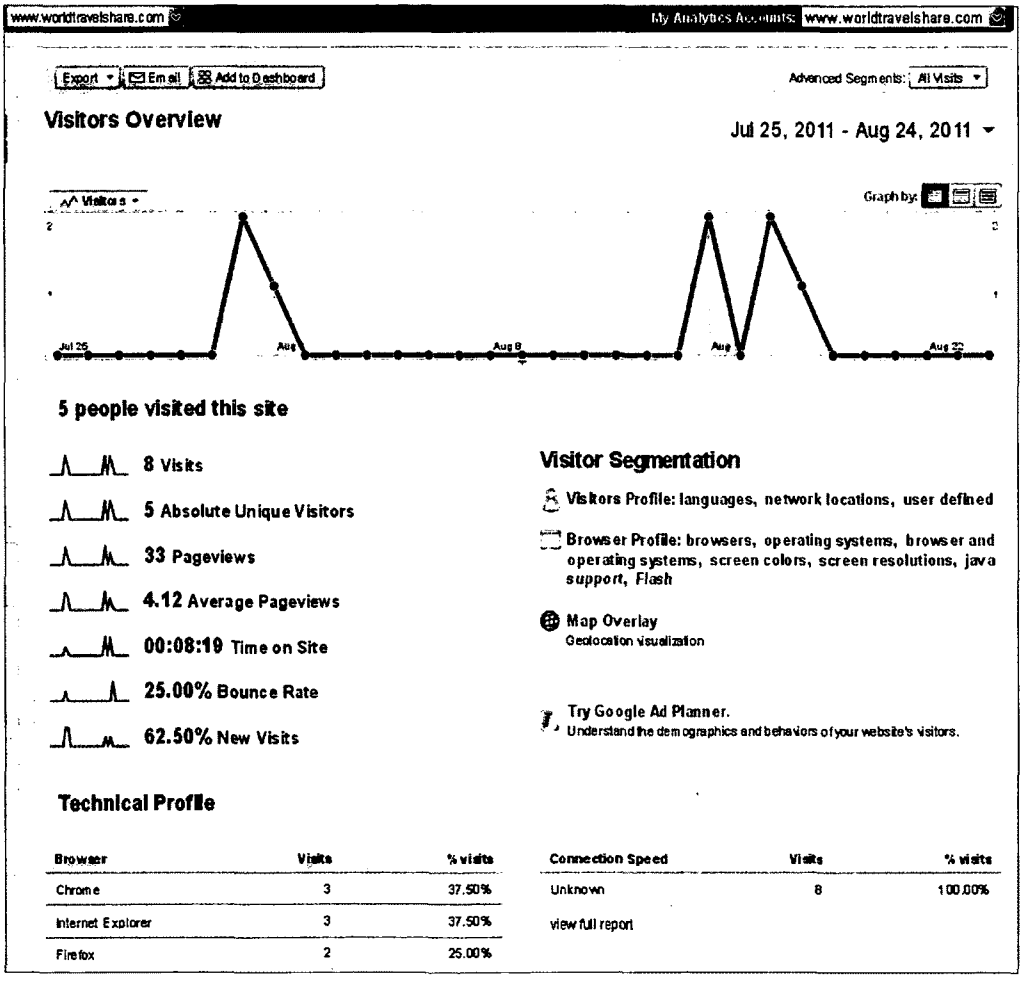


Figure 6.1 - Visitors Overview

Visitors Overview – This is an essential report that tells you straight up how much traffic you have, how many page views, the average length of visit and your bounce rate. You can delve deeper depending on your needs, finding out how much new traffic you're getting, what size monitors your visitors have, whether they use broadband or dial-up, and much more.

In this graph, you can see that 5 people visited www.worldtravelshare.com, and it shows that 3 out of the 5 people used Google Chrome to browse the webpage, 3 out of the 5 people used Internet Explorer and 2 out of 5 people used Firefox to browse the webpage.

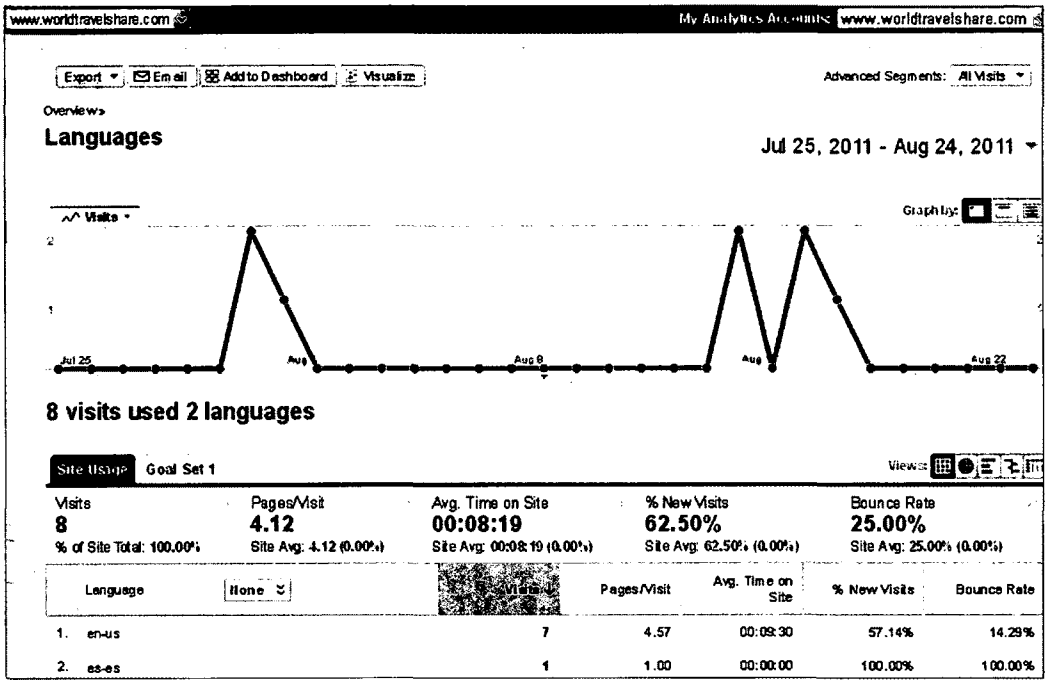
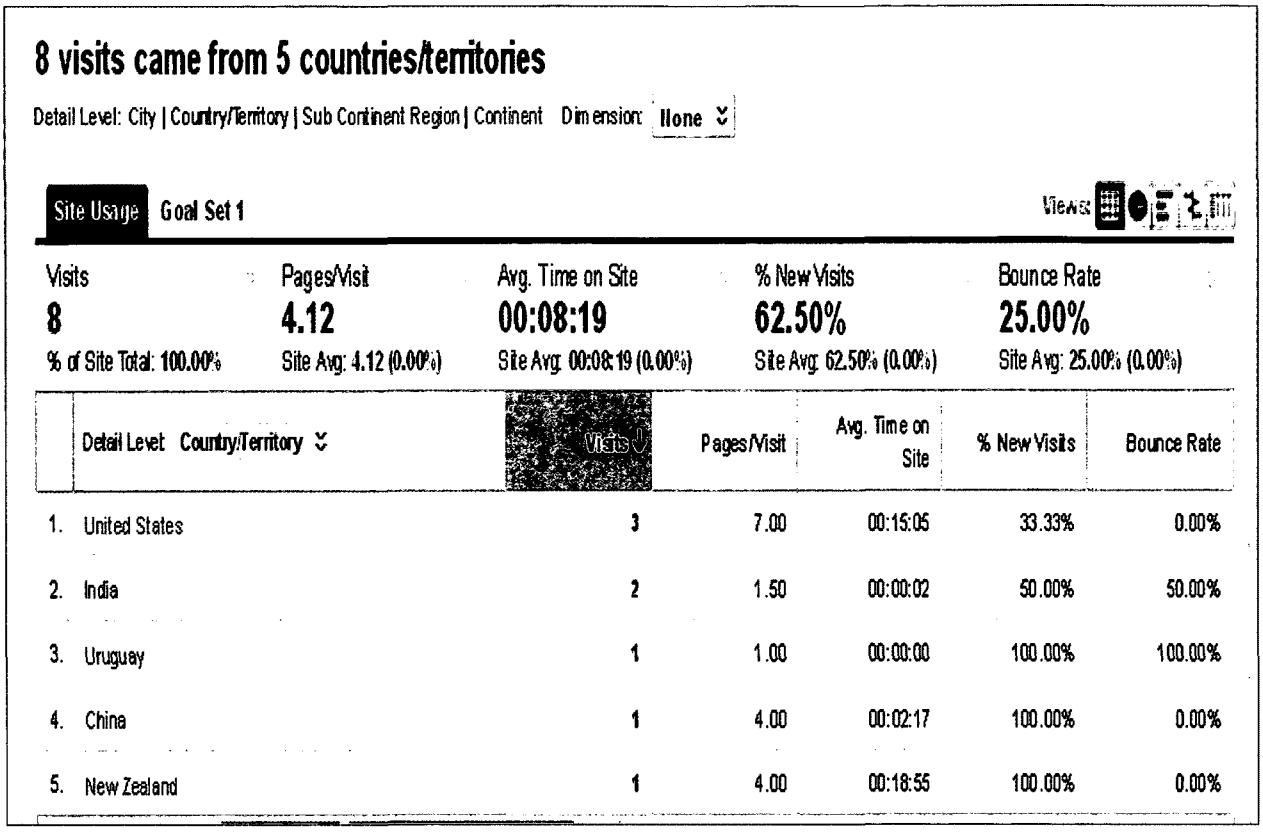


Figure 6.2 - Languages

The above graph shows you the language employed by each visitor. Here English-United States (en-us) has been favored by 7 visitors while Espanol (Spanish) was chosen by 1 visitor. The graph also details Avg. Time on Site, % New Visits and Bounce Rate factor for these languages.



8 visits came from 5 countries/territories

Detail Level: City | Country/Territory | Sub Continent Region | Continent Dimension: None

Site Usage | Goal Set 1 Views:

Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
8	4.12	00:08:19	62.50%	25.00%
% of Site Total: 100.00%	Site Avg: 4.12 (0.00%)	Site Avg: 00:08:19 (0.00%)	Site Avg: 62.50% (0.00%)	Site Avg: 25.00% (0.00%)

	Detail Level: Country/Territory	Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
1.	United States	3	7.00	00:15:05	33.33%	0.00%
2.	India	2	1.50	00:00:02	50.00%	50.00%
3.	Uruguay	1	1.00	00:00:00	100.00%	100.00%
4.	China	1	4.00	00:02:17	100.00%	0.00%
5.	New Zealand	1	4.00	00:18:55	100.00%	0.00%

Figure 6.3 - Countries and territories of the visitors

The above report shows you a picture detailing what country does the visitor belongs to. Country/Territory wise you will be presented with statistics like Page views, Avg. Time on Site, % New Visits and Bounce Rate. In this graph, there are 8 visitors, but in 5 different countries; US, India, Uruguay, China, and New Zealand.

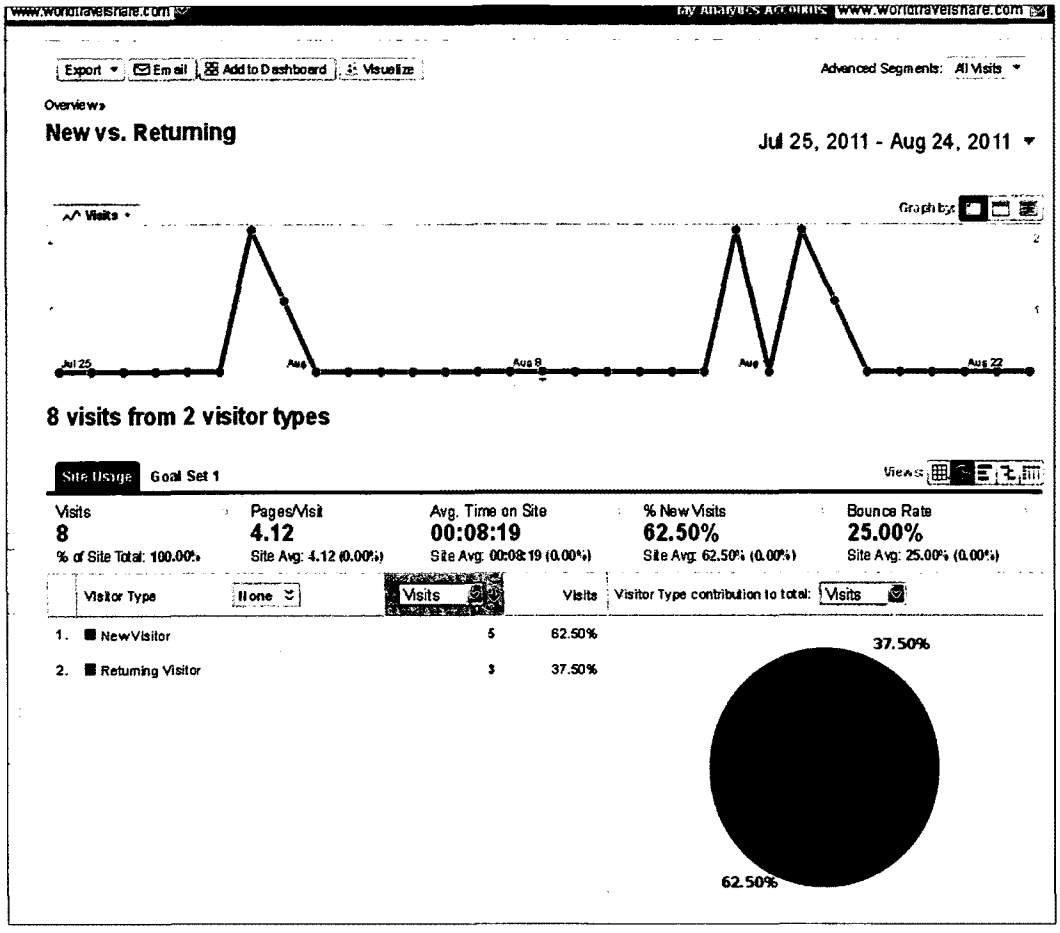


Figure 6.4 - New vs. Returning Visitors

Some businesses might want lots of new traffic (unique visitors), while others might want to generate repeat (returning visitors) visits. This is very important for concerned businesses. New Vs. Returning Graph shows you the total visits (new and returning) and the percentage these visitors belong to either New or Returning. In this graph, it shows that out of the 8 visitors, 3 were returning visitors, and 5 were new visitors.

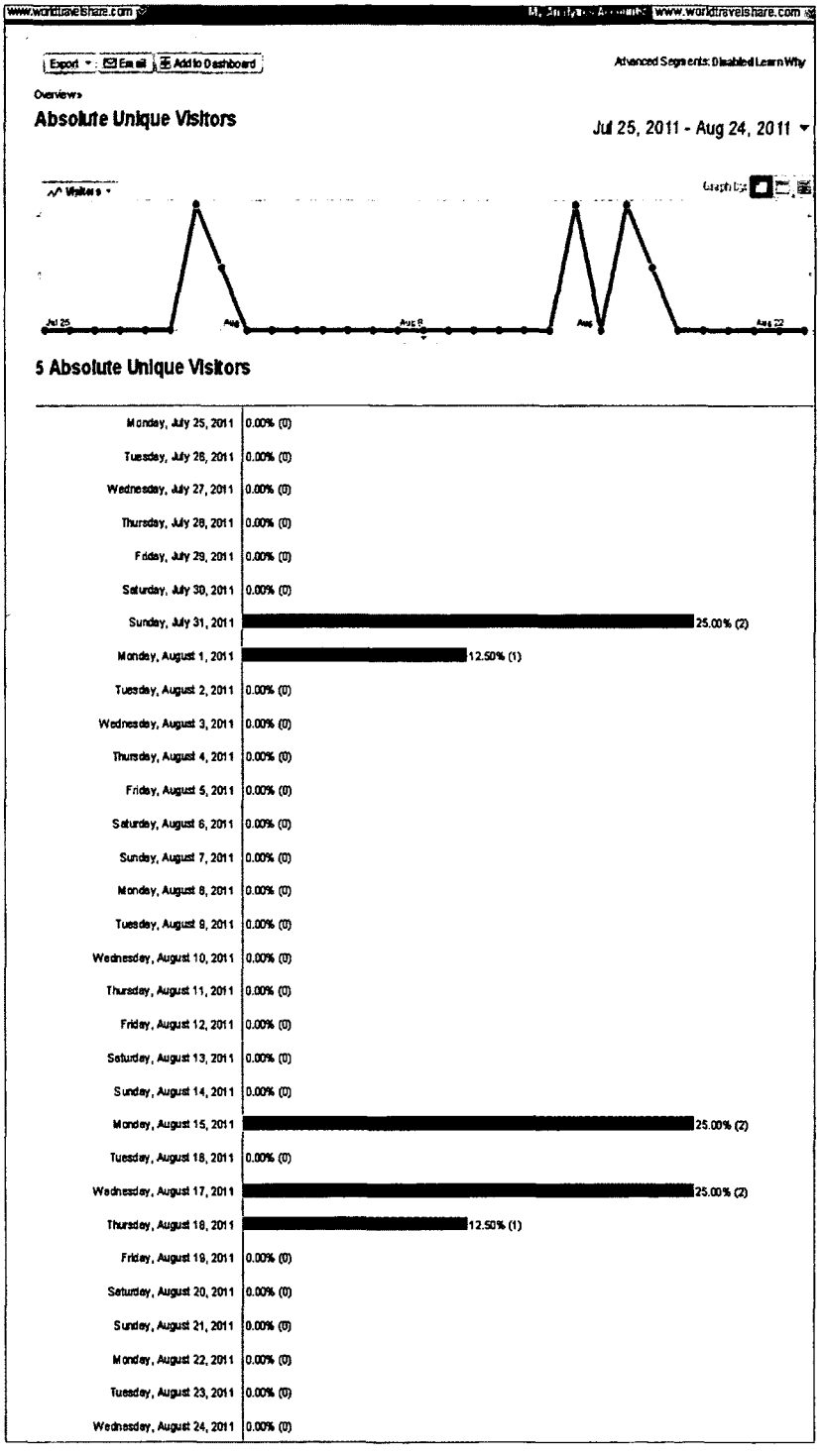


Figure 6.5 - Absolute Unique Visitors

There are actually two metrics for unique visitors in Google Analytics. There's Absolute Unique Visitors and Unique Visitors. Absolute Unique Visitors is the metric you get in the report of the same name in the Visitors section. It used to be the only place you could get visitor metrics in GA. It's also fairly limited: notice that you can't use Advanced Segments on this report (one of the few where you

can't). Furthermore, Unique Visitors is another metric that was introduced for use in Custom Reports (which you can use Advanced Segments on as well). It was an update to the Absolute Unique Visitors that was more compatible with these new features, basically. The metrics themselves actually differ slightly in the way they measure visitors (how they tabulate the individual cookies). So the numbers won't match up exactly. In fact, Unique Visitors is actually more accurate than Absolute Unique Visitors. In this graph, it shows the absolute unique visitors that found this webpage, and it shows the date of the visitors visited.

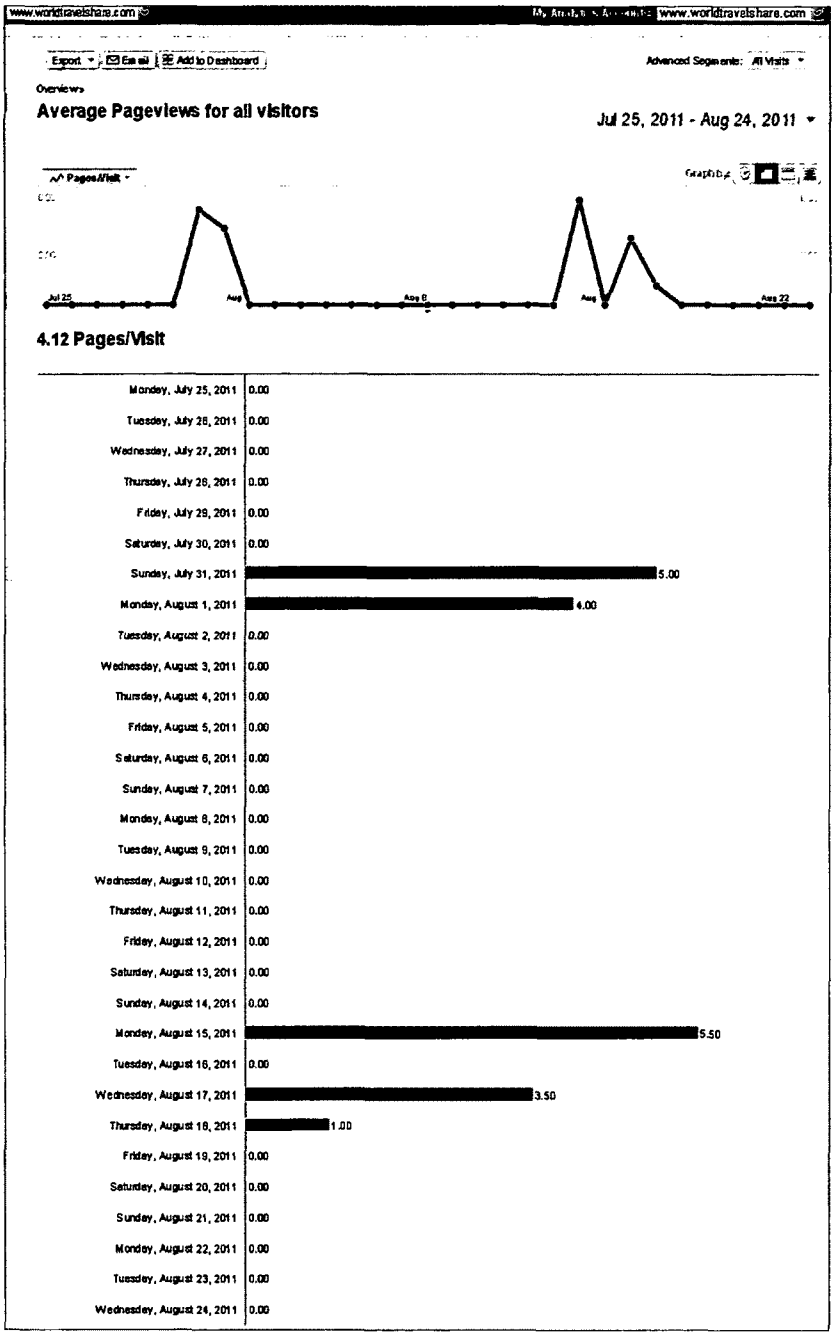


Figure 6.6 - Pages/Visit

The above graph presents you average pages visited by all visitors each day for the given time period. In this graph, it shows the number of pages, the visitors visited.

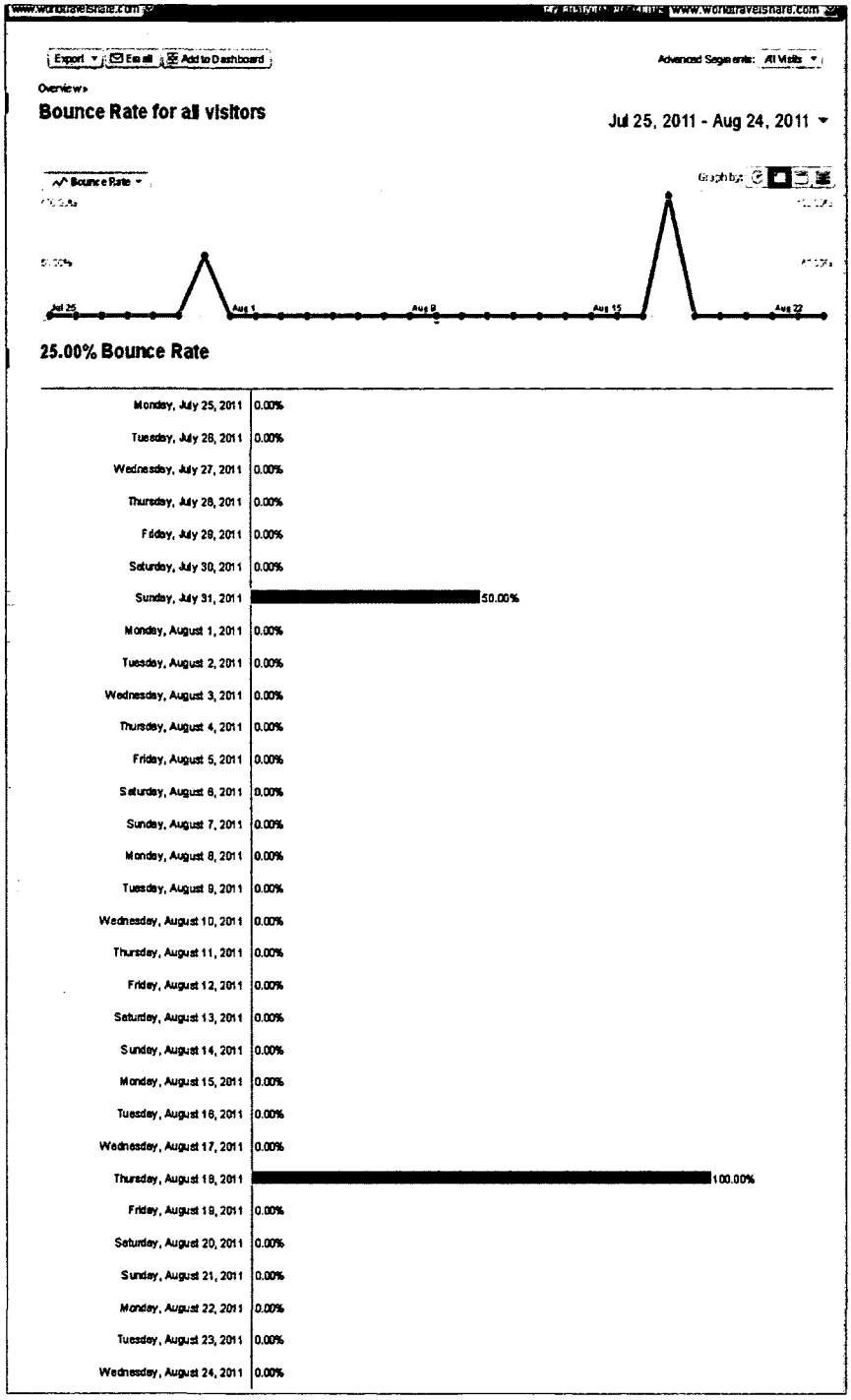


Figure 6.7 - Bounce Rate

The above graph shows you bounce rate values for all visitors based on each day wise for the given time period. This graph shows the bounce rate of the webpage was 25%.

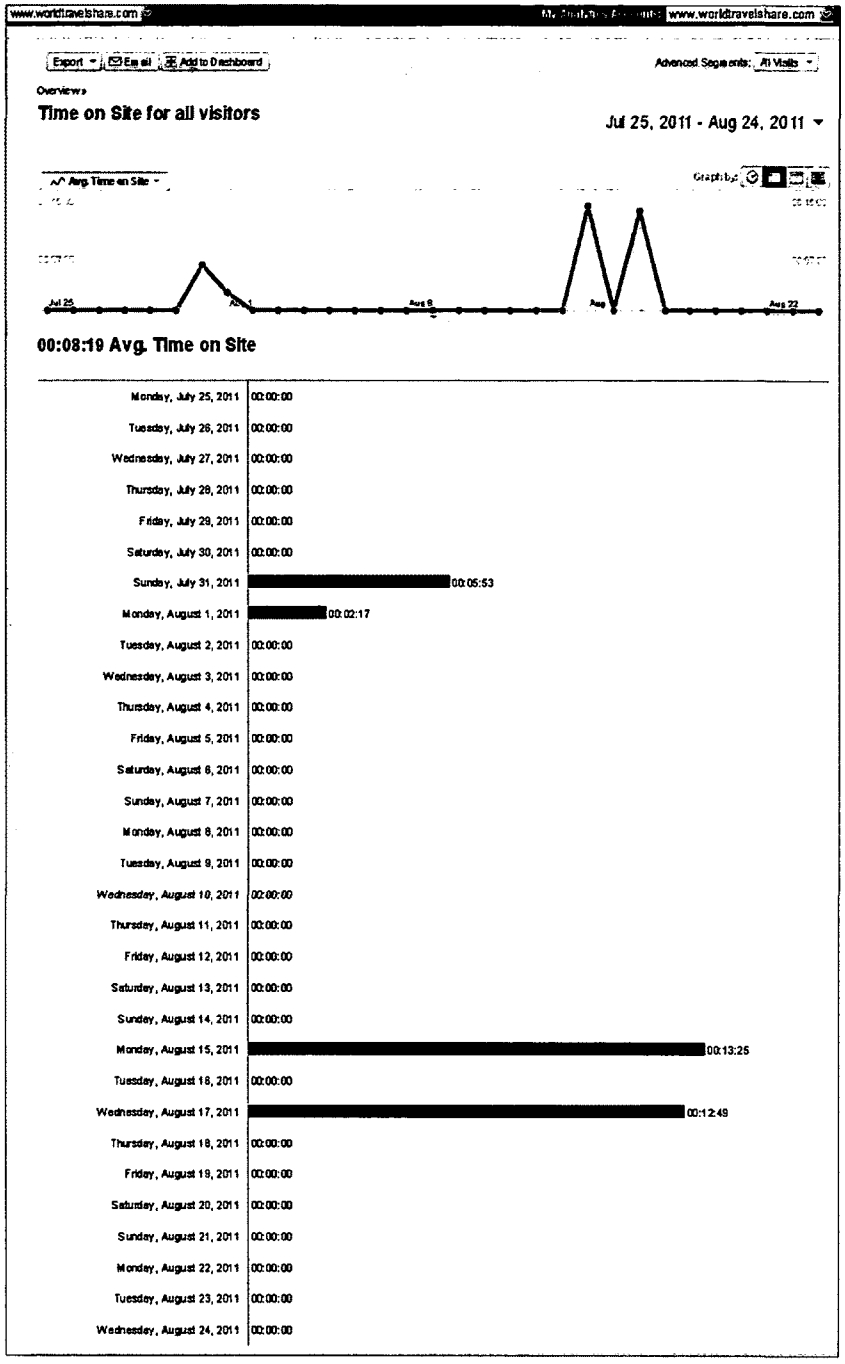


Figure 6.8 - Time on Site for All Visitors

The above graph depicts the average amount of time all these visitors spent on site day wise for the given time period.

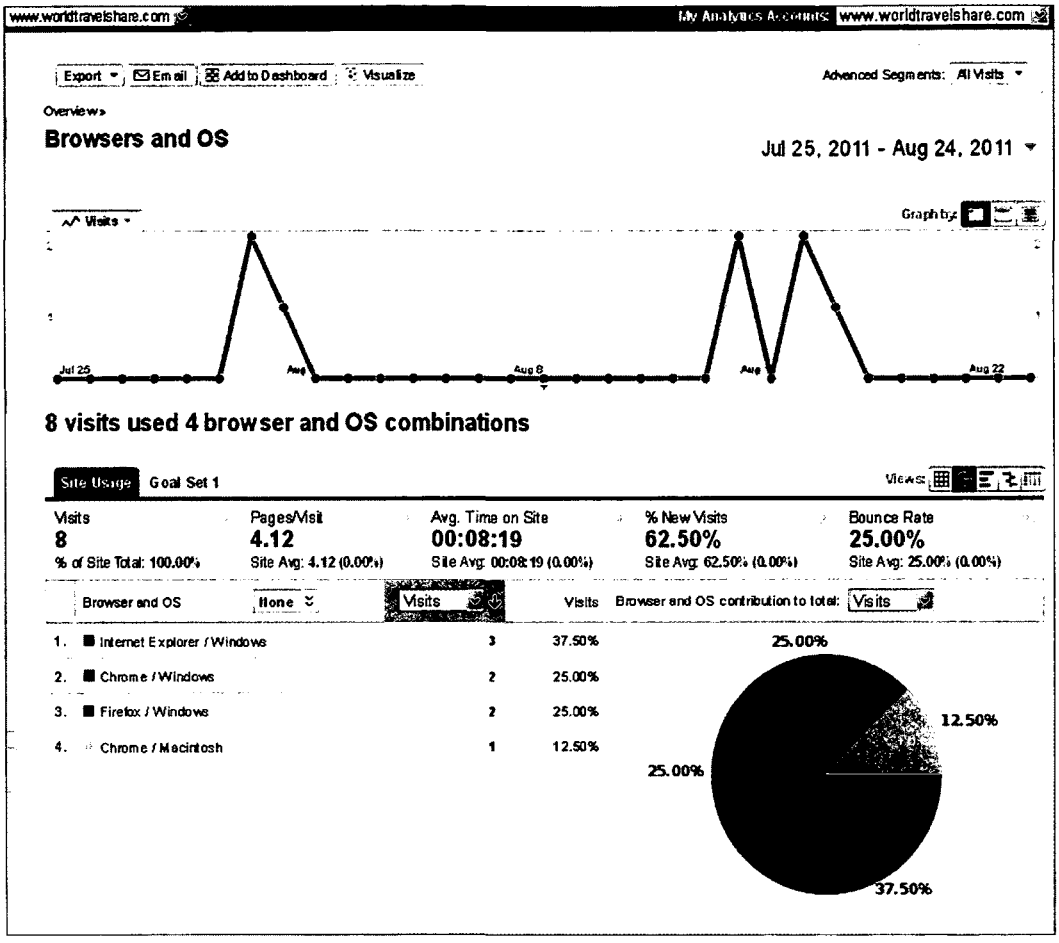


Figure 6.9 - Browsers and Operating System Used

The above graph presents browser information displaying type of browser used by visitors, % of visits, % of new visits and bounce rate for each browser. This graphs shows the browsers and the operating system the visitors used. 37.5% used Internet Explorer on Windows Platform. 25% used Google Chrome on Windows Platform. 25% used Firefox on Windows Platform, and 12.5% used Google Chrome on Macintosh to visit the webpage.

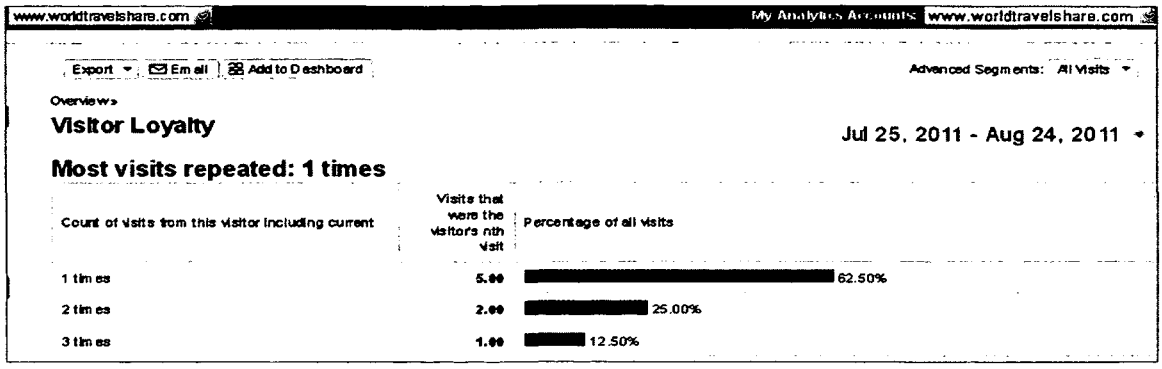


Figure 6.10 - Visitors Loyalty Chart

Visitor Loyalty is the count of visits being monitored including current. The above graph depicts the number of n time visits. This graph shows the loyalty of the visitors revisit the webpage. There were 5 people visited the webpage at least once, 2 out of the 5 people revisited the webpage twice, and 1 out of 5 people revisited the webpage 3 times.

In Chapter 6, we learned the valuable tools in Google Analytics to track the prospects and the customers using your website. The site usage shows the number of visitors the visitor visits using that period of time. It also tracks which page the customers go to the most, how long the customer stay on your website, and is it a new visitor or old visitor. Furthermore, it tracks what kind of operating systems they were using, and the internet browser they were using. Newsletter also would help the visitors to come back visit your website.

CHAPTER 7 CONCLUSION

There are several search engines exist today, most companies will use adopt SEO, WI, and WA techniques to help them promote their websites. In Chapter 2, we compared the IT computer science keywords, Business accounting keywords, and Health Science keywords for the top 3 search engines; Google, Yahoo, and Bing. In the comparison, we can see that the shorter keywords, the accurate rate queries by the search engines are greater than keywords that contain 2 or more keywords. In addition, the popular the keywords also provide more accurate rate in the search results.

In Chapter 3, we use the keywords to search the images. In image searches, we conducted the same categories and the keywords used in Chapter 2. We find the same trend, the shorter the keyword, the better the accurate rate. The search engines index the image search against the name the users provide in the image. It means that most likely, the user don't type a long image name and provide in the search engine. We found that Bing has a better result overall in the image search than Google and Yahoo. The comparisons were based on accurate rate, error rate, and recall rate.

In Chapter 4, we used semantic keywords methods to compare the similar keywords in computer science, accounting and health science categories. First, we can conclude again that the shorter the keyword, the accurate rate is still at higher rate than keywords with 2 or more keyword terms. We use semantic keywords so we can improve the website design later in the chapter. We want to use the semantic keywords to provide better index in the search engines, so people will be able to find us in the top of the list. The results of keyword searches, semantic searches, and image searches are useful for the Web design because we can include those higher accurate rate keywords into the website and it will generate higher visibility in the search engine indexes. The higher the accurate rate, the more likely the search engines' indexes will be able to find you when you include those keywords in your website.

In Chapter 5, we learn that the usage of search engine optimization and the techniques to attract customers to come back to our website. We learned that we must use the SEO techniques to provide better index from the search engines in its natural way. We also learned that web intelligence and web analytics techniques are used to provide examination of the visitors, the value and the purpose of your website. We presented 3 webpage designs in the discovery day of 2009 at Long Island University, Brooklyn Campus to the facilities and students. In the web design, version c utilized efficient SEO techniques, than version a, and b because it included more text, and links. The keywords are useful for search engines to query your website.

In Chapter 6, we utilized the Google Analytic tools to help us experiment the webpage effectiveness. The Google Analytic tool help us keep track of the visitors; rather they are new visitor, the number of visitors visit your website in the period of time, the operating systems they are using, the web browser they are using, the countries they are from, the metrics of the pages they hit on your website. All these tools help the owners of the websites to improve their strategies when they reproduce their updates. The Google Analytics tool also emphasizes using newsletter to remind your visitors to come back.

In today's business marketing, company wants to rank to the top, so customers will visit their websites and gain profits in returns. Secondly, meta-tags use, choose of domain names, and contents are very important in Search Engine Optimization. The travel agency website www.travel4share.org uses the techniques mention in earlier chapters to emphasize shorter keywords in the content and the popularity of the keywords. In future developments of [6] "Web 3.0, experts believes that browser will act like a personal assistant, which you can type a sentence in the search bar, and will return all the possible answers. For example: user can type "I want to see a funny movie, and then eat at a good Mexican restaurant." Finally, [8] "Cloud Computing is the next step in the evolution of the Internet as a source of "services." A "service" represents a "unit of business," not a "unit of technology." Web 3.0 will be "intelligent read-write-execute" in the Internet."" A cloud computing provider will deliver common business applications online which are accessed from a web browser, which the software and data are stored on servers."

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