INTRODUCTION TO INTERNET AND SEARCH ENGINE

Objectives

After completing this module, you will be able to

1. Define internet and discuss its evolution
2. Identify the internet's audience and briefly explain how it affects them
3. Identify and briefly explain the advantages and disadvantages of an internet
4. Explain the value of internet to educational institutions
5. Discuss the history of search engine, define directories and search engines, and identify some popular search engines with figures.
6. Describe metasearch engines and explain the difference between white and yellow pages.
7. Identify some of the differences between a search engine and a directory.
8. Identify forms of queries: Pattern matching queries, Boolean queries, Using wildcards.
9. Explain search fundamentals and terminologies
10. Discuss search strategies, generalization, specialization and samples
11. Briefly explain the differences between a user interface, searcher, evaluator, gatherer and indexer
12. Identify several searching tips: be natural, do not always capitalize words, use uncommon words, spell words correctly and use wildcards
13. Identify factors affecting a site's ranking.

EVOLUTION OF THE INTERNET

The history of the Internet begins with the development of electronic computers in the 1950s. Initial concepts of wide area networking originated in several computer science laboratories in the United States, United Kingdom, and France. The US Department of Defense awarded contracts as early as the 1960s, including for the development of ARPANET, which was then a networking project started by the Pentagon's Advanced Research Projects Agency (ARPA). ARPA's goal was to build a network for two main reasons, the first was to use the network to allow scientists at different physical

locations to share information and work together on military and scientific projects, the second reason was for the network to be so strong to function even if part of it were disabled or destroyed by a disaster such as a nuclear attack, earthquakes and so on.

The original ARPANET consisted of four main computers, one each located at the University of California at Los Angeles, the University of California at Santa Barbara, the Stanford Research Institute, and the University of Utah. The first message was sent over the ARPANET in 1969 from computer science Professor Leonard Kleinrock's laboratory at University of California, Los Angeles (UCLA) to the second network node at Stanford Research Institute (SRI).
Each of these computers served as a host on the network which is defined as any computer that provides services and connections to other computers on a network. As researchers and others realized the great benefit of using ARPANET to share data and information, ARPANET underwent phenomenal growth. By 1984, ARPANET had more than 1,000 individual computers linked as hosts.

In 1986, the National Science Foundation (NSF) connected its huge network of five super computer centers, called NSFnet, to ARPANET, this configuration of complex networks and hosts became known as the Internet. Until 1995, NSFnet handled the bulk of the communications activity, or traffic, on the Internet. In 1995, NSFnet terminated its network on the Internet and resumed its status as a research network. Today, more than 3 billion hosts are connected to the internet.

WHAT IS INTERNET

The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

It allows people to send and receive data wherever they are in the world, provided they have internet access. Everyone will find that they use the internet in one way or another, whether it is to research some information or simply talk to family and friends. Today, the Web and the Internet allow connectivity from literally everywhere on earth—even ships at sea and in outer space.

ADVENTAGES OF INTERNET

The Internet provides many facilities to the people. The main advantages of Internet are discussed below.

1. **Sharing Information:** You can share information with other people around the world. The scientist or researchers can interact with each other to share knowledge and to get guidance etc. Sharing information through Internet is very

easy, cheap and fast method.

2. **Collection of Information:** There is a huge amount of information available on the internet for just about every subject known to man, ranging from government law and services, trade fairs and conferences, market information, new ideas and technical support

3. **News:** You can get latest news of the world on the Internet. Most of the newspapers of the world are also available on the Internet. They have their websites from where you can get the latest news about the events happening in the world. These websites are periodically updated or they are immediately updated with latest news when any event happens around the world.

4. **Searching Jobs:** You can search different types of jobs all over the world, most of the organizations/departments around the world, advertise their vacant vacancies on the Internet. The search engines are also used to search the jobs on Internet. You can apply for the required job through Internet.

5. **Advertisement:** Today, most of the commercial organizations advertise their product through Internet. It is very cheap and efficient way for the advertising of products. The products can be presented with attractive and beautiful way to the people around the world.

6. **Communication:** You can communicate with other through Internet around the world. You can talk by watching to one another; just you are talking with your friends in your drawing room. For this purpose, different services are provided on the Internet such as; Chatting, Video conferencing, E-mail and internet telephony etc.

7. **Entertainment:** Internet also provides different type of entertainments to the people. You can play games with other people in any part of the world. Similarly, you can see movies, listen music etc. You can also make new friends on the Internet for enjoyment.

8. **Online Education:** Internet provides the facility to get online education. Many websites of different universities provide lectures and tutorials on different subjects or topics. You can also download these lectures or tutorials into your own computer. You can listen to these lectures repeatedly and get a lot of knowledge.

9. **Online Results:** Today, most of the universities and education boards provide results on the Internet. The students can watch their results from any part of

country or world.

10. **Online Airlines and Railway Schedules:** Many Airline companies provide their schedules of flights and trains respectively on the Internet.

11. **Online Medical Advice:** Many websites are also available on the Internet to get information about different diseases. You can consult a panel of online doctors to get advice about any medical problem. In addition, a lot of material is also available on the Internet for research in medical field.

12. **Email:** Email is now an essential communication tools in business. It is also excellent for keeping in touch with family and friends. The advantages to email is that it is free (no charge per use) when compared to telephone, fax and postal services.

13. **Services:** Many services are now provided on the internet such as online banking, job seeking and applications, and hotel reservations. Often these services are not available off-line or cost more.

14. **Buy or sell products:** The internet is a very effective way to buy and sell products all over the world.

DISADVANTAGES OF INTERNET

Although Internet has many advantages but it also has some disadvantages. The main disadvantages are:

1. **Viruses:** Today, internet is the most popular source of spreading viruses, most of these viruses are being transfered from one computer to another through e-mail or when information is downloaded on the Internet. These viruses create different problems in your computer. For example, they can affect the performance of your computer and damage valuable data and software stored in your computer.

2. **Security Problems:** The valuable websites can be damaged by hackers and your valuable data may be deleted. Similarly, confidential data may be accessed by unauthorized persons.

3. **Theft of Personal Information:** If you use the Internet, you may be facing grave danger as your personal information such as name, address, credit card number etc. can be accessed by other culprits to make your problems worse.

4. **Spamming:** Spamming refers to sending unwanted e-mails in bulk, which provide no purpose and needlessly obstruct the entire system. Such illegal activities can be very frustrating for you, and so instead of just ignoring it, you should make an effort to try and stop these activities so that using the Internet can become that much safer.

5. **Immorality:** Some websites contain immoral materials in the form of text, pictures or movies etc. These websites damage the character of new generation.

6. **Negative effects on family communication:** Although there are conflicting research findings on this topic, an article published by Science Daily reported that time spent on the Internet was associated with later declines in within house family communication and a decrease in the number of friends and acquaintances with which they keep ties.

7. **Wastage of times:** A lot of time is wasted to collect the information on the Internet. Some people waste a lot of time in chatting or to play games. At home and offices, most of the people use Internet without any positive purpose.

8. **English language problems:** Most of the information on the Internet is available in English language. So, some people cannot avail the facility of Internet.

9. **Filtration of Information:** When a keyword is given to a search engine to search information of a specific topic, a large number of related links are displayed. In this case, it becomes difficult to filter out the required information.

10. **Accuracy of Information:** A lot of information about a particular topic is stored on the websites. Some information may be incorrect or not authentic. So, it becomes difficult to select the correct information. Sometimes you may be confused.

WHY IS INTERNET USED

Below are some of the aspect where internet is being used.

1. **Information –** The Internet is arguably one of the most successful and useful tools mankind has ever created. It is, in fact, the largest library ever created, and is growing daily. Although you need to always be careful of your sources, the Internet is the modern source of information, delivered in multiple media: written word, visual graphics and images, video, and audio have changed the way that

we humans look for and find information.

2. **Communication** – People use the Internet to communicate with one another. Software has made it possible to stream voice and video across the world with minimal delay, and email has become the main means of communicating for many a modern person. Without the Internet, it would be both more expensive and slower to maintain personal and professional relationships.
3. **Entertainment** – Many people use the Internet to enjoy themselves and to engage in personal interests. In recent years, multiple player games and virtual worlds have engaged the time and money of many. Plus, video and music are easy to find, stream and download…plus, the medium encourages feedback! Indeed, Internet use can go too far.
4. **Work** – The Internet provides an alternative to 9-5 workdays, as more and more people can work from home, or "telecommute". Plus, a growing number of people are making a living from the Internet itself, whether becoming experts in how people search the Internet, providing IT or web development services, or specializing in Internet marketing.
5. **School** – More and more elementary, high school and university curricula require use of the Internet for school work.
6. **Relationships** – People use the Internet to find, maintain, or end relationships. But people can get addicted to social networks, too.
7. **Market** – People use the Internet to research, find and buy services and products. They also use it to target and sell to the ultimate consumer. In effect, the Internet has become the best way to buy and sell merchandise, as online "stores" are open 24 hours a day, 7 days a week.
8. **Self-expression** – People not only consume information on the Internet, they create it, and in doing so, people are able to express themselves politically, artistically, vocally, socially, etc. and give voice to what is important to them. The Internet is the ultimate forum on which you can discuss or monologue as you like.
9. **Ask for help** – The protocol for Internet use is one of private consumption without need for naming yourself. By virtue of the privacy and anonymity factor of cyber space, some people use the Internet to ask for help. People ask for help in the form of emotional support, medical advice, or even simply listening.

AUDIENCE OF THE INTERNET AND HOW IT AFFECTS THEM

There are several audience of the internet, some of which are:

1. Researchers- Needing to share findings
2. Marketers- Advertising products and services
3. Educators/Student- Teaching

Presently

- Every object can be on the Internet (Internet-of-Things)

- It affects the audience in a good way because it makes their lives easier and less problematic.

- It enables them to do well in school and in work as they can access information and advice easily
- However, it can also change people in the way they think and their lives in general, as the internet allows them to access anything from anywhere in the world and this isn't always a good thing as extreme violence might be promoted.
- The audience use the internet for many different reasons, in which are explained on the next page. The internet is used in places such as schools, at home and at work and etc.

A BRIEF HISTORY OF SEARCH ENGINES

Archie (1990) was the first tool created by Alan Emtage and L. Peter Deutsch for indexing and is considered the first basic search engine. What began as school project at McGill University in Montreal, was an index that predated the world wide web. **Gopher**, released in **1991** by students from the University of Minnesota, was a protocol used to index and search for documents online as a form of anonymous FTP. Archie, Gopher and similar counterparts lost traction in the late 90's.

Lycos (1993) was created as a university project but was the first to attain commercial search engine success. In 1999 Lycos was the most visited search engine in the world and was available in 40 countries. Now currently comprised of a social network with email, webhosting and media entertainment pages.

In **1994** there were **Yahoo, WebCrawler and Infoseek**. Yahoo started at Stanford University by Jerry Yang and David Filo (both electrical engineering graduate students) that became a web portal and search engine. WebCrawler was created by Brian Pinkerton and it was the first crawler which indexed complete pages online. AOL purchased WebCrawler, using the technology for their network, and when Excite purchased WebCrawler, AOL used Excite to run their program NetFind. WebCrawler was one of the foundational search engines. **Infoseek (1994)** was a search engine begun by Steve Kirsch, and was bought by the Walt Disney Company in **1998**, merging with Starwave to become go.com. Eventually it was replaced by Yahoo, and no longer exists

By the year **1995**, there were several search engines such as AltaVista which was the most popular search engine of its time. It differed from its contemporaries because of two factors: Alta Vista used a multi-threaded crawler (Scooter) that covered more webpages than people knew existed at the time. It also had a well-organized search-running back-end advanced hardware. **By 1996 AltaVista** had become the sole search results provider for Yahoo. In **2003 Alta Vista** was bought by Overture Services, Inc., which only months later was acquired by Yahoo. **Looksmart** was another search engine at that year that competed with Yahoo directory, the search engine had an initial goal of creating a substantial directory of websites. When it went public in 1999, it lost a fair number of customers. By **2002 Looksmart** became a pay-per-click provider, and after being dropped by Microsoft, bought a search engine called WiseNut. Sadly, it

never gained serious traction, and Looksmart lost its momentum. Additionally, there was also Excite, a search engine that was founded originally as "Architext" by Stanford University students, excite was launched officially having purchased two search engines (Magellan and WebCrawler), and signed exclusive agreements with Microsoft and Apple. Excite is now used as a personal portal called My Excite.

Hotbot, Dogpile, Google and Ask were among the search engines to appear by **1996**. Hotbot was launched by Wired Magazine and is now owned by Lycos. Dogpile was developed by Aaron Flin and shortly thereafter sold to Go2net. Now Dogpile fetches results from Google, Yahoo, and Yandex. Google as a search engine started for a research project by Stanford students Larry Page and Sergey Brin. They created a search engine that would rank websites based on the number of other websites that linked to that page. Prior to this, other engines have ranked sites based on the number of times the search term appeared on the webpage. This strategy developed the world's most successful search engine today. ASK (1996) was originally titled "AskJeeves.com" and was designed by Garret Gruener and David Warthen in Berkeley, CA. The goal was to provide users with answers to queries typed with normal every-day language and colloquialisms. It was acquired in 2005 by IAC and continues to grow with over 100 million users.

MSN Search (1998) was the engine used by Microsoft, sourcing search results from Inktomi, and later Looksmart. By 2006 Micosoft started performing their own image searches, and MSN became branded as Windows Live Search, then Live Search, and finally to Bing (2009) which was set to replace the Yahoo search engine. **Overture (1998)** was originally named "GoTo," where top listings were sold on a cost-per-click or pay-per-click basis. In 2000, they began driving traffic by placing its paid listings on another search engines and was eventually bought by Yahoo in 2003.

Alltheweb (1999) began in 1994 out of FTP Search, from Norwegian University of Science and Technology, when then turned into Fast Search & Transfer, or FAST. Alltheweb (1999) was said to have once rivaled Google, but the number of users declined when Overture bought the company in 2003. **AOL Search (1999)** bought Web Crawler (one of the major crawler-based engines of its time) in 1995, and after a number of deals, purchases and exchanges, AOL relaunched their search engine, calling it AOL Search. Teaming with Google, the search engine relaunched in 2006 with newer features including video, search marketplace, etc.

Teoma (2000) meaning "expert" in Gaelic, was a search engine created by professor Apostolos Gerasoulis and Tao Yang at Rutgers University. Teoma's subject-specific technology centered on a link popularity algorithm which allowed pages to rank higher if other pages with a similar content and subject matter linked back to the page. Teoma was acquired by Ask Jeeves in 2001 and rebranded as Ask.com. **WiseNut (2001)** was a crawler-based search engine that was introduced as a beta and was owned by Looksmart. Initially the site was well reputed with an unsullied database, and an automatic clustering of search results by using a technology called WiseGuide. Looksmart bought WiseNut in 2002 and was eventually closed in 2007.

DIRECTORY

A Web directory is a listing of Web sites organized in a hierarchy or interconnected list of categories. In other words, it is a hierarchical representation of hyperlinks where the top level is typically a wide range of very general topics with each topic containing hyperlinks of more specialized sub-topics.

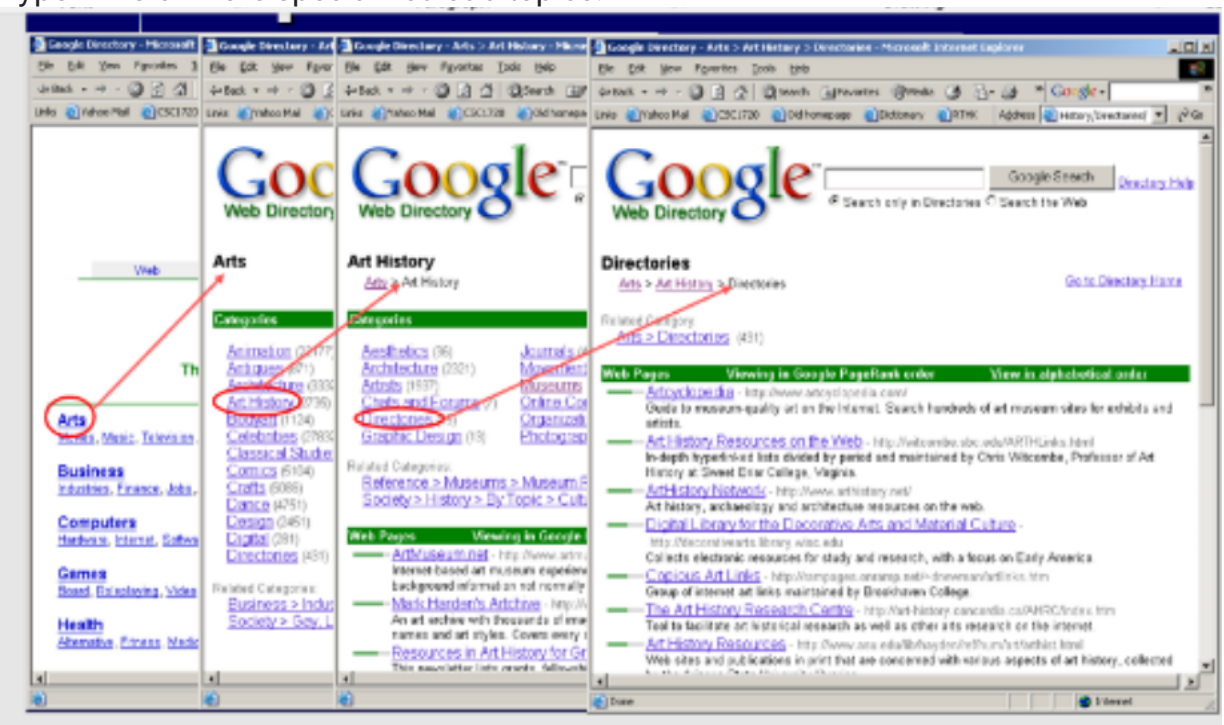

Figure 1. Hierarchical representation of directories

Popular Directories

Below are some popular directories with their respective website addresses

1. Google – www.google.com
2. CNET Search.com – www.search.com
3. Excite – www.excite.com
4. E-Wild life – www.ewildlife.com
5. Lycos – www.lycos.com
6. Yahoo! – www.yahoo.com
7. AOL anywhere – search.aol.com

SEARCH ENGINES

A search engine is a computer program that is designed to search for information on the World Wide Web. The search results are generally presented in a line of results often referred to as search engine results pages (SERPs). Search engine does the following: -

1. Allows user to submit a query that consists of a word / phrase
2. Searches the database
3. Returns a list of suitable URLs which match your query.
4. Allows user to revise and resubmit

Popular Search Engines

Below are some popular search engines with their respective website addresses

1. AOL anywhere – search.aol.com
2. AltaVista – altavista.digital.com
3. Excite – www.excite.com
4. HotBot – www.hotBot.com
5. Magellan – www.mckinley.com
6. Google – www.google.com

Comparison between a search engine and a directory

	Directory	Search Engine
1.	A directory allows you to explore on the and get what you want eventually.	A search engine brings you to the exact page words or phrases you are looking for.
2.	Use a directory to find cooking-related recipe, by websites. ingredients.	Use a search engine to find a specific providing the name of the
3.	Use a directory to find travel guides transportations in a country.	Use a search engine to find the schedule in South Africa.

METASEARCH ENGINES

This is a type of a search engine that performs a search by returning results from more than one other search engine. In metasearch engine, duplicates retrievals are eliminated and the results are ranked according to how well they match with the query. It has an advantage that a single search query can access lot of search engines, even though this sometimes leads to a disadvantage of having a high noise-to-signal ratio, especially in situations where the matches were not the suitable ones.

Popular Metasearch Engines

Below are some popular metasearch engines with their respective website addresses

1. Metasearch – www.metasearch.com
2. Metacrawler – www.metacrawler.com
3. MetaFind – www.metafind.com

4. Dogpile – www.dogpile.com

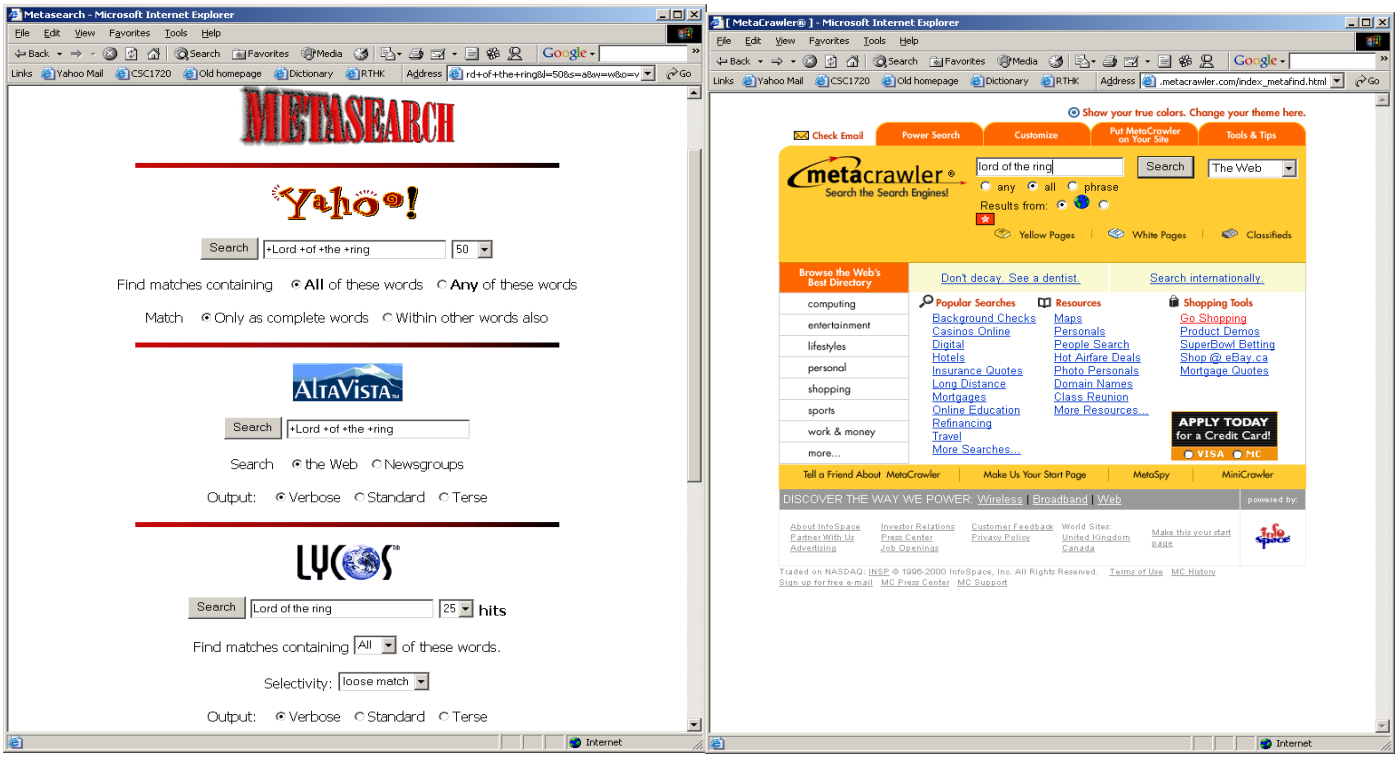

Figure 2 Examples of Metasearch engines

WHITE PAGES AND YELLOW PAGES

White pages allow user to lookup information about individuals, these pages are used to track down the telephone numbers, email address of people.
Yellow pages on the other hand enables a user to look up information about business. Examples of some white and yellow pages together with their addresses are;

White pages **Yellow pages**

Bigfoot – www.bigfoot.com Yahoo! Yellow Page – yp.yahoo.co Yahoo! People Search – people.yahoo.com SuperPages – www.superpages.com
WhoWhere – www.whowhere.com

PATTERN MATCHING QUERIES

Pattern matching allows user to search for patterns in data, if you don't know the exact word or phrase you are seeking. This kind of query uses wildcard characters to match a pattern, rather than specifying it exactly. It is called a fuzzy query, when a user enters

an ungrammatical sentence, incomplete sentence fragments, or disjoint phrases, the search engine gets a collection of keywords. A “+ “sign is used before a keyword that is required to appear in the search results, while “- “sign is used before a keyword that is required not to appear in the search results.

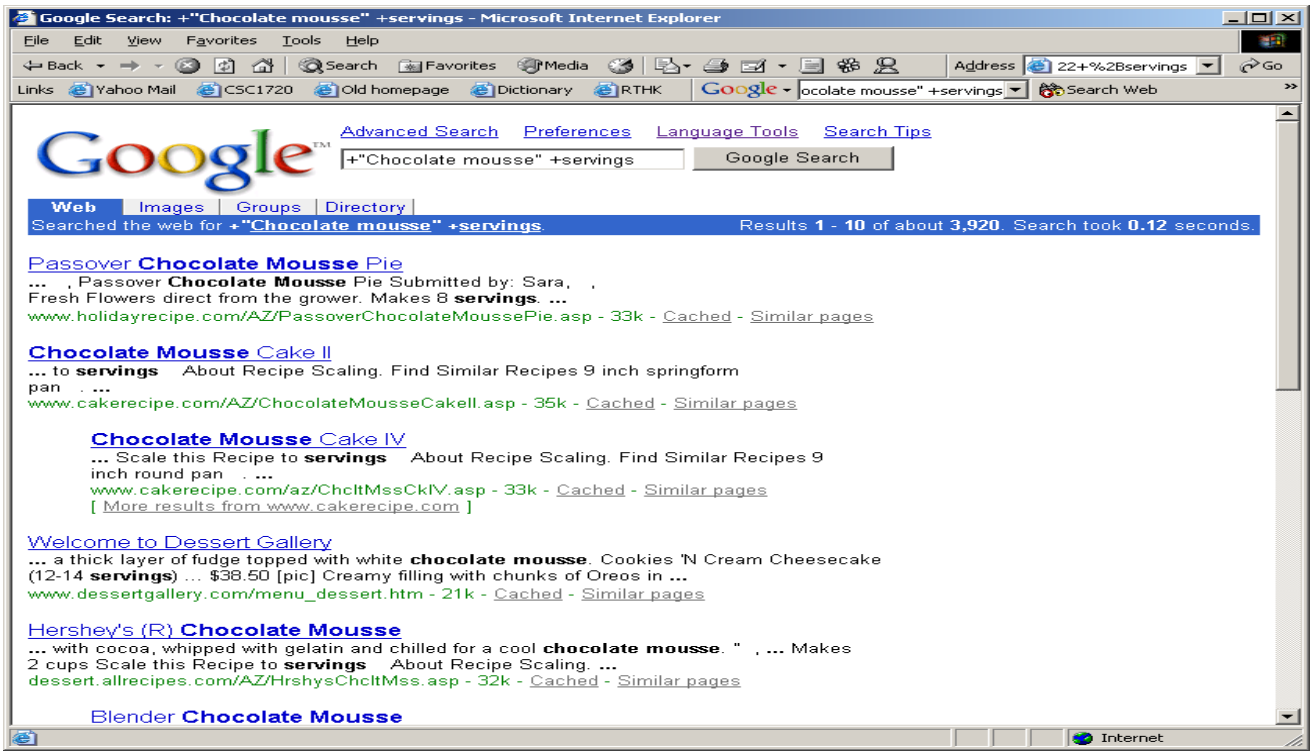

Figure 3: Example of pattern matching queries

BOOLEAN QUERIES

Boolean search is a type of search allowing users to combine keywords with operators (or modifiers) such as AND, NOT and OR to further produce more relevant results. For example, a Boolean search could be "hotel" AND "New York". This would limit the search results to only those documents containing the two keywords.

For instance, X AND Y will return URLs that contain both X and Y, X OR Y will return URLs that contain either X or Y. X AND NOT Y – will return URLs that contain X and not contain Y. AND is used for narrowing a query, if you know that your target documents will contain a group of keywords, list them using the AND operator. OR is used for broadening a query, if you can think of related words for a topic, list them using the OR operator. NOT is used to redirect a query, if you find that a keyword or phrase is leading irrelevant hits, then represent it in your query as AND NOT *keyword*

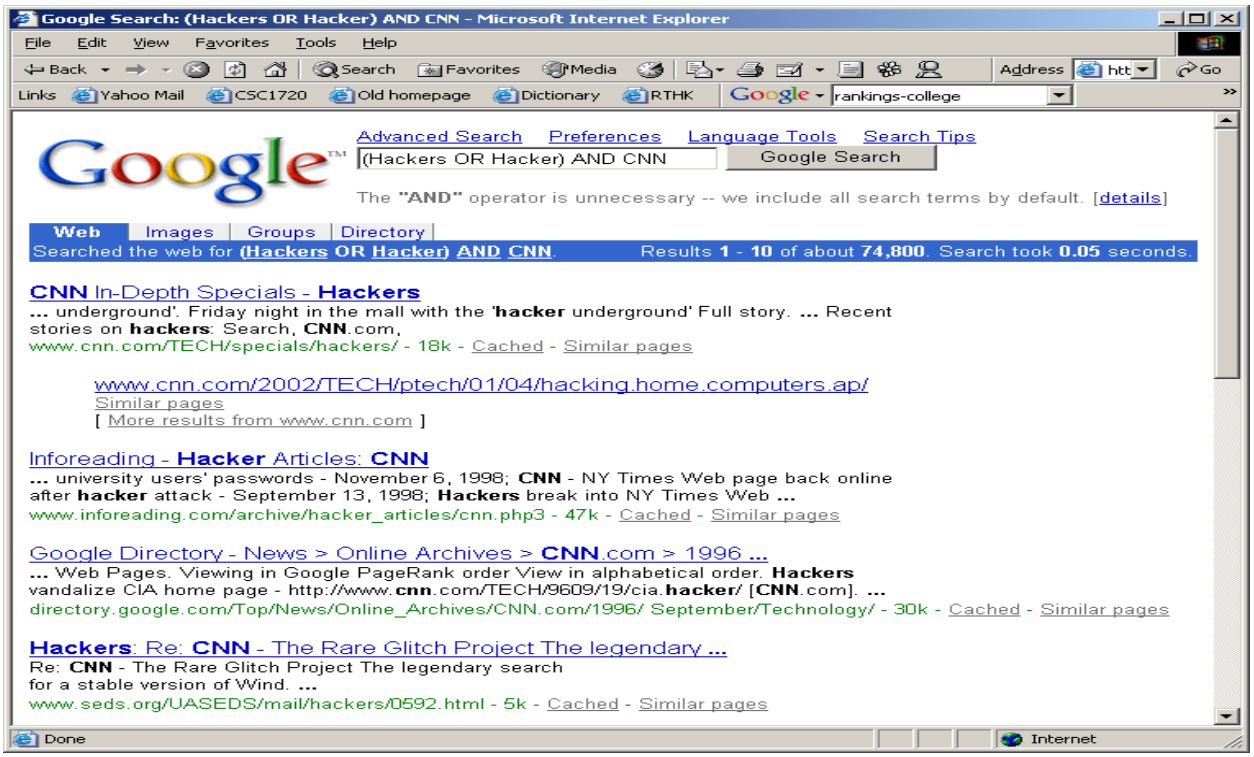

Figure 4: Example of Boolean queries

USING WILDCARDS

Wildcards are useful for retrieving variations of a word, for example, art* will search for art, artwork, artist, artistry, and so forth. It is an excellent way to broaden a search. Different wildcard characters are used by different search engines, the most common characters are: *, #, and?

SEARCH STRATEGIES

A search strategy is an organized structure of key terms used to search a database. The search strategy combines the key concepts of your search question in order to retrieve accurate results. As a good search strategy, a user should find a search engine that meets the following conditions:

- A user-friendly interface
- Easy-to-understand documentation
- Convenient to access
- A large indexed database
- Assigning good relevancy scores.

SEARCH GENERALIZATION

A generalization is the formulation of general concepts from specific instances by abstracting common properties, when you are having too few hits or results, you need to generalize your search query by trying the following:

1. Pattern matching query: eliminate one of the more specific keywords of the query.
2. Boolean query: remove the keywords with AND operator, or delete the NOT item, or use the OR operator.
3. Use a directory or metasearch engine if you still cannot locate the matched URL

When you are having too many hits, the following can be tried to specialize the query:

1. Pattern matching query: add more keywords.
2. Boolean query: use AND with other keyword or add NOT operator to exclude some unwanted pages.
3. Try capitalizing proper nouns or names.
4. Use a directory to locate your information

HOW DOES A SEARCH ENGINE WORKS?

A search engine normally consists of five components e.g. search interface, searcher, evaluator, gatherer, and indexer. **A search interface** is a user-friendly mechanism which make use of forms to allow users to submit queries to the search engine. A user interface displays the search in a convenient way showing the summary of each matched page.

A searcher is a program that uses the search engine's database to locate the matches for a specific query. **An evaluator** looks at the hits returned by searcher to determine whether they match the user's query or not. **An evaluator** ranks pages depending on the references made to those pages. Even though it varies from one engine to another, below are some of variables considered when calculating a relevance score by an evaluator: returns a set of URLs that match your query.

1. The number of times a word in your page appears in queries.
2. Do these query words appear in the title of your page?
3. Do these query words appear in the META tag?

A gatherer is a program that traverses the web and gathers information about the web documents. It runs at short and regular intervals, where it returns information which will be indexed to the database. Alternative names for a gatherer includes Bot, Crawler, Robot, Spider or Worm. Lastly, **an indexer** organizes the data gathered by the gatherer through the creating a set of keys or an index. These indexes need to be rebuilt frequently as new data are being gathered, in order to ensure that the returned URLs are not out of date. E.g. Libraries – Author, Title, ISBN, etc

LINK POPULARITY

This is a total number of websites that links to your site, it is important because it can dramatically increase traffic to a website. Well placed links are an excellent source of consistent and targeted traffic

SEARCHING TIPS

1. **Be natural:** Try to be as natural as possible, for instance when you want to find whether a cell phone is harmful, you will be expected to ask the search engine something like Cell phone" AND harmful.

2. **Always use lowercase:** Use lowercase characters when searching for a website, unless if you really want to search for that term in its uppercase format. For instance, a search on a term “star “will search for “Star, STAR, stAr……”
3. **Use uncommon keywords:** Always use more valid and uncommon keywords, the more this is done, the more specific the results that will be returned.
4. **Require words:** As pointed out above, use “+” before a keyword when you want that keyword to be in every match that is returned by the search.
5. **Exclude words:** Similarly, use “– “ before a keyword when you do not want it to appear in every match that is returned by the search.
6. **Correct Spelling:** Beware of the differences between English and American spellings, for instance Color and Colour.
7. **Stop words:** Ignore the most common words such as *“the, is, …”* for instance, type **“***searching the web***”** and the search engine will ignore “the web”.
8. **Use wildcards:** A wildcard is a symbol used to replace or represent one or more characters. Wildcards are typically either an asterisk (*), which represents one or more characters or question mark (?), which represents a single character. The asterisk in a wildcard matches any character zero or more times. For example, *"comp*"* matches anything beginning with "comp" which means "comp", "complete", and "computer" are all matched.

FACTORS AFFECT YOUR SITE’S RANKING

There are quite a number of factors that affects site’s ranking, some of which are explained below:

Keyword Prominence

In search engine optimization (SEO), this refers to the prominent placement of keywords or phrases within a Web page. Prominent placement may be in the page header, meta tags, opening paragraph, or start of a sentence

Keyword Frequency

Keyword frequency refers to the number of times a keyword or keyword phrase appears within a web page. The theory is that the more times a keyword or keyword phrase appears within a web page, the more relevance a search engine is likely to give the page for a search with those keywords.

Keyword Density

Keyword density, also a called a keyword weight, refers to the ratio (percentage) of keywords contained within the total number of indexable words within a web page. The preferred keyword density ratio varies from search engine to search engine, in most cases a keyword density should not exceed 3 – 10 percent

Keyword Proximity

Keyword proximity refers to the closeness between two or more keywords. In general, the closer the keywords are, the better. For example: these two searches, ***"How Keyword Density Affects Search Engine Rankings"*** and ***"How Keyword Density Affects Rankings in Search Engine".*** The first sentence is more likely to rank higher than the second, the reason is because the keywords are placed closer together. This is assuming that everything else is equal, of course.

Click popularity and Stickiness

Click popularity is a measure of the number of clicks received by each site in a search engine's results page. **Stickiness** is a measure of the amount of time a user spends at a site. It's calculated according to the time that elapses between each of the user's clicks on the search engine's results page.

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