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WEB SEARCH ENGINES EVALUATION BASED ON FEATURES AND END-USER EXPERIENCE

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Abstract

Web has become an integral part of our lives and search engines play an important role in making users search the contents online using textual queries. Search engines now provide various added services too. This paper presents critical evaluation of various popular search engines based on added features along with end-user experiences recorded during a survey. A detailed analysis is presented and results are provided.

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1. Introduction

World Wide Web plays a vital role in human being's day to day life. A tremendous amount of information is available on the web. The friendly user interface and adequate features of the WWW attract the users to access the web. Web holds text as well as multimedia information which include images, videos, sounds, graphics etc. Internet has become the most largest and important network which connects millions and even billions of people all around the world. It's the cheapest, fastest and easiest means of communication. Internet provide many services including e-mail, instant messaging, video conferencing, social networking, online banking, online shopping, file transferring, weather forecasting and many more.

World Wide Web is a complex and unique source of multimedia information [1]. It plays an important role in business, education, health, banking, communication, agriculture etc. Every day a bulk of information which includes thousands of documents and images are added to the web [2]. Search engines are the resources that help the people to find online information available on the web. People can search the web by using search engines that use different algorithms and techniques [3]. Search engines play a major role for searching images, sounds, graphics and other kind of files. A number of search engines are available on the web [4] with their own abilities, characteristics, searching behavior and features. User puts a query or keyword in a search box, search engine matches a query with the information stored on web, retrieves it and then displays the list of results.

Due to the rapid growth of Internet, variety of images is available and their amount is regularly increasing [5, 6, 7]. Content-Based Image Retrieval has been an active research

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area over the last ten years and is rapidly changing [1, 8, 9, 10]. Interest in image retrieval has increased because of fast growth of World Wide Web [11].

This research work focuses on the comparison of five search engines. Search engines chosen for this study are Google, Yahoo!, Bing, AltaVista and Ask. In this paper, we compare the basic features and functionalities of five search engines and examine the user's attitude towards search engines. To accomplish this task, we conducted a survey at Punjab College of Technical Education, Ludhiana, India, which shows user's search interests in search engines. In this survey, 226 under-graduate students and 37 faculty members participated. Participants had to fill questionnaire according to their interest and experience. We devote our effort, in this research work, primarily to the comparison of five search engines.

2. Methodology

World Wide Web's search engines are the most important tools for searching online information [12]. Each search engine has multiple characteristics that differentiate it from other engines [13]. Comparison and analysis of major search engines normally yield surprising results [14].

In this research paper, five search engines are compared and evaluated on the basis of their search capabilities into two sections. In the first section, we compare the features of five search engines which are available to the user while searching the information. In second section, performance and capability is analyzed from the user's point of view. For this, we have taken a survey in which 263 participants participated and we examine their interests in

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search engines. From this survey, we will be able to know that which search engine provides best utility and services to the user and which is most likely used by the people.

3. Comparative Analysis

Twenty first century is so much dependent on the web and web searching is one of the first choices for number of people. This paper presents the comparison of five search engines i.e. Google, Yahoo, Bing, Ask and AltaVista on the basis of features, facilities, speed and many more things. A number of studies have developed approaches to evaluating web search engines [15]. We compare these search engines on the basis of the features provided by them on the home page as well as after displaying the results. Some of the basic features of these search engines were discussed in our previous paper [16].

3.1. Features of Five Search Engines

| Features | Google | Yahoo | AltaVista | Ask | Bing |
|-----------------|--|--|--|--|--|
| Website | www.google.com | www.search.yahoo.com | www.altavista.com | www.ask.com | www.bing.com |
| Search Operator | AND, OR, NOT | AND, OR | AND, OR, NOT | AND, OR | AND,OR,NOT |
| Search Web | √ | √ | √ | √ | √ |
| Search Images | √ | √ | √ | √ | √ |
| Search Videos | √ | √ | X | √ | √ |
| Search News | √ | √ | √ | √ | √ |
| Search Maps | √ | X | X | X | √ |
| Search Books | √ | X | X | X | X |
| Advance Search | √ | √ | √ | √ | √ |

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| | | | | | |
|----------------------------|---|---|---|---|---|
| Change Background | √ | X | X | √ | √ |
| Change Search Settings | √ | √ | √ | √ | √ |
| Display No. of Results | √ | √ | √ | X | √ |
| Shopping | X | √ | √ | X | X |
| Translation Services | √ | X | √ | X | √ |
| Multi-Language Support | √ | X | X | X | X |
| Questions/Answers | X | √ | √ | √ | X |
| Directory | √ | √ | √ | X | X |
| Advertising Programs | √ | √ | X | X | X |
| Business Solution/Services | √ | X | √ | X | X |
| Themes | X | X | √ | X | √ |
| Case Sensitive | X | X | X | X | X |
| Finance | √ | √ | X | X | X |
| Safe Search | √ | √ | √ | √ | √ |
| Search Pad | X | √ | √ | X | X |
| Careers | X | √ | X | √ | X |
| Preferences | √ | √ | √ | √ | √ |

Table 1: Features available in Five Search Engines.

Table 1 show the options available on the home page of these five search engines. From the above table, it is clear that Google provides more options as compared to other search engines. It has better search capabilities than others. The description of each feature is described in Table 2 given below:

| Features | Explanation |
|-----------------|--|
| Search Operator | The operators used internally by the search engine for retrieving the results. |

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| Search Web | Search the information from the web. |
| Search Images | Search for images on the web. |
| Search Videos | Search online videos, T.V. shows from the web. |
| Search News | Search for news, top stories from the various search engines. |
| Search Maps | Search engine enable users to search for directions from one location to another and more. |
| Search Books | Search and preview millions of books from libraries and publishers worldwide. |
| Advance Search | Allow User with advanced options to write specific query and return more precise results. |
| Change Background | User can customize page i.e. user can change the background settings according to their own choice. |
| Change Search Settings | User can change the search settings. |
| Display No. of Results | Search engines display the number of results fetched. |
| Shopping | Facility of buying online products. |
| Translation Services | Search engine translate text and web pages to another language. |
| Multi-Language Support | Search engine support multiple languages? |
| Answers | Good facility where people ask and answer questions on any topic and can share facts, opinions and personal experiences community. |
| Directory | Facility to search the web, organized by topic or category. |
| Advertising Programs | Search engines provide the facility to the users to advertise their business and products. |
| Business Solution/Services | Search engine provide business solution facility to promote and help user's business. |
| Themes | User can change theme according to his own choice. |
| Case Sensitive | Search engine is case sensitive or not. |
| Finance | Information regarding the stock market. |
| Safe Search | Allow the user to filter out explicit, adult-oriented content from results. |

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|-------------|---|
| Search Pad | To keep track of the websites you choose from the search results and to make notes on them. |
| Careers | User can browse various jobs according to his choice. |
| Preferences | User can search information exactly what they want. |

Table 2: Explanation of various features mentioned in Table 1.

There are many others features which are unique to a particular search engine. Following is the description of the unique features provided by the each search engine.

GOOGLE:

- Time Taken:** It displays the time taken to search information from the web.
- Books:** Searching and downloading number of books.
- Calendar:** Way to organize daily schedule and share events with friends.
- Blogs:** Find and Share information from blog fast and easy way.
- Scholar:** Search Engine Allows users to search for scholarly literature.
- Photos:** User share number of photos with other people.
- Discussion:** Share and create online documents.
- Groups:** Create mailing lists and discussion groups.
- Recipes:** Finding best recipes from top websites and cookbook.
- Google Chrome:** A browser built for speed, stability and security.
- Orkut:** Meet new people and stay in touch with friends.
- Picasa:** Searching, editing and sharing your photos.
- Alerts:** Get alert messages to email on the topics of your choice.

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- iGoogle:** Personalized Google page that enables you to add links, games etc.
- Google Earth:** Program that allows a person to view almost everywhere on earth.
- I'm feeling lucky:** Finds single most relevant result for your search.
- Realtime:** Up-to-the-second social updates about current topics around the world.
- YAHOO!:**
- Sports:** News and information regarding the sports.
- Local:** Yahoo helps to find local business listings.
- ALTAVISTA:**
- Travel:** You can arrange your trip plans and reserves hotel and resorts.
- Yellow Pages:** Directory listing business names, addresses, telephone numbers etc.
- People Finder:** People can look up person's address and phone number.
- Text Only Search:** Search the Web with a faster graphics-free version.
- Web Master Search:** Find your site's pages in the AltaVista index, or find pages that link to your site.
- ASK:**
- Encyclopaedia:** A type of reference work that contains articles on various topics.
- BING:**
- Community:** Share and learn resources with other people who use Bing.

So, from the above analyses, we find that Google provides more features to the user as compared to the other search engines.

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4. Analyze Performance through Survey

Today, life is very much dependent on the internet. The Web can be used as a quick and direct reference to get any type of information all over the world [17]. The Web has dramatically changed the way people locate information [18]. User friendly interface of search engine plays an important role for analyzing the best search engines. So, search engine should be comfortable and easy to use for their users. WWW has been growing rapidly and it attracts the users to access the web. So, there is a need to understand that how people utilize the web, how often they access internet, which search engine they like the most. For answering these questions or for analyzing the performance of these five search engines, we conducted a survey in two groups. In first group, 37 faculty members were there and in second group, 226 undergraduate students participated. The table in each question shows the separate results for faculty members and students, but the graph shows the combined results of both kinds of the participants.

Objective of the Survey: This survey is conducted to know the thinking of users regarding the search engines, to know for what purpose they access the internet and for how long, how much time they spend to search information from search engines etc. Overall, the objective of this survey is to know that which search engine has more search capabilities, which provides great ease of use or which is the best from the user's point of view. Survey results will be used to find out that which search engine performs best. Following are the questions taken in the survey and the responses of the participants.

1. How often do you use search engines on the Internet?

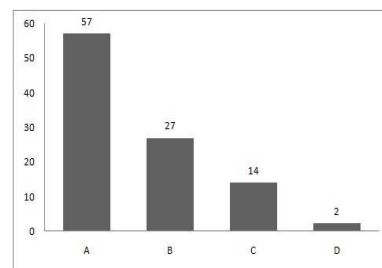
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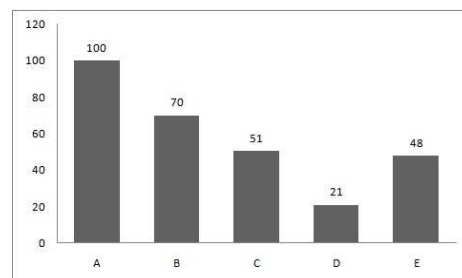
| Q1 | How often do you use search engines on the Internet? | Faculty | Student | Total |
|----|--|---------|---------|-------|
| A | Two or more times in a day | 26 | 124 | 150 |
| B | At least once in a day | 9 | 62 | 71 |
| C | At least once in a week | 1 | 36 | 37 |
| D | Never | 0 | 6 | 6 |



From the above table, it is clear that 57% of the respondents use search engines (surf the internet) two or more times in a day, 27% responded that they use the search engine only once in a day and 14% uses it once in a week. There are 2% users that never access any of the search engines. From the above analysis, we find that at least 84% users uses search engine daily.

2. Have you heard about these search engines?

| Q2 | Have you heard about these search engines? | Faculty | Student | Total |
|----|--|---------|---------|-------|
| A | Google | 37 | 226 | 263 |
| B | Yahoo! | 36 | 148 | 184 |
| C | Ask | 20 | 113 | 133 |
| D | AltaVista | 20 | 35 | 55 |
| E | Bing | 24 | 102 | 126 |



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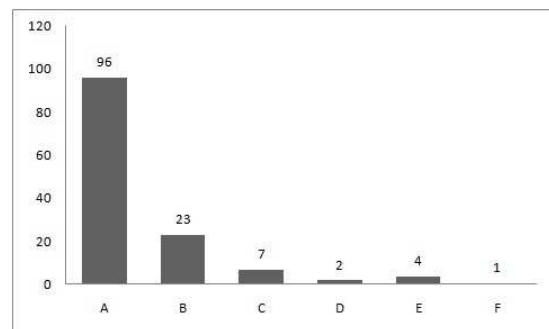
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From the analysis, we find that 100% users know about Google. 70% users have heard about Yahoo. 51% users have heard about Ask, 48% knows about Bing and least have heard about AltaVista i.e. 21%.

3. Which of the following search engines you use most often?

| Q3 | Which of the following search engines you use most often? | Faculty | Student | Total |
|----|---|---------|---------|-------|
| A | Google | 37 | 216 | 253 |
| B | Yahoo! | 15 | 46 | 61 |
| C | Ask | 3 | 15 | 18 |
| D | AltaVista | 3 | 2 | 5 |
| E | Bing | 3 | 7 | 10 |
| F | Any other | 2 | 0 | 2 |



From the above data, it was discovered that there are 96% respondents who said that they use Google most often. 23% respondents prefer to use Yahoo. Ask, AltaVista and Bing has less number of users.

4. Which of the following search engines provide ease of use?

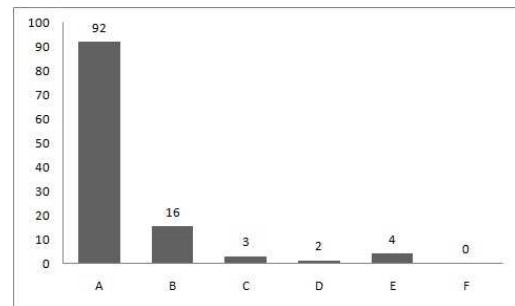
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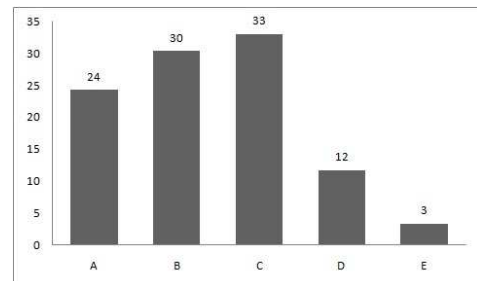
| Q4 | Which of the following search engines provide ease of use? | Faculty | Student | Total |
|----|--|---------|---------|-------|
| A | Google | 37 | 205 | 242 |
| B | Yahoo! | 7 | 34 | 41 |
| C | Ask | 1 | 7 | 8 |
| D | AltaVista | 1 | 3 | 4 |
| E | Bing | 3 | 8 | 11 |
| F | Any other | 0 | 0 | 0 |



92% respondents said that Google is easy to use. For 16% users, Yahoo is easier to use. Less number of respondents found Ask, AltaVista and Bing easy to use. The reason why the users are not comfortable with these search engines, may be, because of the less number of users that access these search engines, as it is clear from Q3.

5. How often do you search “images” on the search engines?

| Q5 | How often do you search “images” on the search engines? | Faculty | Student | Total |
|----|---|---------|---------|-------|
| A | Two or more times in a day | 5 | 59 | 64 |
| B | At least once in a day | 6 | 74 | 80 |
| C | At least once in a week | 18 | 69 | 87 |
| D | At least once in a month | 6 | 25 | 31 |
| E | Never | 2 | 7 | 9 |



24% users search images two or more times in a day. 30% users find images once in a day and 33% users search for images

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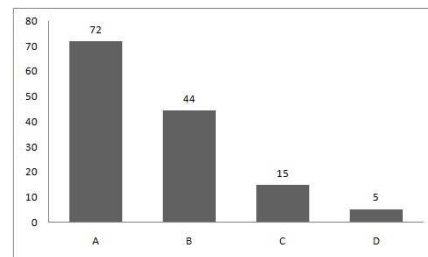
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at least once in a week. 12% search images on the search engines only once in a month. There are 3% users that never search any of the images from the search engine.

6. For what purpose you mostly use the search engine?

| Q6 | For what purpose you mostly use the search engine? | Faculty | Student | Total |
|----|--|---------|---------|-------|
| A | Educational | 37 | 152 | 189 |
| B | Music and Videos | 10 | 107 | 117 |
| C | Sports | 7 | 32 | 39 |
| D | Any Other | 8 | 6 | 14 |



72% users access the internet for educational purpose, may be because the participants of this survey are related to educational institute. The above table shows, 44% users use search engines for their leisure. 15% users use search engines for sports purpose and only 5% user access net for some other purposes like for Current Affairs, News, Products, Lifestyle, Blogging and General Information.

7. You usually stop looking at the search results after?

| Q7 | You usually stop looking at the search results after: | Faculty | Student | Total |
|----|---|---------|---------|-------|
| A | 1st page | 5 | 59 | 64 |
| B | 2nd page | 9 | 66 | 75 |

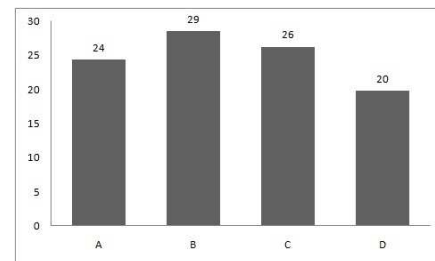
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| | | | | |
|----------|-----------------|----|----|----|
| C | 3rd page | 13 | 56 | 69 |
| D | Beyond 3rd page | 10 | 42 | 52 |



24% users stop looking at search results after first page i.e. they don't review the search results of more than one page. 29% users stop looking search results after second page and 26% search for 3rd page and only 20% users go beyond third page for searching images.

8. Rank the Search Engines

In the last question, users were asked to rank these five search engines. From the study, we found that users give highest rank to Google.

| | 1 | 2 | 3 | 4 | 5 | X(cannot rank) |
|------------------|-----|----|----|----|----|----------------|
| Google | 232 | 2 | 1 | 2 | 6 | 0 |
| Yahoo! | 43 | 85 | 26 | 14 | 13 | 8 |
| Ask | 13 | 8 | 41 | 44 | 17 | 59 |
| AltaVista | 5 | 4 | 16 | 9 | 64 | 82 |
| Bing | 10 | 22 | 37 | 25 | 21 | 59 |

5. Conclusion

Searching is one of the common tool for seeking online information. Search engines are the resources that help the people to search any kind of information on the web in a simple and easy way. The purpose of this study is to presents the extensive review and analysis of

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search engines and examines the user behavior while interacting with search engines. From our analysis of the five search engines, we conclude that Google is best till date. People like to search information on Google as it provides better interface, features and ease of use to the users. It performs better than the other search engines.

6. Appendix

Here is a snapshot of the survey form used for end-user opinions.

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Survey on Search Engines

Roll No.: _____ Name: _____ Class: _____

- How often do you use search engines on the Internet?
 - Two or more times in a day
 - At least once in a day
 - At least once in a week
 - Never
- Have you heard about these search engines? (Tick or Cross)
 - Google []
 - Yahoo! []
 - Ask []
 - AltaVista []
 - Bing []
- Which of the following search engines you use most often?
 - Google
 - Yahoo!
 - Ask
 - AltaVista
 - Bing
 - Any Other: _____
- Which of the following search engines provide ease of use?
 - Google
 - Yahoo!
 - Ask
 - AltaVista
 - Bing
 - Any Other: _____
- How often do you search "images" on the search engines?
 - Two or more times in a day
 - At least once in a day
 - At least once in a week
 - At least once in a month
 - Never
- For what purpose you mostly use the search engine?
 - Educational
 - Music and Videos
 - Sports
 - Any Other: _____
- You usually stop looking at the search results after:
 - 1st Page
 - 2nd Page
 - 3rd Page
 - Beyond 3rd page
- Rank the following search engines according to the scale from 1 to 5.
(1 = Best, 5 = Worst, x = Cannot Rank)
 - Google []
 - Yahoo! []
 - Ask []
 - AltaVista []
 - Bing []

Occupation: Student [] / Faculty []

(Signature)

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