

Search Engine Optimization Techniques with Website Perspective

Simranjeet Kaur¹ and Kiranbir Kaur²

Department of Computer Engineering & Technology,
Guru Nanak Dev University, Amritsar, India^{1,2}

Abstract: Search engine is used to extract data from the web and our website needs to be optimized for higher visibility on it. Search Engine Optimization (SEO) is a technique used to improve the website's visibility. SEO is also known as Website Optimization, as it deals with website's promotion. The website's performance depends on many factors such as website speed, web page loading time on browsers and quality of content. Unique content is considered the most important factor while designing website and including it. The website must be SEO friendly and required to achieve more and more unique visitors in order to promote a website.

The paper is focused to promote a website using mix of search engine optimization techniques and considered all the factors that are must for the enhancement of its visibility i.e. size of all objects, images, monthly basis unique visitors, mobile sessions, website loading time on various browsers. The considered factors are proved to be utmost beneficial for enhancing its visibility and performance.

Keywords: Search engine optimization, website optimization, SEO, website promotion, website speed optimization, website performance optimization.

Received June 25, 2015; Accepted April 15, 2016

1. Introduction

In the world of internet, the numbers of Internet users' are increasing rapidly at very fast rate. So, the need arises to make use of advanced technology to expand any kind of business with the help of internet, as it is the only source from where the people around the world get attracted through website and contact with the service provider. In order to have more and more visitors for providing them services, there is the need to take the website on the first page of search engines to increase the traffic on website and it leads to the expansion of business also, as large number of people wants to take the services of the websites that appears on the top of Search Engine Results Page (SERP). The SEO is used for this purpose and it is also recognized with another name called Website Optimization.

2. Search Engine Optimization

Search Engine Optimization is also known as Website Optimization. SEO is a technique to optimize the code of website, website constitution and content of website with the awareness of way followed by search engine to grab webpage, index [3] and also the process to achieve higher rank in search engine results page.

2.1. Main Purpose of SEO

The main purpose of SEO is to take the website on the first page of search engine results page. SEO is a

technique to improve ranking of website on search engine and to save people from the cost, time and frustration.

2.2. Web Search Engine

Search engines are the program that search the documents based on users query from the World Wide Web and return the list of documents that matches with entered keyword [11]. They index, download and store billions of web pages, and act as content aggregators because it helps to keep record of every webpage available on the WWW [7].

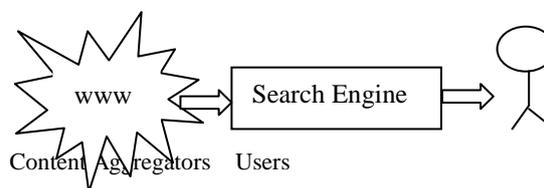


Figure 1. Concept of Search Engine [3]

The main task of search engine is the collection of pages, analyzing, sorting and displaying to user. Excellent search engine is that displays the required information quickly and accurately [3].

2.3. Working of SEO

The web spider's job is to crawl the web pages and make a list of words location, stores the data in

database after indexing them so that user can use the information when required [12].

When user types his query in search engine box, the search engine process its query and match with the results stored in database in the form of web pages that have assigned rank on the basis of keywords relevancy and frequency and content of page. The title and description of website is to appear on the top of webpage, these must be relevant and good so that web pages should appear on the top list.

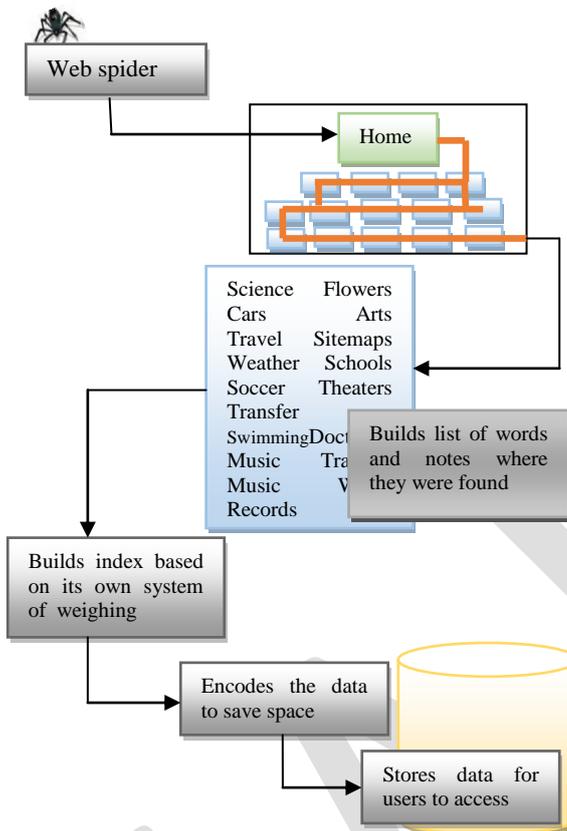


Figure 2. Working of SEO [4]

The web pages are then retrieved from the database with use of search engine. The results that match with user query are displayed on the user screen from most relevant pages at the top to the least relevant pages in the form of a list.

2.4. Methods of SEO

There are mainly two major search engine optimization methods, named organic seo and inorganic SEO, which are employed to attain maximum online visibility of website. These make sure to attain high possibility of placement in search engines [14]. These are as follows:

2.4.1. Organic SEO

Also known as Natural SEO. It generally takes more time to execute their results but it offered long term results. It mainly focused on content optimization, link building, keyword density and placement, optimization of Meta tags and images, and like others [14]. The

benefits offered by organic seo are it results in long term stay on search engine, inexpensive, attracts more search traffic.

2.4.2. Inorganic SEO

Also known as Artificial SEO. It provides quicker results and improves ranking of website placement but it offers temporary results and do not give long term results. It is less effective than organic seo. It mainly concentrates on search engine marketing involving paid advertising, pay-per-click advertising, search engine marketing, and cost per click, paid directories and many others [14]. The benefits offered by inorganic seo include ideal and quick for customer targeting and fast awareness about brand targeting but is very expensive and will not work for long time.

2.5. SEO Techniques

There are two techniques of search engine optimization namely On-Page and Off-Page Optimization. These are as follows:

2.5.1. On-Page Optimization

On-Page Optimization is the process to optimize website that appears on the SERP when the user enters a query like choosing a suitable domain for the website, creating meta-tags, optimizing keywords, site design structure and many others [2,10].

There are multiple elements considered while applying on-page optimization to the website, these are as follows [4]:

- **Website content:** The website content must be unique, fresh and original, by considering the true fact that “Content is the King”, so content should not be copied from internet and other websites [8].
- **URL structure:** Choosing domain name is the first thing to be included to access the website. The URL should reflect the name of your website and its content [8].
- **Pictures:** Images that are being used in the website must relate to the content and must be fresh that are previously not available on the internet. As original images will give more benefit to website [8].
- **Page title:** The title must contain the target keywords. The <title> tag should not contain more than 70 characters, as the long title is not considered by Google or crawler. It is the first thing that is seen by user and read within search engines [8].
- **Meta tags:** Meta tags are usually not seen by user and are especially written for the search engine. <meta name=“description” content=“short description of website i.e. maximum 160 characters”/>
<meta name=“keywords” content=“include maximum 14 keywords”/>

`<meta name="robots" content="index, follow"/>`

This defines a way for the search engine crawlers and act as important information for the search engine. If we don't place it in website then it gets automatically placed by search engine.

- **Headline tags:** When the search engine scans web pages, they look to know about webpage. For Heading tags are included to make the searching faster for search engine crawlers.
- **Internal linking:** Internal linking is used to reference other pages on website. Anchor, `<a>` tag is used to serve this purpose.

2.5.2. Off-Page Optimization

Off-Page Optimization includes the methods or steps that are applied outside the website to increase the rank or traffic to website, including the directory submission and search engine submission of website [10]. There are number of methods are as follows [2, 9]:

- **Finding the domain history:** The website that you are going to include in your website, firstly check for its history information as it gives better idea about that websites reputation in search engines. For his purpose, websites containing similar purpose, websites containing similar contents are searched first.
- **Link building:** The website must contain links of high PR value as it helps to improve the website ranking. Back links are obtained using guest posts, press release submission, submitting websites to directories and many others.
- **Directory submission of website:** Directory submission is used to gain back-links from top ranked web directories. There are paid as well as free directories available, so it will be better to send your website to free directories and it takes time to include but is for permanent listing [4].
- **Article submission of website:** Article submission is done manually like directory submission. By doing so, it increases the chance of getting indexed by search engines [4].
- **Use email to expand business:** With the use of business email, send emails to other contacts containing information about your products or services, and this helps to expand the business world-wide.

2.6. Web Performance Optimization

Website Performance Optimization is the primary factor considered for the success of modern online business. If your website is taking long time to respond then it is considered as bad website and user will not wait too long to open your website and will skip to other sites. For this purpose, un-necessary graphics and multimedia should be avoided [1].

With the increased growth in the number of people using internet and the speed of modems, the need arises to speed up the shopping sites also. The users think the delay, a delay, whether it happens due to processing of server, networking overhead or data is getting accessed from multiple sources as requested by user. . The amount of user's who shop online are increasing rapidly day-by-day. With time, not only technology has changed but users expectations also changes. The delay is experienced by users because of the geographic variability, backbone variability, page download failures, connection speed latencies and number of concurrent users available on web site [13].

2.7. Website Speed Optimization

Page Speed: This term is used with which web pages or media content is downloaded from Website hosting servers and displayed on the requesting browser [15].

Page Load Time is the time elapsed between the clicking of a link and displaying its content on the browser that is requesting for the content. Website Performance affects the ranking of search engine considering various factors like page speed, website responsiveness, user behavior and other performance metrics [15].

Web users often face long time to wait for downloading web pages and the tolerable waiting time for information retrieval is 2-4 seconds, and average of 9.82 to 13.84 seconds [6].

It is highly recommended that PNG is more compact format of representing images and they are not suited on low depth images. So, the jpeg images above 1 kb should be converted to PNG format [1].

2.7.1. Website Speed Optimization on Mobile

It is necessary to analyze the performance of Web Browsing Speed in smart phone devices should be considered with goal to provide the Web services for smart devices. Many people use internet on mobiles rather than PC's to access the social sites and websites, as they expect to have faster browsing speed, where image and browser loading time should be considered to have better performance on mobile also [5].

3. Research Objective

The objective of my study is

- To design a SEO friendly website.
- Promotion of a website by adopting Search Engine Optimization techniques and
- Upgrading the website from normal desktop version to mobile site version i.e. making website responsive to give better response time on mobile.

4. Methodology

The steps followed in methodology are as follows: This study aimed at applying mix of various search engine optimization techniques on a live website. Every small aspect of website is considered like unique and original content, external objects and analyzed the website's performance on various devices. The website is responsive and is designed using Dreamweaver CC and performance is analyzed using Google Analytics, and an online website monitoring tool www.websiteoptimization.com is used to know about objects size and external objects contained in website.



Figure 3. Steps of applied SEO techniques

5. Results and Discussion

Table 1. Objects size

Object type	Size (bytes)	Object download time (in sec)
HTML	21229	0.31
HTML Images	618652	8.48
CSS Images	588282	6.12
Total Images	1206934	14.6
JavaScript	287438	3.12
CSS	47881	0.85
Multimedia	0	0
Other	0	0

Table 1 gives us the information about the size of all objects that are included in the website like HTML, JavaScript, CSS and images contained in websites with their download time for its visibility.

Table 2. External objects in website

External Objects in website	Quantity
Total HTML	1
Total HTML images	26
Total CSS images	15
Total images	41
Total Scripts	8
Total CSS imports	3
Total frames	0
Total iframes	0

Table 2 informs us about the external objects, which external objects are included with their quantity of external objects contained in the website like HTML, CSS images also about the frames.

Table 3. Unique visits of website in six months

Month	Unique Visitors	Page Views
Jan	22	112
Feb	62	198
Mar	403	730
Apr	2469	2957
May	6736	7031
June	6696	6977

Table 3 tells us about the unique visits and Page views of website in six months. The visitors of first two months were very less without applying SEO, amount of unique visitors started rising at a very fast rate when SEO process initiate.

Table 4: Mobile Sessions showing mobile visitors

Month	Total Sessions	Mobile	New Users	Average Session Duration
Jan	18	5	5	1:05
Feb	13	10	10	2:08
Mar	34	13	13	2:55
Apr	26	15	15	0:42
May	15	9	9	0:21
June	21	12	12	0:41

Table 4 shows the mobile visitors. The chart informs us that the website is also get accessed by users on mobile phones. The total mobile sessions and new users visits has been shown.

Table 5. Average Page Loading Time of website on Multiple Browsers

S.No.	Browser	Average Page Load Time (in sec)
1	Safari	5.02
2	Internet Explorer	6.04
3	Chrome	6.13
4	Firefox	7.61

Table 5 shows the average loading time of website on four browsers. It gives the total average page load time of 6.2 seconds on four browsers and safari is the fastest browser.

The web page takes average server connection time of 0.11 seconds .

Table 6.In-Page Analysis of Website

Total Page views	Unique Page views	Average Time on Page (in min)	Average Page Load Time (in sec)
17,252	16,887	3:43	6:40

Table 6 shows the detailed analysis of website, describing total page views, unique views, average time spend by users on webpage and average web page loading time of website.

Table 7. Position of website keywords at the start of SEO process

Month	Keyword	SERP's Page No.
March	Web Innovation India	4

Table 7 tells us that when the methodology applied in the start of promotion, the only keyword i.e. the title of website was the only one visible at the page 4 of Google SERP having ten links per page.

Table 8.List of Promoted keywords after applying SEO techniques

S.No.	Keywords	SERP's Page No.
1.	Web Innovation India	1
2.	Web Innovation	1
3.	Web Innovation in Auckland	2
4.	Website Innovation in Auckland	3
6.	Multimedia Solution Development	4
7.	Website Innovation in India	1
8.	Innovation Website in India	1
9.	Innovations Website Design in India	1
10.	Innovations Website Design in Auckland	7
11.	Ecommerce Solutions in Auckland	1
12.	Ecommerce Solutions Company in Auckland	1
13.	Ecommerce Solutions Services in Auckland	1
14.	Ecommerce Website in Auckland	4
15.	Ecommerce Website Design Services in Auckland	9
16.	Ecommerce Website Services in Auckland	5
17.	Ecommerce Website Company in Auckland	7
18.	E-commerce in Auckland	4
19.	Portal Development Company in Auckland	2
20.	Portal Development in Auckland	8
21.	Portal Development Services in Auckland	3
22.	Web Portal Development Company in Auckland	3
23.	Multimedia Solutions in India	3
24.	Multimedia Solutions in Auckland	1
25.	Multimedia Solutions Company	3
26.	Multimedia Solutions Company in India	3
27.	Multimedia Solutions Company in Auckland	1
28.	Multimedia Services Providers	2
29.	Multimedia Services Providers in India	3
30.	Multimedia Solutions Company India	2
31.	Multimedia Solutions Services	2
32.	Multimedia Solutions Auckland	2
33.	Website Redesign Services	7
34.	Website Redesign Services India	7
35.	E-commerce Website Redesign in Auckland	4

6. Conclusion and Future Work

Present work is implemented on a live website and various search engine optimization techniques were incorporated on it. The speed up of website was improved with the promotion of large number of keywords. Mix of existing optimization techniques was used in an optimized way to achieve the results. So, it will be helpful for SEO optimization for domain specific applications. The performance improve was quite remarkable and specifically for small business website as it provide low cost optimization solution.

In the future work, more methods can be incorporated for a specific task for a low cost solution.

References

- [1] Curran K. and Broderick N., "Understanding and Reducing Web Page Latency", *Information Technology Journal*, vol. 3, no. 2, pp: 211-218, 2004.
- [2] Gunjan V.K., Pooja , Kumari M. , Kumar A. , Rao A.A., "Search Engine Optimization with Google", *International Journal of Computer Science Issues*, vol. 9, issue 1, no. 3, ISSN: 1694-0814, 2012.
- [3] Hui Z., Shigang Q., Jinhua L. and Jianli C., "Study on Website Search Engine Optimization", *IEEE*, 2012.
- [4] Jain A., "The Role of Off Page Search Engine Optimization in Search Engine Ranking", *International Journal of Advanced Research in Computer Science and Software Engineering*, vol. 3, issue 6, 2013.
- [5] Kim Y. and Moon I., "Performance Analysis of Web Browsing Speed in Smart Mobile Devices", *International Journal of Smart Home*, vol. 7, no. 2, 2013.
- [6] Nah F.F.H., "A Study on tolerable waiting time: how long are Web users willing to wait?", *Behaviour and Information Technology*, 2004.
- [7] Neelam D., Sharma A.K. and Komal K. B., "Page Ranking Algorithms: A Survey", *IACC*, 2009.
- [8] Patel K. M. and Rajesh P., "Investigation of techniques to improve website rank on Google search engine", *International Journal of Advance Research in Science and Engineering*, vol. 2, issue 1, ISSN: 2319-8354, 2013.
- [9] PrethiSaganaPoongkode J. , Nirosh V., "A Study on Various Search Engine Optimization Techniques", *International Journal of Innovative*

Research in Computer and Communication Engineering, vol. 2, issue 11, 2014.

- [10] Rafiq E., “*Search Engine Optimization*” The fast and easy way to learn, Available at: www.it-books.info, (Accessed: February 2015).
- [11] Singh R. and Gupta S.K., “*Search Engine Optimization - Using Data Mining Approach*”, *International Journal of Application or Innovation in Engineering and Management*, vol. 2, issue 9, 2013.
- [12] Singh T. and Maini R., “*A Comprehensive Review on Search Engine Optimization*”, *Journal of Global Research in Computer Science*, vol. 4, no.1, 2013.
- [13] Zona Market Bulletin , “*The Need for Speed*” , , issue 05, April 2001.
- [14] *All about SEO organic and inorganic SEO explained*. Available at: <http://www.tectutive.com/all-about-seo-organic-and-inorganic-seo-explained/>, (Accessed: February 2015).
- [15] *Introduction to Website Speed Optimization*, Available at: <https://kinsta.com/learn/page-speed/>, (Accessed: March 2015).



Simranjeet Kaur is an M.Tech (Software System) student from Guru Nanak Dev University, Amritsar, Punjab, India and has done B.Tech in Information Technology. Her area of interest is Search Engine Optimization and web mining.



Kiranbir Kaur is pursuing PhD in cloud computing and serves as an Assistant Professor in Guru Nanak Dev University, Amritsar. She has done M.Tech from Guru Nanak Dev University, Amritsar, India. Her areas of interest are Cloud

Computing, search engine optimization and distributed system.