

# Search Engine Optimization To Enhance User Interaction

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**Abstract-** Search Engine Optimization (SEO) is important for websites to improve the rank for search results and get more page views requested by the user. This search engine ranks provide the better and optimized result to user, which will help them to view the popular page among the number of pages available in the search results. Apart from this search engine ranking, it also enables the websites to compete with other rival's website as each and every website owner expect to see their own website on the list before other's websites. This paper puts forward idea about SEO principles and basic strategies. It also expresses different techniques that are employed by search engines to improve its results. Also it presents the observation section, which gives the comparative analysis of SEO techniques.

**Keywords-** Search engine, website optimization, Search Engine Optimization (SEO)

## I. INTRODUCTION

Today Internet has become a vast source of information with many websites being added every day. To manage the access and data integration of this vast resource has been a challenge these days. Since 93% of internet traffic is handled by search engines, so exploring the potentials of search engines is crucial [2][12]. Search Engine Optimization is a tool that is used by website owners to defeat its competitors by placing its link before others website links in search engine's results. Since internet is full of raw data, the job of directing towards relevant and exact data lies in the hands of search engine. Due to this reason, Search Engine Optimization Techniques has become an important topic for researchers and academicians and business organizations.

SEO techniques make use of original results, which are analyzed by search engines to increase the popularity of website. These techniques help government and business organizations to promote their websites and increase the movement of traffic in and out of their websites. Through the discovered search results, SEO improves the ranking of a website or a web page in search engine websites list. Also, to increase the ranking of website, SEO considers various parameters such as, the response time of search engine for a

particular website, frequently being visited websites by users, type of search terms entered into URL and type of search engines preferred by users [6]. Through SEO one can ensure that a particular site is accessible through search engine, which improves the chances of quickly discover a site by the search engine. Search Engine Optimization is typically a set of best practices that adopted by webmasters, web developers and web content producers to achieve a better ranking in search engine scenario.

SEO comprises of set elements, to increase site's traffic, rankings of the websites and provide guidelines to users about the usage of search engines [5]. SEO is a procedure through which one can ensure that his/her site is formulated in structured way, which would be understood by search engines. SEO is sometimes used for finding the terms and phrases (keywords) that generate traffic to website, for making the site friendly to search engines, to build links and marketing the unique value of sites. SEO provides different tips and strategies that are helpful to improve both internal and external factors that influence a website's ranking.

The rest of the paper is organized as follows: Section II, covers the search Engine Optimization process. In section III, various search engine optimization techniques are discussed. Section IV presents Analysis on SEO techniques in terms of their advantages and disadvantages. Finally the paper ends with Conclusion.

## II. SEARCH ENGINE OPTIMIZATIONPROCESS

At the beginning of search engine optimization (SEO), it is necessary to understand the overall process carried out in an effective implementation of SEO. The overall process is divided into the six phases, namely research, reporting and goal setting, content building, webpage optimization, social and link building and maintaining progress report of SEO plan [1]. The overall process of SEO briefs the simple steps to carry out for effective and efficient optimization of web pages. Now let us see these phases.

### A. Research

Research phase is carried out into two steps, namely, Keyword Analysis and Competitive Analysis.

### 1) *Keyword Analysis*

First step in keyword analysis is to identify a set of keywords that will be used in optimization. Once the set of keywords are identified, then it is easy to determine which keywords are being frequently typed in the search URLs. The outcome of the keyword analysis phase is the occurrences of particular keyword in URLs. There are many keyword finders available, which will take input in the form of keywords and gives the output in the form of how many times that keyword was entered by users i.e. the number of occurrences of that keyword. However, if a particular keyword has the highest number of occurrences in the search results, that keyword will become the greatest competitor within the search results.

Sometimes keyword analysis is based on specificity of keywords. For example, if you want to buy 'Lenovo Laptop', then instead of looking for all company's laptops (HP, Dell) you're interested in those laptops, which are having tag or brand as 'Lenovo' and so in search URL's instead of selecting general terms as 'laptops', you need to enter more specific keyword as 'Lenovo Laptop'. Also keyword analysis gives accurate results, if keyword specificity level increases. That is, if you are looking for 'Lenovo' laptops and in that you're interested only in 'Lenovo ThinkPad' laptops, which is more specific than the previous example. As level of keyword specificity increases, the number of search results, which will be having the specified keyword will be decreases.

### 2) *Competitive Analysis of Websites*

After the keyword analysis phase, competitive analysis of the subject website is performed against its competitors' websites. To perform competitive analysis of websites, different parameters are considered such as, incoming and outgoing links, ranking of website on search results, number of visitors for the website, view rate or bounce rate, appearance of web contents on webpage etc. All these parameters are stored in SEO metrics, which will be used to identify subject website's position in search engine and accordingly he/she will identify the areas of his/her website to improve the website ranking.

### *B. Reporting & Goal Setting*

Most important step in Reporting and Goal Setting is to analyze the sites traffic. Site's traffic mainly depends on type of search engine, number of occurrences of keywords in search engine, popularity of web contents, number of visitors

etc. Sometimes the parameters from SEO metrics are also used to calculate the site's traffic. Most important factor considered while calculating site's traffic is the number of incoming and outgoing links. If the site has more number of outgoing links to other website as well as incoming links from another website, the number of visitors will be more for that website. This will ultimately increase the bounce rate, which will result in high traffic rate. A website which has incoming link is called as 'Child Website' and a website which has outgoing link is called as 'Parent Website'. This Parent-Child websites concept is used by Page Rank algorithm of SEO technique.

Depending on the previous phase outcome the goal identification and goal setting will be performed by SEO Review Committee (SRC). After that site's starting position is decided, then goals are set for the SEO plan. The identified goals are measureable and defined which will be specific to the SEO plan. During any of the SEO phase, if changes are to be made to the predefined goals, firstly, the plan's goals are analyzed and reported. Then the required adjustments need to be done in the SEO plan, which will be useful for further progress reports.

### *C. Content Building*

Content is the important factor of search engine optimization. The website with the high-quality content will provide the better competitive environment in search engine optimization.

Content building phase is divided into two steps. First, a site is loaded with high-quality content, which gives reason to user to stay on the website and to come back to the website. If user finds most relevant information on particular website, then instead of visiting other sites, he/she always stick to that particular website. The main aim of the user to stay or to come back on site is just to find or search information. Second, he/she will receive the added benefit or credit by providing or serving exactly what content the search engines want [1]. Search engines will store more information about user's business and products. This information will be directly translated into the ranking given for user's site based on the related keyword phrases.

### *D. Webpage Optimization*

This phase considers all the parameters, which are related to Graphical User Interface (GUI) of the website. Along with the Content building phase, the appearance of the media components on the webpage is equally important.

The webpage optimization is carried out in four steps, namely, webpage titles, web content exploration, prominence of targeted keyword phrases and site outline. Let us see these four steps in brief.

- 1) *Web Page Titles*—A Page title on the site’s website not only just contain company name or tag as “welcome” but also contains most frequently used targeted phrases on the web page followed by the company name.
- 2) *Web Content Exploration* - Webpage is mainly a collection of media components such as text and images. Some search engines cannot able to deal with images. In such cases, site’s search engine requires web content explorer, which will analyze the web contents accurately and provide the desired output for search term in the URL. The quality of the web content explorer will decide the ranking/indexing of the website in search engine list.
- 3) *Prominence of Targeted Keyword Phrases* – The presence of targeted keyword is not enough to increase the ranking of webpage but position or placement of the targeted keywords on webpage is also equally important. For example, the site’s first paragraph with targeted keyword phrase gives it more weight than placing the same paragraph at the bottom or middle of the webpage. Also, the text with larger font sizes and font styles (bold, italic and underline) can increase its importance and have positive impact on page’s ranking depending on the appearance of the targeted keywords on the web page.
- 4) *Site Outline* – When the users visit a subject website, they should find all the list of links, which will direct them to the important web pages of site. The site map stores the list of all incoming and outgoing links, which will help to increase the ranking of the subject website.

#### E. Social & Link Building

This phase is carried out in two steps, namely, using social media and calculating incoming and outgoing link ratio.

##### 1) Using Social Media

Now a day’s billion number of users are using social media for various purposes. In marketing, sharing of web contents through various social media provides number of options for organizations to establish a best customer relationship and also emphasize on other clients to use those social media for sharing of site contents and improves connectivity with other potential customers[1].

##### 2) Calculating Incoming and Outgoing LinkRatio

Web content quality also has a highest impact on web site ranking. If the site has quality contents and quality incoming and outgoing links, then it will allow searchers to repetitively visits to the site and provides them with better services or products as they want. Google search engine views links to the site as votes for the site and rewards the site accordingly. In addition, Google’s Webmaster Tools provides information regarding the inbound/incoming and outbound/outgoing links to the site, which will have great impact on website optimization [1].

#### F. Maintaining Progress report of SEOPlan

At the start and end of each SEO phase, progress report is generated to analyze the activities performed in particular SEO phase. The outcome of the phase is recorded for further analysis. Rankings, site’s traffic levels and some other parameters are considered to measure the ranking results.

### III. REVIEW OF EXISTING SEOTECHNIQUES

Looking at the overall process followed in Search Engine Optimization (SEO) let us see now the various techniques used for SEO.

#### A. Page Rank Algorithm

Page Rank Algorithm was proposed by founders of Google Larry Page and Sergey Brin in 1996 [4][7]. Page rank algorithm calculates the rank of the web pages based on its importance. Page importance depends upon the number of occurrences of the web page. In most of the cases, the page rank algorithm follows the link structure of web page to calculate the rank. Link structure of web page mainly depends upon the number of incoming and outgoing links for that web page. Consider the pages A and B. A is having incoming link for B and B is having outgoing link for A. So to calculate the A’s rank we require rank of B and to calculate B’s rank we require rank of A. If the page is having more number of incoming and outgoing links, then it is having highest vote or rank.

Page rank algorithm is easy to understand as it considers the parameters like the rank of the web page, which depends on the occurrence of the web page as well as the number of incoming links to the webpage. But the calculation doesn’t give exact answer, if they performed only once. Accurate ranks are obtained through multiple iterations. A concept called ‘Page Dependency’, which is used in Page

Rank algorithm to calculate the page rank. This page rank depends on the rank of other pages that are linked to it. For calculating the rank of page, the algorithm considers the probability of web page's rank, which is already stored in the database instead of taking the current rank status, which is required by the query. It always divides the page rank of incoming links equally among the web page, which is not important or relevant[3].

#### B. Weighted Page Rank Algorithm

This algorithm was introduced by Wenpu Xing and Ali Ghorbani [3]. This algorithm also follows the link structure of web pages that is the incoming and outgoing links to or from web pages. Weighted Page Rank algorithm (WPR) calculates the rank of the pages based on both incoming and outgoing links. The page has a highest rank, if it is having more number of outgoing links associated with it. The popularity of page depends on both incoming and outgoing links [4][11]. Weighted Page Rank algorithm (WPR) considers the current status of page rank at the time of user query as against the probability of page rank, which is considered in case of Page Rank algorithm.

#### C. HITS Algorithm

Hypertext Induced Topic Search (HITS) algorithm was proposed by Jon Kleinberg to rate a webpage based on link structure of the web pages [4]. This algorithm analyses the structure of web pages' links based on the concept called Authority and Hubs. An authority page contains the useful information based on the user query whereas hubs are the pages that provides links to the authority pages. HITS algorithm mainly has two steps [8].

- 1) In sampling step, the algorithm collects the number of relevant web pages based on user query.
- 2) In iterative step the authority and hub pages are calculated in order to serve user query in efficient time.

These steps performed in HITS algorithm to calculate the page rank of the webpage. Authority and Hub pages collects the samples of the pages from ranking model and based on the incoming and outgoing links of webpage page rank is calculated.

#### D. Query Dependent Algorithm

Query Dependent Algorithm was proposed by Lee, Jiang, et al. [3]. This algorithm mainly focuses on links (incoming and outgoing links) as well as the contents of user query. This algorithm measures the similarity between the user

queries. Based on the similarity between queries, this algorithm builds the ranking model also called training set. Depending on the contextual features of user query, this algorithm extracts the relevant documents to the ranking model. Then the "probability function" of the document is calculated to find the rank score of the web page [9]. This algorithm sometimes considers the occurrences of documents in the ranking model and assigns the page rank to the pages as in Time ranking algorithm [8] [10].

Once the user query is fired to find the equivalent content on the web page, the query evaluation engine extracts the query from web page and does the query optimization to meet the desired results.

### IV. OBSERVATIONS

This section covers the analysis of SEO techniques discussed in previous section. We analyze each are on the basis of various parameters used by these techniques while ranking a page.

- a. Page Rank Algorithm divides the page equally among web pages and focuses only on outgoing links, which will give the less ranking ratio compare to Weighted Page Rank Algorithm as it considers both incoming and outgoing links.
- b. Page Rank algorithm assigns larger rank to older pages even if, newly added page has relevant information. Weighted Page Rank algorithm assigns rank to newly added page. If it is having more number of incoming and outgoing links than the older page.
- c. In HITS algorithm, the content analysis also performed, along with the link structure of web pages. In page rank algorithm to calculate the rank of one page, one has to consider the page rank of another page, which is dependent on first page. So page rank becomes the iterative process considering the repeated data. This issue is overcome in HITS algorithm by creating separate ranking model containing the more accurate similarity measure.
- d. HITS algorithm gives result at the time of indexing, while Query Dependent Algorithm gives result based on user query.
- e. In Page Rank algorithm, depending on the number of outgoing links and in Weighted Page Rank algorithm, depending on the number of incoming and outgoing links for a particular webpage, page rank of the webpage is calculated. In case of Query Dependent Algorithm, depends on the user query for the webpage i.e. the total number of views made by the user for the webpage rank will be calculated.

- f. In HITS algorithm web contents will be analyzed and similarity measure will be stored in the similarity matrix, while in Query Dependent algorithm, similarity measure is calculated based on how many users used that same query and how manytimes.
- g. In Weighted Page Rank algorithm, rank is calculated based on incoming and outgoing links which takes more time but gives less accurate result (as all links are considered). In HITS algorithm incoming and outgoing links are further divided into Authority and Hub pages, which give only relevant data. While calculating the page rank only these links will be considered, ignoring all other incoming and outgoing links because they don't have any relevant data. This process takes less time and gives more accurate result compared to Weighted Page Rank algorithm.

## V. CONCLUSION

Search Engine Optimization come from more advanced technologies in traditional web search engines such as Google search engine. One of the important aspects of search engine is to improve the performance and usability of search engines through various techniques so that user interaction will be increased to that particular web site. In this paper, we analysed search engine results depend on the various algorithms, which improves web page rank. Web pages are displayed according to their rank, which is calculated by using factor like content, number of incoming and outgoing link etc. This analysis will help to improve the overall performance of search engine in competitive world.

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