# SEARCH ENGINE OPTIMIZATION TOOLS AND KEYWORD FREQUENCY ANALYSIS IN ENHANCING SEARCH ENGINE EFFICACY USING ENHANCED BOYER MOORE ALGORITHM

**RISHIT KALRA**

*Sri Venkateshwar International School, Sec-18, Dwarka, New Delhi*

## ABSTRACT

*Search Engine Marketing (SEM) and Search Engine Optimization(SEO), are strategies that are effectively used to grow business by attracting potential customers in an extremely competitive marketplace. This paper first revisits the working of a search engine and the most widely used search engine. Second, it includes the approach to Search Engines Marketing in order to improve website ranking. Third, a discussion about various available tools for SEO and implementation of some of them has been illustrated. Fourth, some string matching algorithms have been discussed and an analysis of top ten search results from google for a particular keyword. As keyword frequency is considered one of the major factor in the on-page factors of website ranking. Enhanced boyer moore algorithm have been used in order to analyses the keyword frequency in the content of the search results obtained. The results have been obtained using both Boyer Moore and enhanced Boyer Moore algorithm and the run time comparison is also made for the two algorithms.*

*Keywords:  **Search Engine Optimization; Website ranking, Boyer Moore, string matching, keyword frequency.***

## INTRODUCTION

In the present digital age, searching information on websites using search engines like Google etc is of prime significance. With the increasing number of websites and growth in the size of web and the users searching for a product online, search engines poses a challenge for effective extraction of accurate webpages or sites for a particular search.

- *Search Engine Marketing (SEM)-* It is a type of marketing technique which uses internet and aims at promoting a website to upgrade the website rank in search engine and thus, gain more viewers. This can be done either by advertising which is a paid method or by optimizing i.e by organic/unpaid methods.

- *Search Engine Optimization (SEO)-* It is the process of optimizing the website or webpages focusing mainly on its content to assure a better ranking of a site or page for a certain keyword in the Search Engines Result Pages(SERPs)     [12].

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Different Search Engines uses different algorithms and thus all search engines have a different way to calculate the ranking of a website. So, no search engine will produce the same results. For example: Google and yahoo will never give the same result for any search query, as also illustrated in fig.4 and fig.5.
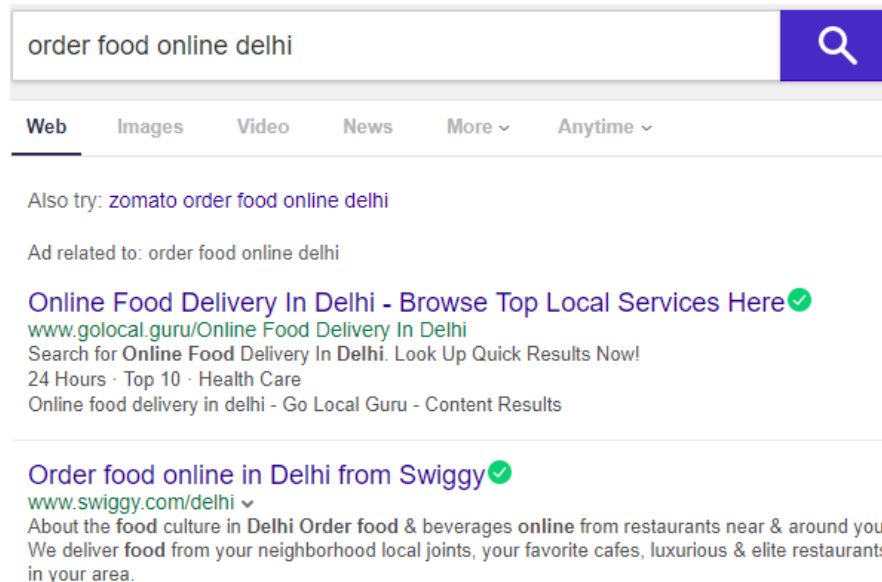


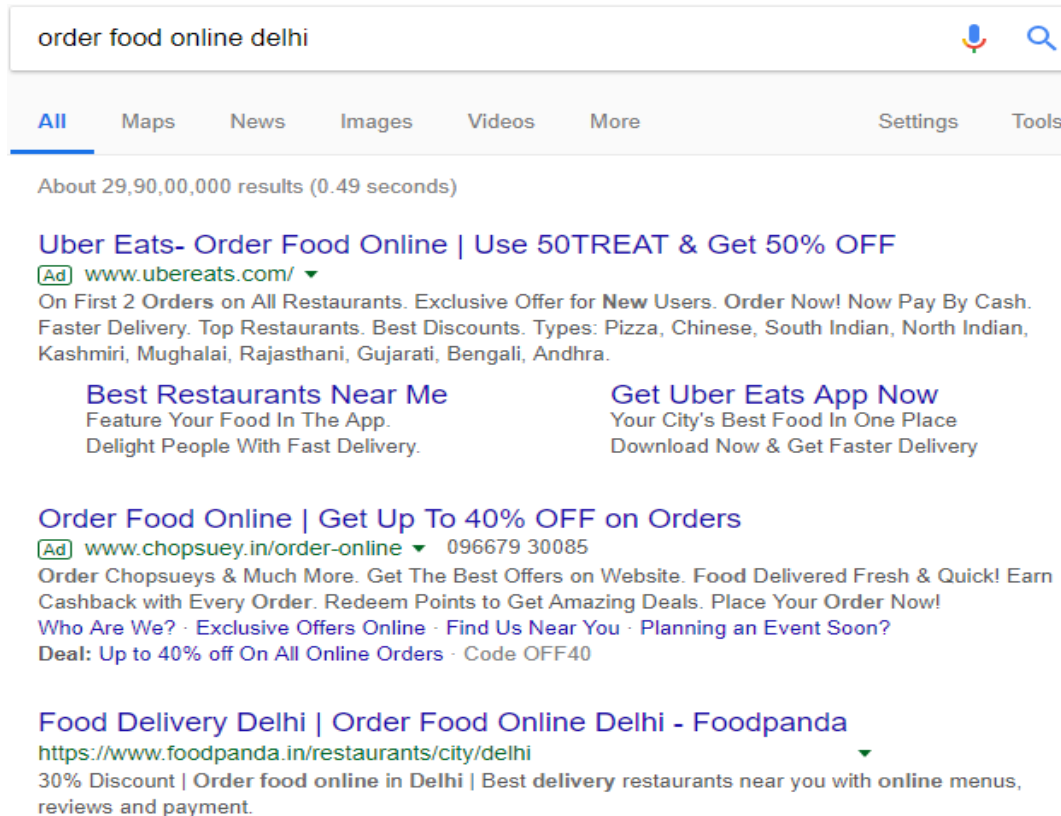**Fig. 4. Yahoo search results for keyword "Order food online delhi"[22]**



**Fig. 5. Google search results for keyword "Order food online delhi"[23]**

**Search Engine Optimization(SEO)** is the method with an objective to gain visitors on website from free or organic search results in search engines like Google[13] Majority of search engines considers most relevant webpages or websites for users and based on relevancy search engine ranks them as their primary search results. These are called organic results[21] because they are free and not driven by paid advertisements.

Fig.4 shows the Yahoo search results and Fig.5 shows the Google search results for the same search input. As noticed in the Google search the first two results are the PPC advertisements whereas the third result shown is the organic result obtained through SEO. Google being the most popular Search Engines, more people invest on Google paid ads rather than to invest in search engines like Yahoo. But, because of the different algorithms used by these search engines even the organic search results produced by both of them are different. Various techniques of information extraction and retrieval including data mining may play a significant role and act as a back bone for search engine optimization [16] [17].

In this paper, Section II working of a search engine and the most widely used search engine. Second, it includes the approach to Search Engines Marketing in order to improve website ranking. In section III, a discussion about various available tools for SEO and implementation of some of them has been illustrated. In Section IV, some string matching algorithms have been discussed and an analysis of top 10 search results from google for a particular keyword. As keyword frequency is considered one of the major factor in the on-page factors of website ranking. Enhanced boyer moore algorithm have been used in order to analyze the keyword frequency in the content of the search results obtained. The results have been obtained using both Boyer Moore and enhanced Boyer Moore algorithm and the run time comparison is also made for the two algorithms.

## SEARCH ENGINE WORKING

Search Engine is a software program [13] designed in order to search for the information on web. It provides the service to the internet users to search for the required content.Fig.2 shows the use of search engine diagrammatically.
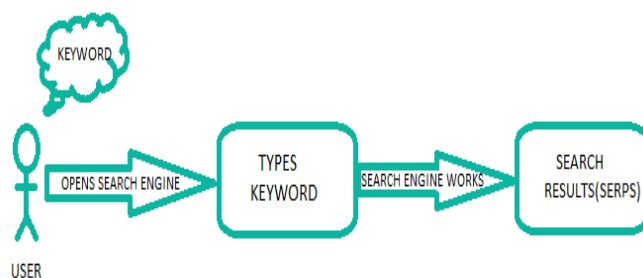


**Fig. 2. User using a search engine to find information [13]**

Search engines uses a crawler or spider or a bot in order to crawl and index new content to the search database [6].

*Working:* For displaying any sites in the search results crawler based search engines follows five steps, as discussed in Table1.

**Table 1. Working of Crawler Based Search Engine [24]**

| Steps | Description |
|---|---|
| Crawling[24] | • To get the accessible web pages search engine crawls the complete web and this crawling is done by crawler (bot or spider). <br> • The rate at which crawling is done depends on the search engine which takes periodic crawling. <br> • The new updated content is shown by the search results, once the crawling of the site is done again by the search engine. |
| Indexing[24] | • It is the process of recognizing the words or statements that best describes the web page. <br> • The recognized words are called as keywords and that page is allocated to that particular keyword. <br> • If the crawler is unable to interpret a web page, that site may rank lower in the search results. <br> • To make sure that the content is easily understandable there is a need to optimize the web pages. <br> • When the crawlers picks up the correct keywords for a particular webpage, that page is allocated to the chosen keywords and thus, ranks high in search results. |
| Processing | • Here, Search strings are compared with the indexed strings in the database of the search engine. |
| Calculate Relevancy[24] | • It may be possible that more than one web page holds the same keyword. <br> • Search engine calculates the relevancy of every web page in its index containing the searched keyword. <br> • Many algorithms are available for calculating the relevancy. <br> • Every algorithm assigns distinct comparative weights to prevalent factors like keyword density, |

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| Steps | Description |
|---|---|
|  | meta tags, or links.<br>• Thus, all search engines provide different results for the same search string . |
| Retrieve Results[24] | • It is the process to display the search results in the web browser.<br>• Pages are sorted in an order of most relevant to least relevant by the search engines in these results. |

These days there are numerous search engines to make a search easier on the web, but individuals don't prefer all search engines that exist. Accordingly, there is a trend analysis on the most widely used search engines and a report is generated, as shown in Fig.7  using Search Engine market share analysis.
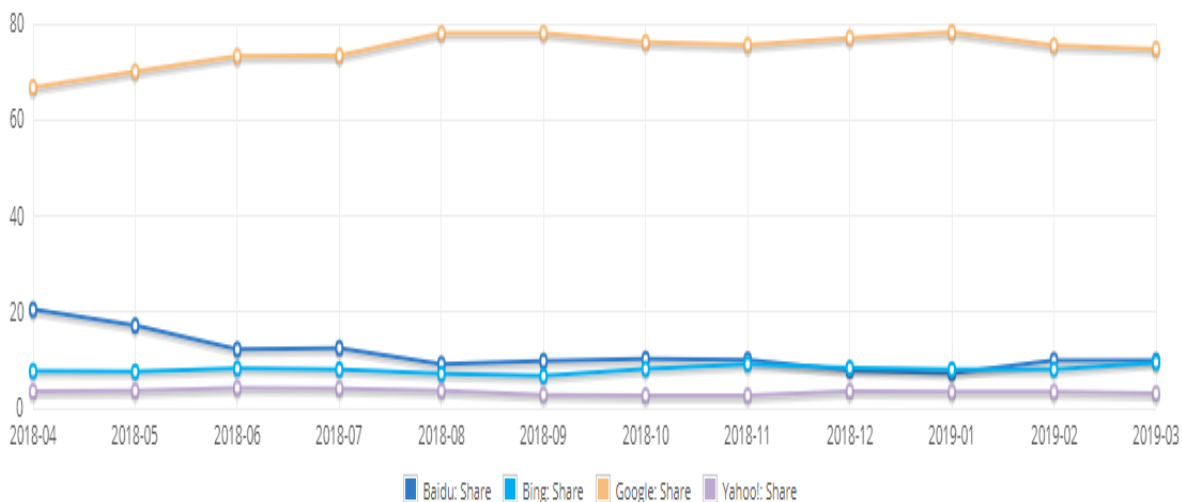


**FIG. 7. SEARCH ENGINE MARKET SHARE 2018-04 TO 2019-03[18]**

From the above Search Engine market share analysis, it could be concluded that Google is the most widely used search engine since years. Therefore, in order to gain more visitors to a site, Google trend analysis and an understanding of the way it provides the search results to the users is of utmost importance. Next, in order to improve the ranking of a website or a webpage there is a need to apply some SEM technique.

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# PROPOSED APPROACH

The following Fig.9. shows the steps proposed for SEM methodology which are further described in Table 2.
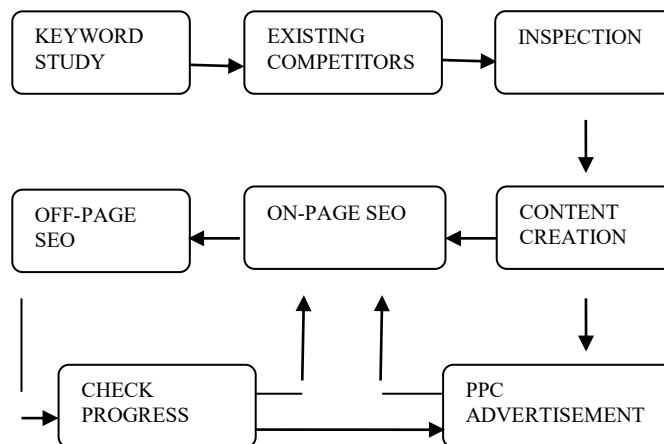


**FIG.9.** PROPOSED STEPS FOR SEM APPROACH FOR IMPROVING WEBSITE RANKING[10,19].

TABLE **2.** DESCRIPTION OF THE PROPOSED STEPS

| Step | Description |
|---|---|
| 1.     Keyword Study | <ul><li>The most important step to start with SEO.</li><li>Before creating a web page or a website one must know which keywords to work on.</li><li>Ideas to choose the correct keyword for the website can be taken from the tools like keyword planner available in Google Adwords as shown in fig 10.</li><li>This method includes three steps[4]:<br>i. Ensure that the site could be indexed in the search engines.<br>ii. Find the appropriate keywords.<br>iii. Use the chosen keywords to generate and convert traffic.</li><li>Keyword Density, keyword Density Analyzer, analyze keywords density are also some of the tools[9] used to find the best keywords for the website.</li><li>More tools like SEMrush[7] is also available but that is a paid tool , freely available for a limited period and that too with limitations like the number of searches per day.</li></ul> |

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| Step | Description |
|---|---|
| | • Certain sites like smallSEOtools.com[7] generates keyword density report for a given website in order to track how the traffic is coming to a particular site. |
| 2.     Existing Competitors | • Analyze the competitors i.e the websites that rank high in search engine results for the same business.<br>• As, the most commonly known websites for online shopping are Flipkart, Amazon,Paytm, Shopclues,Snapdeal and are competitors to each other .So, for purchasing products from these sites one of the most important factor are reviews posted by the other customers.<br>• Various ranking analysis might be possible on these websites. One such ranking analysis has been performed for customer reviews of product using opinion mining process where the general item was considered, and amongst the examinations performed, the most extreme score rating went to the Amazon site[15]. In this regard, further various factors like cost, quality, delivery days, Shipping Charges and brand of the product being sold on the respective sites were taken into consideration to assess the likelihood of sentiment sifting. Based on the analysis, the best score was achieved by the Amazon site for most of the cases. Conclusively, huge number of customers prefer Amazon for Online shopping [15]. This approach demonstrated the most effective online shopping sites and how they carried on, similarly every business have their own areas of interest. A proper analysis done with the competitors and knowing the factors because of which the business is lacking behind proves to be highly beneficial for SEO process. |
| 3. Inspection | • Analyze the keywords chosen by the rivals and how these keywords are used on their site.<br>• Some of the tools available for this purpose are SEO Digger, Top Competitor Tool-Webuildpages, Competition analysis tool-Seoscorecard[9]. |

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| Step | Description |
|---|---|
| 4.        Content Creation | • Creation of a website with a good design containing precise as well as meaningful content.  . |
| 5.            PPC Advertisement | • This step deals with the paid promotion of a website i.e, investing money in order to get a high rank in search results.<br>• Based on the auction conducted by search engines like Google or Bing, the highest bidder holds higher chances to get the most prominent place.<br>• In the proposed approach this is shown as an optional steps because marketers with low investment budget might not be able to invest on this.<br>• It is an advertising technique that requires marketers to pay only when an online user clicks on their ad. An auction is conducted by search engines like Google or Bing where the highest bidder holds higher chances to get the most prominent place.<br>• To display an advertisement in Paid or Inorganic Search Results marketers may[20]:-<br><br>    • Generate advertisement(ad).<br>    • Bid on keywords.<br>    • Pay the search engine a fees for every user click on the advertisement.<br><br>These cost-per click advertisements appear above and below the organic results. These ad spots are also sold in an auction. The more the CPC, the higher is the chance to be ranked as number 1 in the paid results; but even then, quality score can impact a websites ranking. Google Adwords is a software used for advertisement purposes which requires a certain payment but gains the traffic towards the website within a few minutes of account creation. |
| 6.        On-page SEO | • Optimization done on on-page factors i.e on web pages.<br>• Various factors  for on page-seo are[11]:- |

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| Step | Description |
|------|-------------|
|  | • Title of page<br>• Meta description<br>• Meta keyword<br>• Heading tag<br>• Alt attribute of image |
| 7.    Off-page SEO | • Optimization done somewhere other than the webpages.<br>• Various techniques  for off page-seo are[11]:-<br>  • Page Sitemap creation<br>  • Join groups<br>  • Promoting through Social networking sites<br>  • Building Links<br>  • Creating Blogs |
| 8.    Check Progress | • Monitor the website i.e visitors visiting the website. New visitors, old visitors, activities performed by them on site.<br>• Tools such as Google Analytics can be used for this purpose[8]. |

The proposed approach will help improve the website ranking following the organic as well as paid strategies, starting from analyzing the best suitable keywords that best define one's business to exploring the existing competitors in the marketplace for the same business and inspecting their content. This is followed by the planning done to decide what and how the content is to be included in the website. After the creation of the content, it is required to be optimized and monitored. This optimization process is done from time to time as the search engines keep updating their algorithms occasionally, with an optional step of promoting the site through financial investments which might not be possible for all marketers.

So, to meet this ever changing requirement and to avoid the dropping of a website rank in search engine results, these steps are shown in a loop and reflects that if there is no updating done on the websites, it might disappear from the search results and thus lose its audience.

Fig.10 shows the keyword planner tool available in Google AdWords that helps in selecting the accurate keyword before creating the content of the site. It provides the details about the average monthly searches done on Google for a particular keyword, its low and high range bidding for the top of page position of the website and the existing competition for that keyword and many more facts. It also provides the above details for the related keywords which offers more options to select the appropriate one.

| Keyword (by relevance) | Avg. monthly searches | Competition |
|---|---|---|
| order food online delhi | 1K – 10K | High |
| food delivery | 10K – 100K | Medium |
| delivery near me | 1K – 10K | Low |
| food delivery near me | 10K – 100K | Medium |
| order food online | 10K – 100K | High |
| delivery | 100K – 1M | Low |

**FIG. 10. RESULTS FOR "ORDER FOOD ONLINE DELHI" KEYWORD IN KEYWORD PLANNER TOOL PROVIDED BY GOOGLE ADWORDS.**

## SEO TOOLS IMPLEMENTATION

It helps us research right keywords, troubleshoot and diagnose errors, analyse SEO results, and compare site with competitor.

1) **KEYWORD STUDY TOOL**

**SEMrush :** Tool used for keyword research and analysis.

The results shown below are obtained by the tool SEMrush which is a paid tool available for a limited period of time i.e 14 days.

## Keyword Analytics: Related Keywords (order food online delhi)
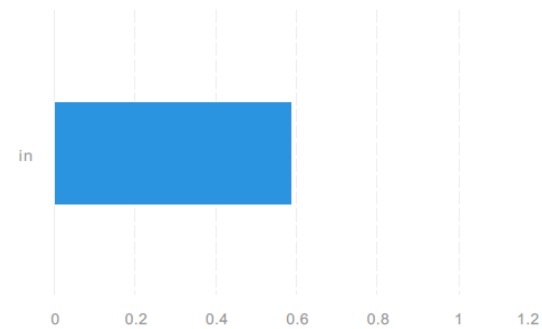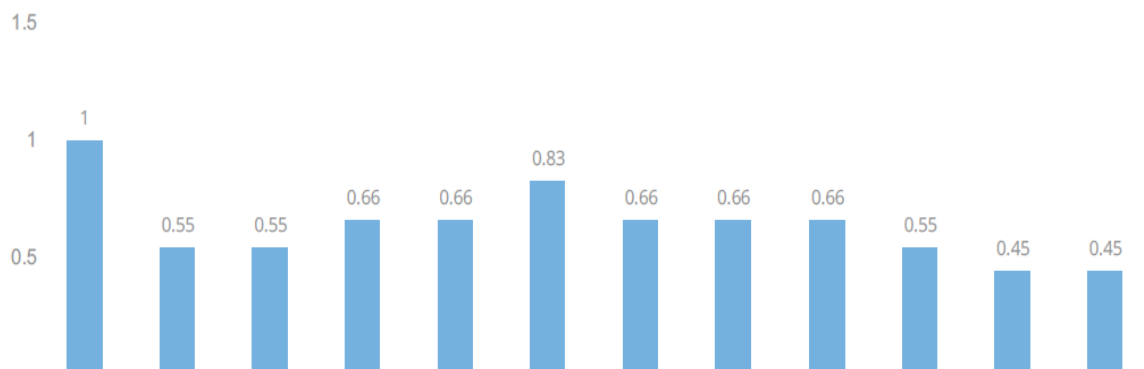


**Fig.3. Organic, paid search analysis and CPC distribution by SEMrush for keyword "Order food online Delhi"**



**Fig.4.Keyword Research trend analysis by SEMrush for keyword "Order food online Delhi"**

**Related Keywords 1 - 10 (874)**

IN | order food online delhi

| Keyword | Relevance ▼ | Volume | KD | CPC (USD) | Com. | Result | Trend |
|---|---|---|---|---|---|---|---|
| food online delhi | 75.00 | 210 | 61.62 | 0.43 | 0.70 | 236,000,000 | |
| order food delhi | 70.00 | 90 | 53.74 | 0.47 | 0.52 | 135,000,000 | |
| online food delivery delhi | 60.00 | 320 | 58.50 | 0.66 | 0.72 | 55,800,000 | |
| food delivery delhi | 55.00 | 480 | 64.88 | 0.46 | 0.56 | 76,100,000 | |

**Fig.5.Report generated for other relevant keywords by SEMrush for keyword "Order food online Delhi"**

| Keyword | Relevance ▼ | Volume | KD | CPC (USD) | Com. | Result | Trend |
|---|---|---|---|---|---|---|---|
| delhi food online | 55.00 | 20 | 49.90 | 0.44 | 0.89 | 224,000,000 | |
| home delivery food delhi | 50.00 | 140 | 67.18 | 0.46 | 0.69 | 91,700,000 | |
| home delivery delhi | 35.00 | 20 | 77.22 | 0.33 | 0.94 | 158,000,000 | |
| order dinner online | 30.00 | 480 | 65.15 | 0.30 | 0.60 | 356,000,000 | |
| how to order food online | 30.00 | 260 | 69.65 | 0.63 | 0.56 | 3,850,000,000 | |
| online food order sites | 30.00 | 260 | 57.64 | 0.60 | 0.62 | 1,390,000,000 | |

**Fig.6.Report generated for other relevant keywords by SEMrush for keyword "Order food online Delhi"**

## 2) EXISTING COMPETITORS SEARCH AND AUDIT TOOL

**Netpeak Checker:** is a multifunctional instrument for mass examination and correlation of the sites which encourages you play out a wide scope of assignments in web based promoting field. The apparatus gives you a chance to get information from the most mainstream benefits all around the globe, for example, Moz, Serpstat, Majestic, SEMrush, Alexa, Google, Bing, Whois, Facebook, Twitter, and so on.

To start working with the tool, there is a need to:
- have a list of URLs for which you want to get data.
- know the parameters that are to be analyzed (for getting some parameters, you'll need a paid access to an appropriate service)

The results for finding the top competitors for the keyword "order food online delhi" on Google, and the analysis for the content on their website using Netpeak Checker Tool are as follows:.

| # | URL | Position | Snippet Type | Title | Description |
|---|---|---|---|---|---|
| 1 | https://www.foodpanda.in/restaurants/city/d... | 1 | Result | Food Delivery Delhi \| Order Food O... | 30% Discount \| Order food. |
| 2 | https://www.zomato.com/ncr/order-food-on... | 2 | Result | Order food online in Delhi NCR, foo... | Order food online - Restaur |
| 3 | https://www.zomato.com/ncr/order-food-on... | 3 | Result | Order food from veg restaurants in... | Order food online from veg |
| 4 | https://www.swiggy.com/ | 4 | Result | Order food online from India's best... | Order food online from res. |
| 5 | https://www.swiggy.com/delhi | 4 | Sitelink | Delhi | (NULL) |
| 6 | https://www.swiggy.com/kolkata | 4 | Sitelink | Order food online from India's ... | (NULL) |
| 7 | https://www.swiggy.com/delhi/karnataka-fo... | 4 | Sitelink | Karnataka Food Centre | (NULL) |
| 8 | https://www.swiggy.com/support | 4 | Sitelink | Help & Support | (NULL) |
| 9 | https://www.foodcloud.in/ | 5 | Result | Online Food Order Delhi Noida Gur... | Order Food Online with Fo. |
| 10 | https://order.faasos.io/new delhi | 6 | Result | Faasos- Order Food Online in new d... | Order food online in new d |
| 11 | https://www.justdial.com/delhi-ncr/online-fo... | 7 | Result | Order Food Online from 415+ Resta... | Justdial Online Food Orderi |
| 12 | https://www.quora.com/Which-is-the-best-O... | 8 | Result | Which is the best Online food order... | It uses artificial intelligence. |
| 13 | https://www.ubereats.com/en-IN/new-delhi/ | 9 | Result | Delhi NCR Food Delivery \| Restauran... | Order delivery from your fa |
| 14 | http://www.rollmaal.in/ | 10 | Result | Rollmaal - Fast Food Restaurant, Or... | Order food online at Rollm. |

**Fig.7.Top Competitors for keyword "Order food online Delhi" on Google SERPS.**

| # | URL | Highlighted Text | Sitelinks | Rating (review snippet) | Featured Snippet |
|---|---|---|---|---|---|
| 1 | https://www.foodpanda.in/restaurants/city/d... | Order Food Online Delhi, fo... | (NULL) | (NULL) | FALSE |
| 2 | https://www.zomato.com/ncr/order-food-on... | Order food online, Delhi, fo... | (NULL) | (NULL) | FALSE |
| 3 | https://www.zomato.com/ncr/order-food-on... | Order food, Delhi, order, fo... | (NULL) | (NULL) | FALSE |
| 4 | https://www.swiggy.com/ | Order food online, food del... | Delhi, Order food online fr... | (NULL) | FALSE |
| 5 | https://www.swiggy.com/delhi | (NULL) | (NULL) | (NULL) | FALSE |
| 6 | https://www.swiggy.com/kolkata | (NULL) | (NULL) | (NULL) | FALSE |
| 7 | https://www.swiggy.com/delhi/karnataka-fo... | (NULL) | (NULL) | (NULL) | FALSE |
| 8 | https://www.swiggy.com/support | (NULL) | (NULL) | (NULL) | FALSE |
| 9 | https://www.foodcloud.in/ | Online Food Order Delhi, D... | (NULL) | (NULL) | FALSE |
| 10 | https://order.faasos.io/new delhi | Order Food Online, delhi, o... | (NULL) | (NULL) | FALSE |
| 11 | https://www.justdial.com/delhi-ncr/online-fo... | Order Food Online, delhi, F... | (NULL) | (NULL) | FALSE |
| 12 | https://www.quora.com/Which-is-the-best-O... | Online food order, Delhi, O... | (NULL) | (NULL) | FALSE |
| 13 | https://www.ubereats.com/en-IN/new-delhi/ | Delhi, Food Delivery, delhi,... | (NULL) | (NULL) | FALSE |
| 14 | http://www.rollmaal.in/ | Food, Order Food Online, D... | (NULL) | (NULL) | FALSE |

**Fig.8.Analysis of competitor's website.**

Below are the results for finding the top competitors for the keyword "order food online delhi" on Yahoo, and the analysis for the content on their website using Netpeak Checker Tool.

| # | URL | Position | Snippet Type | Title | Description |
|---|---|---|---|---|---|
| 1 | https://www.foodpanda.in/restaurants/city/d... | 1 | Result | Food Delivery Delhi \| Order Food O... | Online food delivery in Del... |
| 2 | https://www.swiggy.com/delhi | 2 | Result | Order food online in Delhi from Swi... | About the food culture in D... |
| 3 | https://www.zomato.com/ncr/order-food-on... | 3 | Result | Delhi NCR Restaurants, Restaurants i... | Restaurants in Delhi NCR; D... |
| 4 | https://www.foodcloud.in/ | 4 | Result | Online Food Order Delhi Noida Gur... | Order Food Online with Fo... |
| 5 | https://www.quora.com/Which-is-the-best-O... | 5 | Result | Which is the best Online food order... | It uses artificial intelligence... |
| 6 | https://www.foodpanda.in/ | 6 | Result | Food Home Delivery \| Order Online... | The foodpanda app is desi... |
| 7 | https://www.swiggy.com/ | 7 | Result | Swiggy - Official Site | Order food online from res... |
| 8 | https://www.freshmenu.com/ | 8 | Result | Order food online. Get fresh food d... | Order food online from Fre... |
| 9 | https://www.innerchef.com/ | 9 | Result | Innerchef - Gurgaon Food Home De... | Enjoy the best indian & con... |
| 10 | https://box8.in/ | 10 | Result | Box8 - Official Site | Order food online in Mumb... |

**Fig.13.Top Competitors for keyword "Order food online Delhi" on Yahoo SERPS.**

| # | URL | Highlighted Text | Sitelinks | Rating (review snippet) | Featured Snippet |
|---|---|---|---|---|---|
| 1 | https://www.foodpanda.in/restaurants/city/d... | food, delhi, Online, Delhi, o... | (NULL) | (NULL) | FALSE |
| 2 | https://www.swiggy.com/delhi | delhi, food, Delhi, Order, on... | (NULL) | (NULL) | FALSE |
| 3 | https://www.zomato.com/ncr/order-food-on... | Order Food, Delhi | (NULL) | (NULL) | FALSE |
| 4 | https://www.foodcloud.in/ | food, Order, Food, Online,... | (NULL) | (NULL) | FALSE |
| 5 | https://www.quora.com/Which-is-the-best-O... | Online, food, order, online,... | (NULL) | (NULL) | FALSE |
| 6 | https://www.foodpanda.in/ | food, ordering | (NULL) | (NULL) | FALSE |
| 7 | https://www.swiggy.com/ | Order, food, online, Delhi | (NULL) | (NULL) | FALSE |
| 8 | https://www.freshmenu.com/ | Order, food, online | (NULL) | (NULL) | FALSE |
| 9 | https://www.innerchef.com/ | food, Order | (NULL) | (NULL) | FALSE |
| 10 | https://box8.in/ | Order, food, online | (NULL) | (NULL) | FALSE |

**Fig.14.Analysis of competitor's website.**

3) **TOOL FOR CONTENT CREATION**

WordPress is an online, open source website creation tool written in PHP. It's probably the easiest and most powerful blogging and website content management system (or CMS) in existence today.

4) **TOOL FOR PPC ADVERTISEMENT**

AdWords (Google AdWords) is a publicizing administration by Google for organizations needing to show advertisements on Google and its promoting system. The AdWords program empowers organizations to set a spending limit for publicizing and possibly pay when individuals click the advertisements. The promotion administration is to a great extent concentrated on catchphrases.

Organizations that utilization AdWords can make pertinent advertisements utilizing catchphrases that individuals who search the Web utilizing the Google internet searcher would utilize. The catchphrase, when scanned for triggers your promotion to be appeared. AdWords at the top promotions that show up under the heading "Supported Links" found on

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the right-hand side or above Google indexed lists. In the event that your AdWords advertisement is tapped on, Google search clients are then coordinated to your site.
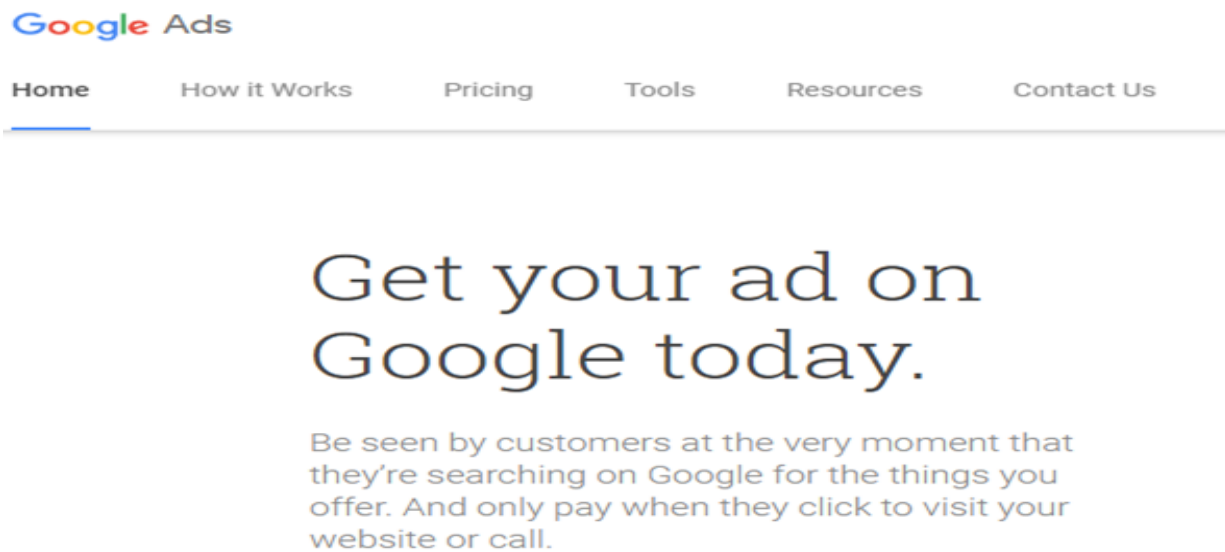


**Fig19.Snapshot of Google ADWORDS tool.[18]**

## 5) TOOL FOR CHECKING PROGRESS

Google Analytics is a free Web analytics service that provides statistics and basic analytical tools for search engine optimization (SEO) and marketing purposes. The service is available to anyone with a Google account.
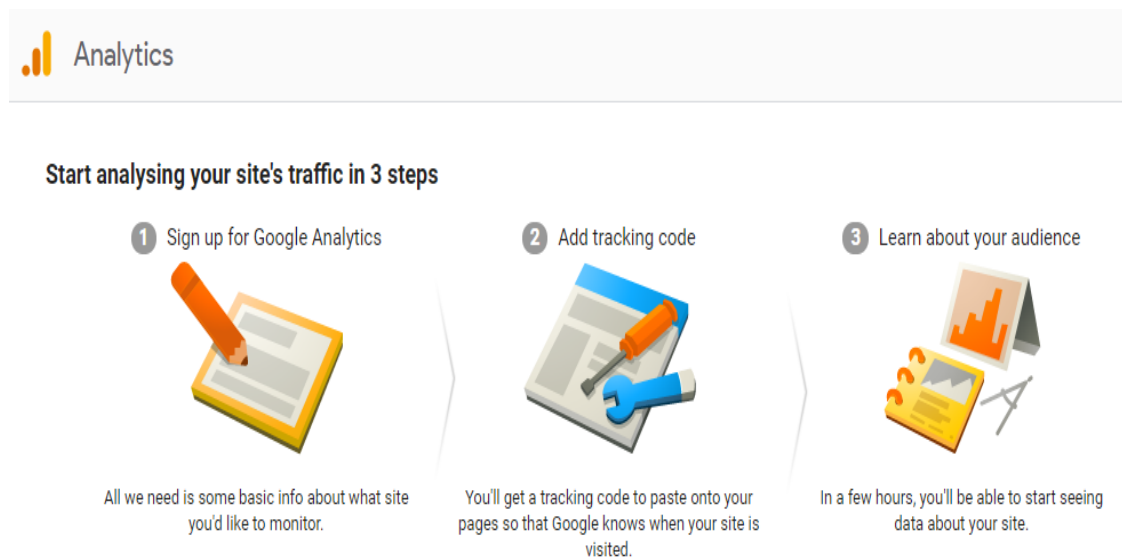


**Fig.20.Snapshot of Google ANALYTICS tool.[17]**

# STRING MATCHING ALGORITHMS

A Brute Force algorithmic program for string coordinating has 2 contributions to be thought of (a string of m characters to go searching for), and content (a long string of n characters to go looking in). Calculation begins with situating an example toward the beginning of each character of an example is contrasted with the following character, moving from left to appropriate, till every one of the character's zone unit found to coordinate. While the example isn't found and in this way the content isn't none the less depleted, an example is realigned to the one position to the best possible and contrasted with the comparing character, moving from left to right. For precedent think about a basic model:

We have been given a series of characters "THIS IS A SIMPLE PATTERN" and the content that we have to coordinate is "Basic". Presently we will begin coordinating the content from left to right we will continue moving one position each till we coordinate the pattern. This calculation has different focal points

**Karp-Rabin Algorithm**

- Pattern matching algorithm.
- Illustration of hashing.
- Multiple pattern search capacity.
- This algorithm calculates a hash value for each n character to be searched.

This algorithm is responsible for calculating a hash value for each given pattern. If the hash value for any n character is unequal, then the algorithm will search for the next sequence of M characters in the string. But if the array values fall in the same category then each n character will be placed from left to right and then every character will be searched one by one.

Assume we are given a string 'S', presently the string coordinating includes that 'P' is an example, P ought to happen in S and in the event that this occurs, at that point P restores the situation in S. The most basic methodology in string design coordinating is to coordinate the main letter of 'P' with the string 'S' and we continue moving the situation by one spot till the example is found. On the off chance that a match is discovered continue rehashing the means till the whole example is found. Kunth Morris and Pratt have a direct time calculation for example coordinating. The time intricacy of O(n) is vanquished by taking out the components in S that have been coordinated with P previously. There are normally two pieces of KMP calculation:

In our research we have figured out a way to extract the data from various social media sites and then match our existing pattern that we want to generate. The data that is extracted is known as unstructured data, it is here that we apply a combination of Boyer Moore and Composite Boyer Moore algorithm. An explanation regarding the Boyer Moore algorithm is discussed below. The Boyer Moore algorithm has a drastic approach in which given a string 'S' and we have to find the pattern 'P' so to do so the Boyer Moore algorithm matches the

characters from right to left. If the pattern is found at the first instance, then it is termed as a good suffix. If there is a mismatch, then we have to compute using the bad character rule. This algorithm is considered to be most efficient because there are no hash values to be considered.

We have extracted the data from google.com (a Search Engine). when we click on the ANALYZE button the unstructured data is loaded from the google.com site, we have to extract the structured data from the words. now when we click on the TEXT button the data is converted into structured data. It is only after this we apply the respective algorithms (Boyer Moore algorithm, Naive Bayes algorithm, Composite Boyer Algorithm). In our project we have mentioned the occurrences of searched keywords in a page

**KEYWORD FREQUENCY ANALYSIS FOR TOP 10 GOOGLE SEARCH RESULTS**
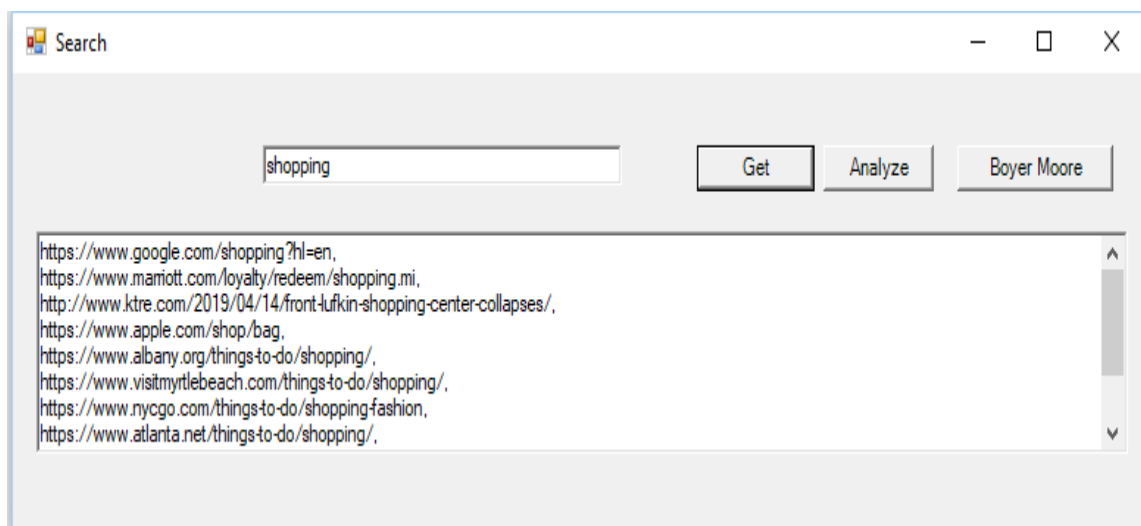


**RUNTIME COMPARISONS FOR BOYER MOORE AND ENHANCED ALGORITHM**

**INTERNATIONAL JOURNAL OF ADVANCES IN ENGINEERING RESEARCH**
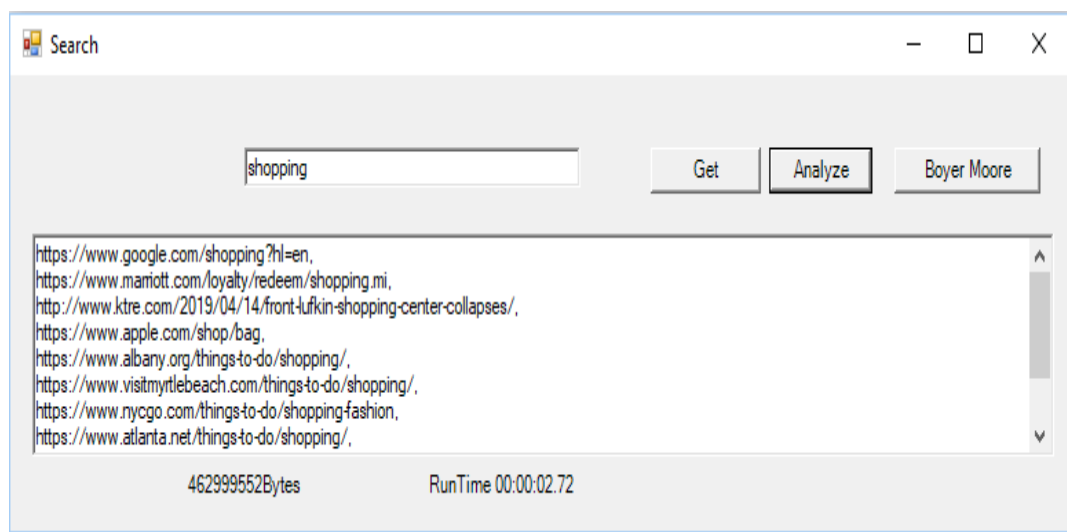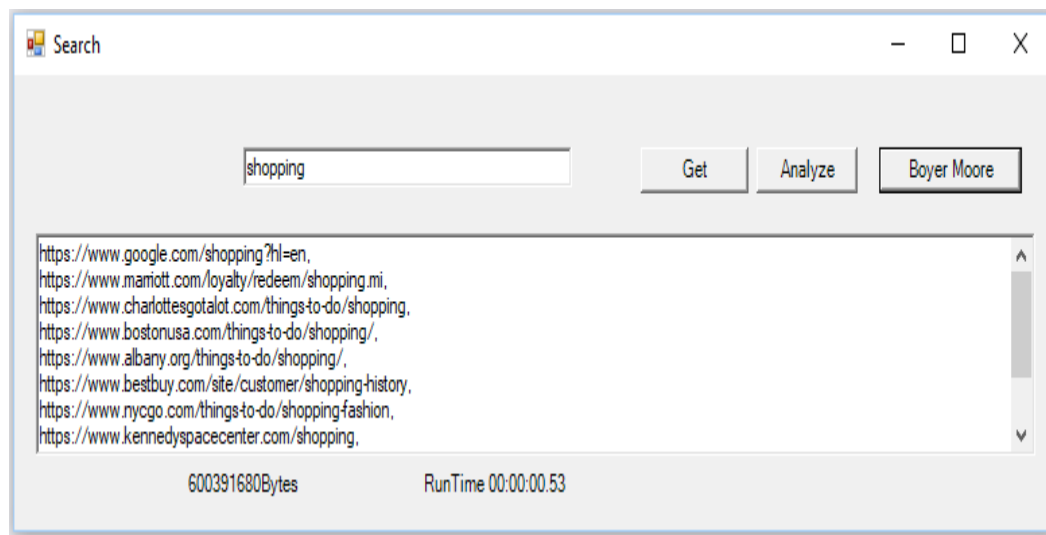
| 59 | https://www.g... | 2 | shopping |
| 60 | https://support... | 2 | shopping |
| 61 | https://www.c... | 44 | shopping |
| 62 | https://www.ex... | 74 | shopping |
| 63 | https://washin... | 46 | shopping |
| 64 | https://www.b... | 0 | shopping |
| 65 | https://visitana... | 10 | shopping |
| 66 | https://www.w... | 0 | shopping |
| 67 | https://www.y... | 18 | shopping |
| 68 | https://www.vi... | 12 | shopping |

## CONCLUSION AND FUTURE WORK

Search Engine Optimization is a never ending process. Various search engines face a challenge to display the appropriate content to its users when a search is done and this can be achieved by following some approach or using some marketing strategies. In this paper, results of various available tools for this purpose have been observed. Also some string matching algorithms have been discussed and Boyer Moore and Enhanced Boyer Moore algorithm have been used to analyse the keyword frequency in the top ten search results of google as keyword frequency in the content of a website is considered to be one of the major factor responsible for website ranking. Also, the efficiency of the enhanced algorithm has been analysed to the existing Boyer Moore algorithm.

This paper may further be extended in the future by developing an effective system or taking an experimental website and recording results for SEO for obtaining a higher ranking of a website on different search engines. As String matching algorithms play a major role in the working of a search engines these algorithms may further be analysed for indexing purposes, information extraction/retrieval and data mining techniques in order to increase the efficiency of a search engine.