Search Engine Results Ranking System and Techniques to Increase Website Visibility *

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Abstract

Search engines are powerful tools that help users find information on the web. They use various algorithms and techniques to crawl, index, optimalize and rank web pages based on their relevance and quality. However, not all web pages are equally visible to search engines, and some may be buried under millions of other results.

Therefore, web content creators and webmasters need to optimize their websites and content to increase their visibility and reach their target audience.

This document aims to explain the methods for increasing the website visibility, by first providing an overview of how search engines work, what factors affect their ranking, how are search engine sorting and optimalizing found results, in order to give an comprehensive explonation on how to align the website goals with the user needs and expectations. Then, it will describe some of the best practices and strategies that can be applied to improve the web design, content, keywords, links, and social media presence of a website. Finally, we will discuss some of the challenges and limitations of search engine optimization (SEO) and how to measure its effectiveness.

By following these guidelines, web content creators and webmasters can enhance their online presence and attract more visitors to their websites.

1 Introduction

In the contemporary digital landscape, search engines serve as the cornerstone of information discovery on the World Wide Web. These sophisticated tools use intricate algorithms and methodologies to traverse, catalog, optimize, and rank the vast expanse of web pages in accordance with their relevance and quality. Yet, not all web pages enjoy equal visibility. Many remain hidden beneath

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an avalanche of millions of other results, challenging the prospects of being discovered by users seeking information.

Consequently, web content creators and webmasters find themselves confronted with the request to enhance the visibility of their websites. This endeavor is essential for achieving alignment between the goals of a website and the expectations and needs of its target audience.

This document embarks on a comprehensible explanation of the mechanisms and techniques that underlie the augmentation of website visibility. Initially, it provides a foundational understanding of the inner workings of search engines, elucidating the factors influencing their ranking processes and the techniques employed for sorting and optimizing the results they yield. With this groundwork in place, we delve into an examination of the methods available to harmonize a website's objectives with the demands of its users.

Subsequently, this document delineates a compendium of best practices and strategies, encompassing aspects such as web design, content optimization, keyword selection, link building, and the cultivation of a robust social media presence.

Search Results: The search results are organized in three different categories i.e.:

- **Organic results:** The results that are come from search engine ranking algorithm. This is the area where search engine optimization techniques are applied. [16, p. 674](Type of search results)
- **Paid ads:** These are the paid results that often come on the top of the search results. [16, p. 674](Type of search results)
- **Blended results:** These are the videos, images, maps, locations, news, directions, movie, sports, ecommerce, local business, public transport, etc. [16, p. 675](Type of search results)

2 How does search engine search for information

In the following section, we will discuss the mechanisms of search engines. We will examine how they interpret user queries and navigate the vast digital landscape to retrieve relevant information.

This process involves complex algorithms and data structures, which we will explain in detail

2.1 Crawling

Crawling is the process used by search engine web crawlers (also known as bots or spiders) to visit and download a page and extract its links in order to discover additional pages. Pages known to the search engine are crawled periodically to determine whether any changes have been made to the page's content since the last time it was crawled. If a search engine detects changes to a page after crawling a page, it will update its index in response to these detected changes. [1, p. 245] (paragraph B), [20] (Introduction) (Search Engines)

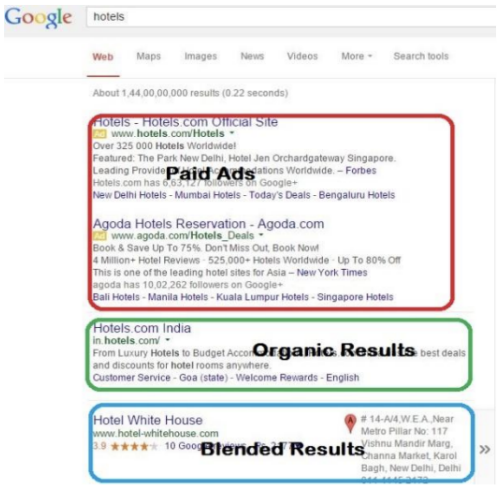

Figure 1: Type of search results [16, p. 675](Figure 3.)

Search engines use their own web crawlers to discover and access web pages. All commercial search engine crawlers begin crawling a website by downloading its robots.txt file, which contains rules about what pages search engines should or should not crawl on the website. The robots.txt file may also contain information about sitemaps- this contains lists of URLs that the site wants a search engine crawler to crawl. [20, p. 150] (Robots Exclusion Protocol)

Search engine crawlers use a number of algorithms and rules to determine how frequently a page should be re-crawled and how many pages on a site should be indexed. For example, a page that changes on a regular basis may be crawled more frequently than one that is rarely modified. [1, p. 248] (discussion)

When a search engine bot crawls a web page, it reviews all content and code that it can find. This includes plain text, images and alt text, links, etc. Crawlers note any links found on a site and crawl those pages too. In this way, site owners can create a link path for crawlers. [20, p. 154] (history of bias)

2.2 Indexing

After a page is crawled, the next step is to index its content. The indexed page is stored in a giant database, from where it can later be retrieved. Essentially, the process of indexing is identifying the words and expressions that best describe the page and assigning particular keywords to the page. The frequency of words is evaluated as well. [4, p. 2](Classical search) [4, p. 2](A. Search engines)

For a human it will not be possible to process such amounts of information but generally search engines deal just fine with this task. [4, p. 2](Classical search) [4, p. 2](A. Search engines)

Key words are then adjusted to their basic form (root word), their prefixes, suffixes, replacements, adverbs and other unnecessary parts are removed. So indexing can work more efficiently. [4, p. 2](Classical search)

2.3 Query Processing

This is how search engines interpret the search terms entered by users. The query is generally taken from a UI search box where the user enters the search query. The query may be pre-processed or transformed using techniques like spell checking, query suggestions, or query expansion (adding more terms to the query, to be more precise).

The resulting string / modified Query, is further compared with the indexes in the databases and with the information gathered by crawlers. With this process, web engines try to match users intentions [23, p. 2](Implementation of the distributed query processing system)

2.4 Paid results

Besides organic results, search engines also display paid results, which are essentially advertisements.Search engine will first start matching similarities with paid ad indexes and then will continue with regular list of indexes, that's why these results are usually distinguished from organic results but are also relevant to the user's query.

These paid results (ads) typically appear at the top of relevant search engine results pages (SERPs). [2, p. 2](Paid search advertising) [2, p. 2](Case study)

The whole process is nicely illustrated in the following picture.

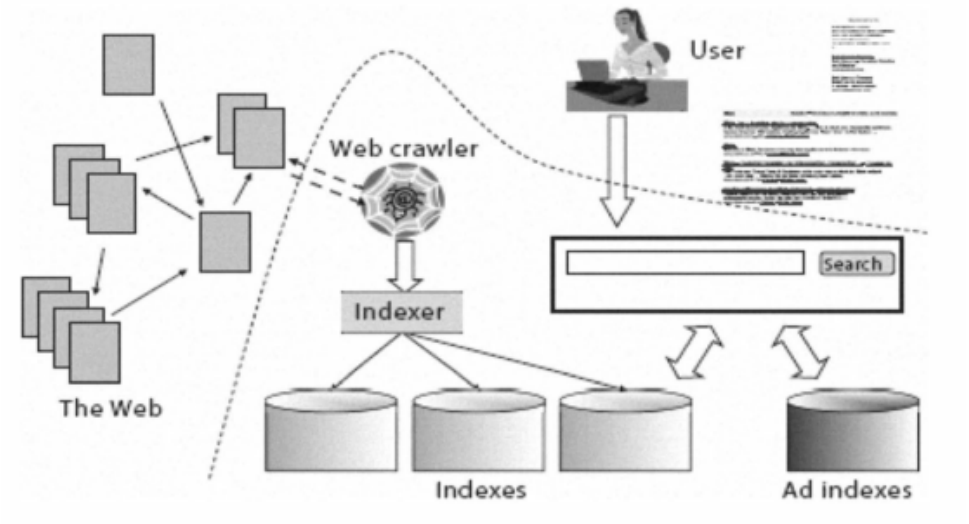

Figure 2: The various components of a web search engine.Source: [12, p. 2]

3 How does search engine search Rank results

Search engines analyze information across the web network and then rank them based on their own set qualitative measures. Every search engine use different methods.

In the past, it was far easier to rank higher in Search Engine Result Pages SERPs because it was easier to surpass the quality check measures. Presently search engines cognitive abilities have grown exceptionally and give more value to content published by established brands and less to new digital marketers. [17, p. 1](Introduction)

3.1 Search Engine Algorithms

There are many different ranking algorithms with hundrets of different parameters unique to every search engine. Some of the most popular search engines ranking algorithms include [18, p. 3](Introduction):

- **PageRank algorithm:** The ranking of page is gotten through whether referenced by other pages, how many pages are referencing this page and whether referenced by some important pages. [21, p. 1699](Overview Other Sorting Technologies)
- **HillTop algorithm:** determine the importance and relevance of the page through users input the query keywords in the query box. Searching result will be returned out the list page called "experts' document" [21, p. 1699](Overview Other Sorting Technologies)
- **Panda:**This algorithm update was designed to reduce the prevalence of low-quality, thin content in Google's top search results and to reward unique, compelling content. [18, p. 3](google SEO Algorithms)
- **Mobilegeddon:** This update was to ensure that mobile-friendly pages rank higher on mobile searches. [18, p. 3](google SEO Algorithms)

Of course, there many many more different ranking algorithms to every search engine. The ones mentioned above are the most popular. The main idea is that the more these measures match with your web, the higher the chances of your site getting ranked high on search engines. [18, p. 3](google SEO Algorithms)

3.2 Popularity

Popularity in the context of search engines often refers to the number of backlinks a webpage has. The more backlinks a webpage has from reputable sources, the more popular it is considered to be.

In addition, search engines like Google use hundreds of factors to determine both the relevance and popularity of webpages. These factors include things like page speed, mobile-friendliness, and content quality.

A popular and relevant website is likely to rank higher in search engine results, leading to increased visibility and potentially more traffic. [8, p. 676] (Introduction) [8, p. 677](The proposed stochastic model)

3.3 Search engine companies

Searchers using more than one search engine will likely have noticed that for a given query, the competing SERPs tend to show different rankings, and indeed often show different sites entirely. [13, p. 53] (Search Engine Companies and Programmers)

Every search engine has its own ranking system. For example Google Scholar will prefer educational websites and articles, on the other hand, Google Chrome will prefer more commercial sites. [13, p. 53] (Search Engine Companies and Programmers)

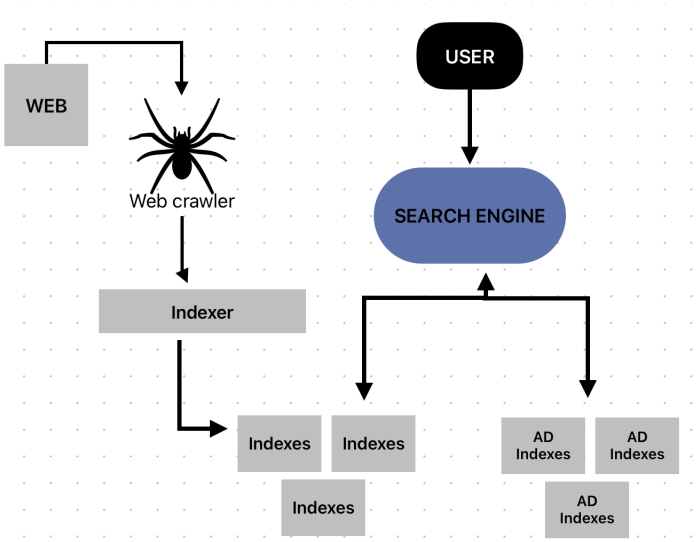

Figure 3: Revision of search engine components, Source:me, based on [12, p. 2]

4 Search engine optimization

Search engine optimization (SEO) is a way for digital marketers to increase value of their webpages for the search engine algorithms [17, p. 1] (Introduction)

4.1 Types of search engine optimization

SEO techniques can be categorized into two parts. These are on page SEO and off page SEO. SEO requires both on-site and off-site content optimization [17, p. 1](Introduction)

4.1.1 On Page SEO

Here the optimization is done in the coding of the website. It means to set up the content on the webpage according to the guidelines set by the search engines-It helps search engines understand what the content is about [17, p. 2](Introduction) On Page SEO Elements include:

- **Title Tag:** The most important part in good search optimization is the title part. The content of this tag is crawled on the priority basis. [19, p. 153](On Page SEO Elements)
- **Meta Tag:** The keyword and description tag are the two meta tags used by SEO. [19, p. 153](On Page SEO Elements)
- **Header tags (H1, H2 and H3)**: According search engine point of whatever the HTML tags are also important [19, p. 153](On Page SEO Elements)
- **Keyword Density:** The percentage of times a keyword or phrase appears on the web page compared to the total number of words on the page is called as a keyword density. Keyword Density is really important in terms of SEO. [19, p. 153](On Page SEO Elements)
- **Sitemap:** In Sitemap, all important website links are available with date and updated information of page. Search Engine will crawl the sitemap links on the priority basis [19, p. 153](On Page SEO Elements)

4.1.2 Off Page SEO

This is the technique for making back links. Back links are normally termed as link back from other website to our website. Back links are important for SEO because search engine algorithms give credit, if any website has large number of back links. As well as back links increase, website popularity will increase. [19, p. 153](On Page SEO Elements) [17, p. 1](Introduction)

Off site SEO is far more difficult and requires a lot more resources. [19, p. 153](On Page SEO Elements) [17, p. 1](Introduction)

4.2 Flavours of search engine optimization

There are two main ways to start an off-site digital marketing campaign named as White Hat and Black Hat techniques [17, p. 1](Introduction)

These search engine optimization technique can be categorized into three "flavors": [19, p. 153](Flavours of search engine optimization)

4.2.1 White Hat CEO

White Hat SEO refers to a set of SEO strategies that aim to improve a site's rankings on a search engine results page without violating the rules of the search engine. It adheres to the quality guidelines of search engines like Google and does not engage in spam methods to manipulate the algorithm. In simpler terms, it's a safe form of search engine optimization. [16, p. 675](White hat)

This technique includes original content writing with high quality keywords important html meta tags, heading tags, inbound links or internal links that help search engine to recognize the structure of the website. [16, p. 675](White hat)

Is a proper and best way to optimize any website according to user requirement. All search engines appreciates and supports this type of optimization technique, particularly the Google. [19, p. 153](White hat CEO)

4.2.2 Black Hat CEO

Uses techniques that challenge or abolish the rules and guidelines of search engines. These techniques are comparatively takes little time than white hat - SEO techniques and gave higher results also but now search engines are very much aware of such scam and fraud website they caught you easily and penalize you. [19, p. 153] (black hat SEO) [16, p. 675](black hat)

These methods may cause sudden increase your rank in search results but as per consequences you were easily penalized by search engines.It may harm the ranking of your website because of unusual behaviour of website. [16, p. 675](black hat SEO)

It includes auto generated pages, fraud backlinks creator, keyword stuffing, hidden text etc. [19, p. 153](Introduction) [16, p. 675](black hat SEO)

Parameter	**White Hat**	**Black Hat**
Time consumption	More	Less
Efficiency	More efficient	Less efficient method easily get penalize
Effect come into existence	Take long time	Take lesser time
Rules and Guidelines	Follow	Abolish
Properties	Original content writing with high quality keywords , important html meta tags, heading tags, inbound, links or internal links that links or internal links that help search engine to recognize the structure of the website	Auto generated pages, fraud backlinks creator, keyword stuffing, hidden text etc

Table 1: Table-1: Difference between black hat and white hat SEO [16, p. 677](Table-1)

4.3 Location-based Ranking Method

The average query length on a popular search engine is only 2.35 terms. Due to the short queries, the search engines are not able to accurately provide the results. [7, p. 329](Introduction)

To improve the relevancy, in this work Location-based Ranking Method (LBRM) is presented for Ranking Search Results in the search engine. The location is identified by the geographic information. [7, p. 333](Conclusion)

In the past, it was far easier to rank higher in Search Engine Result Pages SERPs because it was easier to surpass the quality check measures. Presently search engines cognitive abilities have grown exceptionally and give more value to content published by established brands and less to new digital marketers. [17, p. 1] (Introduction)

5 Search Engine Optimization benefits

- **Popularity:** By this technique popularity will increase. [19, p. 153] (Search Engine Optimization benefits)
- **Increase Visibility:** Once a website has been optimized, it will increase the visibility of website in search engine. More people will visit website. [19, p. 153] (Search Engine Optimization benefits)
- **Targeted Traffic:** Search Engine Optimization can increase the number of visitors to the website for the targeted keywords. [19, p. 153] (Search Engine Optimization benefits)
- **High ROI (Return of Investments):** An effective SEO campaign can bring a high return of investment than any other marketing. it will increase the volume of sales. [19, p. 153] (Search Engine Optimization benefits)
- **Online Marketing And Promotion:** best strategy for promotion [19, p. 153] (Search Engine Optimization benefits)

6 Conclusion

The problem that this article aimed to address is how to enhance the visibility of a website and achieve alignment between the goals of the website and the expectations and needs of its target audience. This article explained the inner workings of search engines, including factors that influence their ranking processes and techniques for sorting and optimizing the results they yield.

Additionally, my work offered best practices and strategies for optimizing website design, content, keyword selection, link building, and social media presence. Overall, my work aimed to provide a comprehensive "guide" for improving website visibility through search engine optimization techniques.

In conclusion, my work provided a detailed examination of the mechanisms and techniques involved in optimizing website visibility and achieving alignment with the target audience's expectations and needs. By following the best practices and strategies outlined in this guide, website owners and creators can improve their website's overall visibility and search engine ranking.

7 topics discussed at lectures

Social Contiguity of Informatics ("Spoločenské súvislosti" in Slovak)
The "Social Contiguity of Informatics" refers to how informatics brings individuals and communities closer together. The implementation of the internet and digital communication tools has enabled unlimited interaction across the globe, regardless of physical distances. [3, p. xi](Introduction)

Social media platforms and online communities facilitate shared experiences and discussions helps people everyday. Informatics also enhances accessibility to information and resources, regardless of location. [3, p. xi](Chapter 1 - Introduction)

Historical contiguity ("Historické súvislosti" in Slovak) The history of search engines began in the early 1980s with the creation of WHOis, the first domain search engine. This was followed by the development of Archie, which was the first search engine to crawl through an index of downloadable files. (first webcrawler) [22]

Search Engine Optimization (SEO), which enhances the visibility of websites on search engines, was officially termed around 1997. The growth of both fields highlights the rapid technological advancement in the digital age. Over the years, both search engines and SEO have evolved significantly with key developments like new algorithms, new ranging methods and with the launch of Google. [22]

Technology and people ("Technológia a ľudia" in Slovak) Search engines, (and technology as the whole), are deeply influenced by human elements. They are being designed by teams of engineers and data scientists, whose perspectives and biases shape the algorithms. These algorithms and Search Engine Optimization (SEO) techniques are purely based on understanding of human online behavior. [10, p. 260](Discussion)

Human evaluators also play a crucial role in assessing the quality of search results. Their feedback is used to fine-tune the search algorithms, creating a direct link between human judgment and search engine performance. [10, p. 260](Discussion)

Lastly, the interaction between technology and people in search engines raises ethical considerations such as data privacy, algorithmic errors, and potencial misuse of data. Recognizing the human element in search engines can lead to their more effective and ethical use. [10, p. 260](Discussion)

Sustainability and ethics ("Udržateľnosť a etika" in Slovak) Search engines, while providing invaluable services, also raise important questions about sustainability and ethics. They consume significant energy, with data centers accounting for about 1.3 percentage of global electricity use. As the digital economy grows, search engines must strive for energy efficiency to reduce their environmental impact. [15, p. iii]

Data privacy is another ethical concern. Search engines collect vast amounts of user data, necessitating transparent data collection practices and adherence to regulations like the GDPR in the EU and the CCPA in the US. [6]

Lastly, inclusive access is crucial. Search engines should provide equal access to information for all users, regardless of their geographical location, language, or disability. By addressing these challenges, search engines can contribute to a more sustainable and equitable digital economy.

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