SEARCH ENGINE ALGORITHM

Ever wonder how major search engines such as Google rank your website within their searches? Or how content such as videos or local listings are shown and ranked based on what the search engine considers most relevant to users? This paper will explain how search engines like google, rank the search results of a user. The paper will also investigate the aspects of how the process works and how each search engine is different based on efficiency and accuracy.

Search engines update their search algorithm regularly to provide their users with the most comprehensive and accurate results possible. While updating their algorithm they update their ways to index and rank their website, perform consistent checks concerning site content and overall search engine optimization (SEOs).

Google is the most popular, leading search engine race and is storing about two-thirds of the world's search engine queries to produce the most high-quality and relevant results. Their search engine routinely owns about 90% of the market, resulting in approx. 3.5 billion individual searches on their platform every day. Google search algorithm relies on the basics of Page rank algorithm to rank web pages in their search engine results. PageRank algorithm works by counting the number and quality of links to a page to determine a rough estimate of how important the website is. The underlying assumption is that more important websites are likely to receive more links from other websites. To further rank the websites that match to user's query, Google uses web crawlers that scan and index pages that were listed as part of the search results. Every page gets rated according to googles opinion of its authority and usefulness to the end-user. Then, using an algorithm, with over 200 known factors it orders them on a search result page.

Google's PageRank is a very complex algorithm and uses a mathematical formula to score the values of a page based on the quality of the pages linking it to it. The PageRank formula looks at the number of inbound links, external links, and the PageRank of those links to determine authority. The formula will create a score using a logarithmic scale with values ranging from 0-10. The higher the PageRank score of a page, the more authorities the page is. The below formula defines how the score is generated for a particular page.

$$PR(A) = (1-d) + d\,(PR(T1)/C(T1) + \ldots + PR(Tn)/C(Tn))$$

As per the original paper published in 1997, the formula assumes page A has pages T1…Tn which point to it (i.e., are citations). The parameter d is a damping factor that can be set between 0 and 1. We usually set d to 0.85. C(A) is defined as the number of links going out of page A. since the PageRank forms a probability distribution over webpages, so the sum of all web pages' PageRank's will be one. The formula also has a damping factor, which stimulates the probability of random users continuing to click on links as they browse the web. This is perceived to decrease with each link click. Therefore, when calculating the PageRank, the damping factor is multiplied by the total vote of a page.

When calculating the PageRank of a webpage, a few factors are considered that would easily influence the rank as the quality and quantity of the inbound linking pages, the number of outbound links on each lining page, and PageRank of each linking page. Other factors such as anchor text, the likelihood of being clicked, internal links, no-follow links, backlinks also positively impact your PageRank.

Back in the day, Google used to have a toolbar that could show you the PageRank of any webpage you visited. Unfortunately, this was removed in 2016 as SEOs became obsessed with PageRank, and it quickly became the most focused on SEO tactic, even above creating great content and a solid user experience.

The problem was that by publicly sharing a PageRank Score, this became easier for SEOs to manipulate, alongside influencing factors such as anchor text and the reasonable surfer model. SEOs knew how they could use PageRank to rank their websites higher, and they took advantage of this. Essentially, the Google team realized that making this score public was adding little value to website owners and decided to stop investing in the toolbar. Due to these reasons, google no longer publishes information or any detail that relates to the PageRank algorithm.

Bing's algorithm on the other hand differs a lot from Google. Bing search results are generated by using an algorithm that relies on machine learning and AI to match the search query a user enters the search engine with content in our index. It then breaks down how it ranks web pages based on relevance, quality & credibility, user engagement, freshness, location, and page load time.

Google and Bing have several differences. The table below gives a side-by-side comparison of the different factors used by Google and Bing's search engine algorithms.

Factor	Google	Bing
Mobile Optimization	Mobile first index and unique mobile ranking factors including sites that fit in mobile browsers	Sites should fit in mobile browsers and be mobile optimized
Title Tags	Used as a ranking signal	Used as a ranking signal
Content Keywords	Recognizes synonyms and context of a keyword	Exact keywords work better
DA & PA (Backlinks)	PA is weighted over DA with focus on quality of backlinks	Considers DA for rankings. Favors .edu and .gov sites and focuses more on quality
Flash Content	Doesn't support Flash	Can crawl Flash and encourages it in some cases
Meta Keyword Tags	Ignored completely	Used as a spam signal, not a ranking factor
Social Media	Unknown or little importance	Social media popularity and sharing are used for ranking

Double-Meaning Queries	For keywords with multiple meanings, the more popular site will rank first	Provides local search results
Context	Identifies natural word patterns and show search results based on relationships between the keywords.	Focuses on anchor text, keywords, title tags. Often misses out on the context in which users type in search words
Multimedia use	Relies more on text-based content	Ranks sites that use pictures, videos audio flashes and other content higher
Crawl factor	bots crawl through all the contents of a website before it comes up with a search ranking.	Bots don't read the entire page; they only look at the first 10kb of a page to award a rank
Performance	Sophisticated, can analyze and interpret complex semantic search terms	Capable of the same things but hasn't reached the same level of accuracy and understanding

Whatever the differences are between the two engines, one thing remains the same: both search engines reward high-quality content relevant to their users. It is the user's preference which search engine they would like to use based on their experience with it.

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