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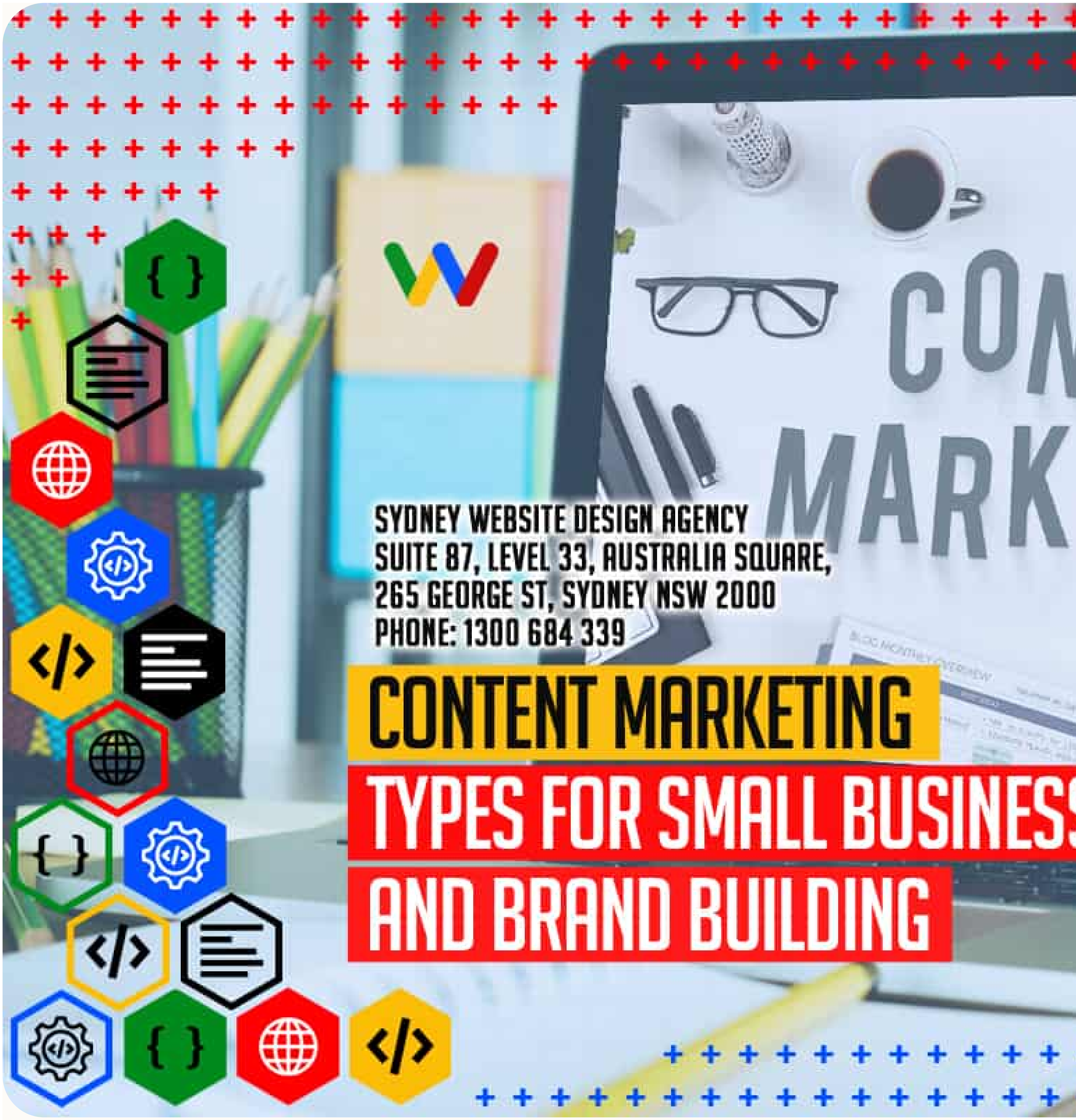
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"SEO" redirects here. For other uses, see Seo (disambiguation).

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Part of a series on

Internet marketing

- Search engine optimization
- Local search engine optimisation
- Social media marketing
- Email marketing
- Referral marketing
- Content marketing
- Native advertising

Search engine marketing

- Pay-per-click
- Cost per impression
- Search analytics
- Web analytics

Display advertising

- Ad blocking
- Contextual advertising
- Behavioral targeting

Affiliate marketing

- Cost per action
- Revenue sharing

Mobile advertising

Search engine optimization (**SEO**) is the process of improving the quality and quantity of website traffic to a website or a web page from search engines.[1][2] SEO targets unpaid search traffic (usually referred to as "organic" results) rather than direct traffic, referral traffic, social media traffic, or paid traffic.

Unpaid search engine traffic may originate from a variety of kinds of searches, including image search, video search, academic search,[3] news search, and industry-specific vertical search engines.

As an Internet marketing strategy, SEO considers how search engines work, the computer-programmed algorithms that dictate search engine results, what people search for, the actual search queries or keywords typed into search engines, and which search engines are preferred by a target audience. SEO is performed because a website will receive more visitors from a search engine when websites rank higher within a search engine results page (SERP), with the aim of either converting the visitors or building brand awareness.[4]

History

[edit]

Webmasters and content providers began optimizing websites for search engines in the mid-1990s, as the first search engines were cataloging the early Web. Initially, webmasters submitted the address of a page, or URL to the various search engines, which would send a web crawler to *crawl* that page, extract links to other pages from it, and return information found on the page to be indexed.[5]

According to a 2004 article by former industry analyst and current Google employee Danny Sullivan, the phrase "search engine optimization" probably came into use in 1997. Sullivan credits SEO practitioner Bruce Clay as one of the first people to popularize the term.[6]

Early versions of search algorithms relied on webmaster-provided information such as the keyword meta tag or index files in engines like ALIWEB. Meta tags provide a guide to each page's content. Using metadata to index pages was found to be less than reliable, however, because the webmaster's choice of keywords in the meta tag could potentially be an inaccurate representation of the site's actual content. Flawed data in meta tags, such as those that were inaccurate or incomplete, created the potential for pages to be mischaracterized in irrelevant searches.[7][*dubious* – *discuss*] Web content providers also manipulated attributes within the HTML source of a page in an attempt to rank well in search engines.[8] By 1997, search engine designers recognized that webmasters were making efforts to rank in search engines and that some webmasters were manipulating their rankings in search results by stuffing pages with excessive or irrelevant keywords. Early search engines, such as Altavista and Infoseek, adjusted their algorithms to prevent webmasters from manipulating rankings.[9]

By heavily relying on factors such as keyword density, which were exclusively within a webmaster's control, early search engines suffered from abuse and ranking manipulation. To provide better results to their users, search engines had to adapt to ensure their results pages showed the most relevant search results, rather than unrelated pages stuffed with numerous keywords by unscrupulous webmasters. This meant moving away from heavy reliance on term density to a more holistic process for scoring semantic signals.[10]

Search engines responded by developing more complex ranking algorithms, taking into account additional factors that were more difficult for webmasters to manipulate.[*citation needed*]

Some search engines have also reached out to the SEO industry and are frequent sponsors and guests at SEO conferences, webchats, and seminars. Major search engines provide information and guidelines to help with website optimization.[11][12] Google has a Sitemaps program to help webmasters learn if Google is having any problems indexing their website and also provides data on Google traffic to the website.[13] Bing Webmaster Tools provides a way for webmasters to submit a sitemap and web feeds, allows users to determine the "crawl rate", and track the web pages index status.

In 2015, it was reported that Google was developing and promoting mobile search as a key feature within future products. In response, many brands began to take a different approach to their Internet marketing strategies.[14]

Relationship with Google

[edit]

In 1998, two graduate students at Stanford University, Larry Page and Sergey Brin, developed "Backrub", a search engine that relied on a mathematical algorithm to rate the prominence of web pages. The number calculated by the algorithm, PageRank, is a function of the quantity and strength of inbound links.[15] PageRank estimates the likelihood that a given page will be reached by a web user who randomly surfs the web and follows links from one page to another. In effect, this means that some links are stronger than others, as a higher PageRank page is more likely to be reached by the random web surfer.

Page and Brin founded Google in 1998.[16] Google attracted a loyal following among the growing number of Internet users, who liked its simple design.[17] Off-page factors (such as

PageRank and hyperlink analysis) were considered as well as on-page factors (such as keyword frequency, meta tags, headings, links and site structure) to enable Google to avoid the kind of manipulation seen in search engines that only considered on-page factors for their rankings. Although PageRank was more difficult to game, webmasters had already developed link-building tools and schemes to influence the Inktomi search engine, and these methods proved similarly applicable to gaming PageRank. Many sites focus on exchanging, buying, and selling links, often on a massive scale. Some of these schemes involved the creation of thousands of sites for the sole purpose of link spamming.[18]

By 2004, search engines had incorporated a wide range of undisclosed factors in their ranking algorithms to reduce the impact of link manipulation.[19] The leading search engines, Google, Bing, and Yahoo, do not disclose the algorithms they use to rank pages. Some SEO practitioners have studied different approaches to search engine optimization and have shared their personal opinions.[20] Patents related to search engines can provide information to better understand search engines.[21] In 2005, Google began personalizing search results for each user. Depending on their history of previous searches, Google crafted results for logged in users.[22]

In 2007, Google announced a campaign against paid links that transfer PageRank.[23] On June 15, 2009, Google disclosed that they had taken measures to mitigate the effects of PageRank sculpting by use of the nofollow attribute on links. Matt Cutts, a well-known software engineer at Google, announced that Google Bot would no longer treat any no follow links, in the same way, to prevent SEO service providers from using nofollow for PageRank sculpting.[24] As a result of this change, the usage of nofollow led to evaporation of PageRank. In order to avoid the above, SEO engineers developed alternative techniques that replace nofollowed tags with obfuscated JavaScript and thus permit PageRank sculpting. Additionally, several solutions have been suggested that include the usage of iframes, Flash, and JavaScript.[25]

In December 2009, Google announced it would be using the web search history of all its users in order to populate search results.[26] On June 8, 2010 a new web indexing system called Google Caffeine was announced. Designed to allow users to find news results, forum posts, and other content much sooner after publishing than before, Google Caffeine was a change to the way Google updated its index in order to make things show up quicker on Google than before. According to Carrie Grimes, the software engineer who announced Caffeine for Google, "Caffeine provides 50 percent fresher results for web searches than our last index..."[27] Google Instant, real-time-search, was introduced in late 2010 in an attempt to make search results more timely and relevant. Historically site administrators have spent months or even years optimizing a website to increase search rankings. With the growth in popularity of social media sites and blogs, the leading engines made changes to their algorithms to allow fresh content to rank quickly within the search results.[28]

In February 2011, Google announced the Panda update, which penalizes websites containing content duplicated from other websites and sources. Historically websites have copied content from one another and benefited in search engine rankings by engaging in this practice.

However, Google implemented a new system that punishes sites whose content is not unique.[29] The 2012 Google Penguin attempted to penalize websites that used manipulative techniques to improve their rankings on the search engine.[30] Although Google Penguin has been presented as an algorithm aimed at fighting web spam, it really focuses on spammy links [31] by gauging the quality of the sites the links are coming from. The 2013 Google Hummingbird update featured an algorithm change designed to improve Google's natural language processing and semantic understanding of web pages. Hummingbird's language processing system falls under the newly recognized term of "conversational search", where the system pays more attention to each word in the query in order to better match the pages to the meaning of the query rather than a few words.[32] With regards to the changes made to search engine optimization, for content publishers and writers, Hummingbird is intended to resolve issues by getting rid of irrelevant content and spam, allowing Google to produce high-quality content and rely on them to be 'trusted' authors.

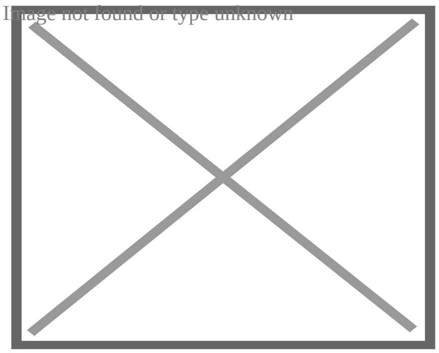
In October 2019, Google announced they would start applying BERT models for English language search queries in the US. Bidirectional Encoder Representations from Transformers (BERT) was another attempt by Google to improve their natural language processing, but this time in order to better understand the search queries of their users.[33] In terms of search engine optimization, BERT intended to connect users more easily to relevant content and increase the quality of traffic coming to websites that are ranking in the Search Engine Results Page.

Methods

[edit]

Getting indexed

[edit]



A simple illustration of the Pagerank algorithm. Percentage shows the perceived importance.

The leading search engines, such as Google, Bing, and Yahoo!, use crawlers to find pages for their algorithmic search results. Pages that are linked from other search engine-indexed pages do not need to be submitted because they are found automatically. The Yahoo! Directory and DMOZ, two major directories which closed in 2014 and 2017 respectively, both required manual submission and human editorial review.[34] Google offers Google Search Console, for which an XML Sitemap feed can be created and submitted for free to ensure that all pages are found, especially pages that are not discoverable by automatically following links[35] in addition to their URL submission console.[36] Yahoo! formerly operated a paid submission service that guaranteed to crawl for a cost per click;[37] however, this practice was discontinued in 2009.

Search engine crawlers may look at a number of different factors when crawling a site. Not every page is indexed by search engines. The distance of pages from the root directory of a site may also be a factor in whether or not pages get crawled.[38]

Mobile devices are used for the majority of Google searches.[39] In November 2016, Google announced a major change to the way they are crawling websites and started to make their index mobile-first, which means the mobile version of a given website becomes the starting point for what Google includes in their index.[40] In May 2019, Google updated the rendering engine of their crawler to be the latest version of Chromium (74 at the time of the announcement). Google indicated that they would regularly update the Chromium rendering engine to the latest version.[41] In December 2019, Google began updating the User-Agent string of their crawler to reflect the latest Chrome version used by their rendering service. The delay was to allow webmasters time to update their code that responded to particular bot User-Agent strings. Google ran evaluations and felt confident the impact would be minor.[42]

Preventing crawling

[edit]
Main article: Robots exclusion standard

To avoid undesirable content in the search indexes, webmasters can instruct spiders not to crawl certain files or directories through the standard robots.txt file in the root directory of the domain. Additionally, a page can be explicitly excluded from a search engine's database by using a meta tag specific to robots (usually <meta name="robots" content="noindex">). When a search engine visits a site, the robots.txt located in the root directory is the first file crawled. The robots.txt file is then parsed and will instruct the robot as to which pages are not to be crawled. As a search engine crawler may keep a cached copy of this file, it may on occasion crawl pages a webmaster does not wish to crawl. Pages typically prevented from being crawled include login-specific pages such as shopping carts and user-specific content such as search results from internal searches. In March 2007, Google warned webmasters that they should prevent indexing of internal search results because those pages are considered search spam.[43]

In 2020, Google sunsetted the standard (and open-sourced their code) and now treats it as a hint rather than a directive. To adequately ensure that pages are not indexed, a page-level robot's meta tag should be included.[44]

Increasing prominence

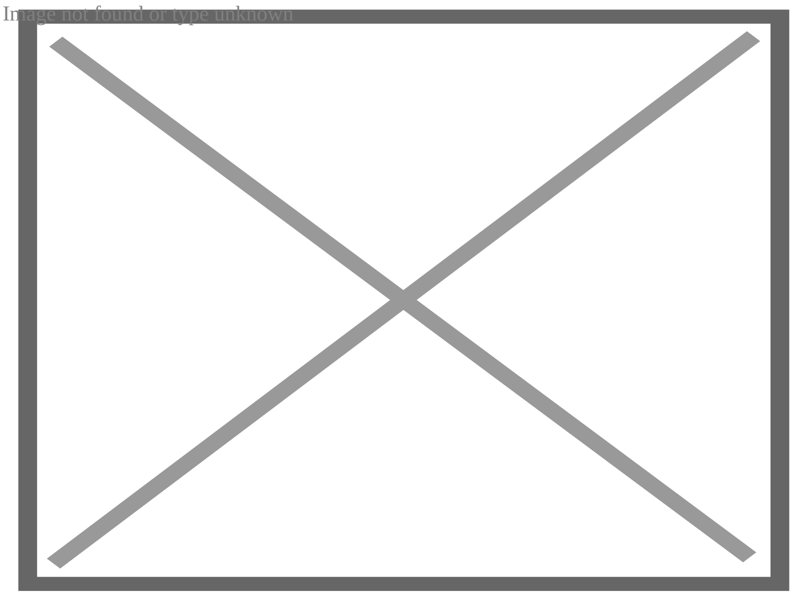
[edit]

A variety of methods can increase the prominence of a webpage within the search results. Cross linking between pages of the same website to provide more links to important pages may improve its visibility. Page design makes users trust a site and want to stay once they find it. When people bounce off a site, it counts against the site and affects its credibility.[45]

Writing content that includes frequently searched keyword phrases so as to be relevant to a wide variety of search queries will tend to increase traffic. Updating content so as to keep search engines crawling back frequently can give additional weight to a site. Adding relevant keywords to a web page's metadata, including the title tag and meta description, will tend to improve the relevancy of a site's search listings, thus increasing traffic. URL canonicalization of web pages accessible via multiple URLs, using the canonical link element[46] or via 301 redirects can help make sure links to different versions of the URL all count towards the page's link popularity score. These are known as incoming links, which point to the URL and can count towards the page link's popularity score, impacting the credibility of a website.[45]

White hat versus black hat techniques

[edit]



Common white-hat methods of search engine optimization

SEO techniques can be classified into two broad categories: techniques that search engine companies recommend as part of good design ("white hat"), and those techniques of which search engines do not approve ("black hat"). Search engines attempt to minimize the effect of the latter, among them spamdexing. Industry commentators have classified these methods and the practitioners who employ them as either white hat SEO or black hat SEO.[47] White hats tend to produce results that last a long time, whereas black hats anticipate that their sites may eventually be banned either temporarily or permanently once the search engines discover what they are doing.[48]

An SEO technique is considered a white hat if it conforms to the search engines' guidelines and involves no deception. As the search engine guidelines[11][12][49] are not written as a series of rules or commandments, this is an important distinction to note. White hat SEO is not just about following guidelines but is about ensuring that the content a search engine indexes and subsequently ranks is the same content a user will see. White hat advice is generally summed up as creating content for users, not for search engines, and then making that content easily accessible to the online "spider" algorithms, rather than attempting to trick the algorithm from its intended purpose. White hat SEO is in many ways similar to web development that promotes accessibility,[50] although the two are not identical.

Black hat SEO attempts to improve rankings in ways that are disapproved of by the search engines or involve deception. One black hat technique uses hidden text, either as text colored similar to the background, in an invisible div, or positioned off-screen. Another method gives a different page depending on whether the page is being requested by a human visitor or a search engine, a technique known as cloaking. Another category sometimes used is grey hat SEO. This is in between the black hat and white hat approaches, where the methods employed avoid the site being penalized but do not act in producing the best content for users. Grey hat SEO is entirely focused on improving search engine rankings.

Search engines may penalize sites they discover using black or grey hat methods, either by reducing their rankings or eliminating their listings from their databases altogether. Such penalties can be applied either automatically by the search engines' algorithms or by a manual site review. One example was the February 2006 Google removal of both BMW Germany and Ricoh Germany for the use of deceptive practices.[51] Both companies subsequently apologized, fixed the offending pages, and were restored to Google's search engine results page.[52]

Companies that employ black hat techniques or other spammy tactics can get their client websites banned from the search results. In 2005, the *Wall Street Journal* reported on a company, Traffic Power, which allegedly used high-risk techniques and failed to disclose those risks to its clients.[53] *Wired* magazine reported that the same company sued blogger and SEO Aaron Wall for writing about the ban.[54] Google's Matt Cutts later confirmed that Google had banned Traffic Power and some of its clients.[55]

As marketing strategy

[edit]

SEO is not an appropriate strategy for every website, and other Internet marketing strategies can be more effective, such as paid advertising through pay-per-click (PPC) campaigns, depending on the site operator's goals.[*editorializing*] Search engine marketing (SEM) is the practice of designing, running, and optimizing search engine ad campaigns. Its difference from SEO is most simply depicted as the difference between paid and unpaid priority ranking in search results. SEM focuses on prominence more so than relevance; website developers should regard SEM with the utmost importance with consideration to visibility as most navigate to the primary listings of their search.[56] A successful Internet marketing campaign may also depend upon building high-quality web pages to engage and persuade internet users, setting up analytics programs to enable site owners to measure results, and improving a site's conversion rate.[57][58] In November 2015, Google released a full 160-page version of its Search Quality Rating Guidelines to the public,[59] which revealed a shift in their focus towards "usefulness" and mobile local search. In recent years the mobile market has exploded, overtaking the use of desktops, as shown in by StatCounter in October 2016, where they analyzed 2.5 million websites and found that 51.3% of the pages were loaded by a mobile device.[60] Google has been one of the companies that are utilizing the popularity of mobile usage by encouraging websites to use their Google Search Console, the Mobile-Friendly Test, which allows companies to measure up their website to the search engine results and determine how user-friendly their websites are. The closer the keywords are together their ranking will improve based on key terms.[45]

SEO may generate an adequate return on investment. However, search engines are not paid for organic search traffic, their algorithms change, and there are no guarantees of continued referrals. Due to this lack of guarantee and uncertainty, a business that relies heavily on search engine traffic can suffer major losses if the search engines stop sending visitors.[61] Search engines can change their algorithms, impacting a website's search engine ranking, possibly resulting in a serious loss of traffic. According to Google's CEO, Eric Schmidt, in 2010, Google made over 500 algorithm changes – almost 1.5 per day.[62] It is considered a wise business practice for website operators to liberate themselves from dependence on search engine traffic.[63] In addition to accessibility in terms of web crawlers (addressed above), user web accessibility has become increasingly important for SEO.

International markets and SEO

[edit]

Optimization techniques are highly tuned to the dominant search engines in the target market. The search engines' market shares vary from market to market, as does competition. In 2003, Danny Sullivan stated that Google represented about 75% of all searches.[64] In markets outside the United States, Google's share is often larger, and data showed Google was the dominant search engine worldwide as of 2007.[65] As of 2006, Google had an 85–90% market share in Germany.[66] While there were hundreds of SEO firms in the US at that time, there were only about five in Germany.[66] As of March 2024, Google still had a significant market share of 89.85% in Germany.[67] As of June 2008, the market share of Google in the UK was close to 90% according to Hitwise.[68][*obsolete source*] As of March 2024, Google's market share in the UK was 93.61%.[69]

Successful search engine optimization (SEO) for international markets requires more than just translating web pages. It may also involve registering a domain name with a country-code top-level domain (ccTLD) or a relevant top-level domain (TLD) for the target market, choosing web hosting with a local IP address or server, and using a Content Delivery Network (CDN) to improve website speed and performance globally. It is also important to understand the local culture so that the content feels relevant to the audience. This includes conducting keyword research for each market, using hreflang tags to target the right languages, and building local backlinks. However, the core SEO principles—such as creating high-quality content, improving user experience, and building links—remain the same, regardless of language or region.[66]

Regional search engines have a strong presence in specific markets:

- China: Baidu leads the market, controlling about 70 to 80% market share.[70]
- South Korea: Since the end of 2021, Naver, a domestic web portal, has gained prominence in the country.[71][72]
- Russia: Yandex is the leading search engine in Russia. As of December 2023, it accounted for at least 63.8% of the market share.[73]

The Evolution of International SEO

[edit]

By the early 2000s, businesses recognized that the web and search engines could help them reach global audiences. As a result, the need for multilingual SEO emerged.[74] In the early years of international SEO development, simple translation was seen as sufficient. However, over time, it became clear that localization and transcreation—adapting content to local language, culture, and emotional resonance—were far more effective than basic translation.[75]

Legal precedents

[edit]

On October 17, 2002, SearchKing filed suit in the United States District Court, Western District of Oklahoma, against the search engine Google. SearchKing's claim was that Google's tactics to prevent spamdexing constituted a tortious interference with contractual relations. On May 27, 2003, the court granted Google's motion to dismiss the complaint because SearchKing "failed to state a claim upon which relief may be granted."[76][77]

In March 2006, KinderStart filed a lawsuit against Google over search engine rankings. KinderStart's website was removed from Google's index prior to the lawsuit, and the amount of traffic to the site dropped by 70%. On March 16, 2007, the United States District Court for the Northern District of California (San Jose Division) dismissed KinderStart's complaint without leave to amend and partially granted Google's motion for Rule 11 sanctions against KinderStart's attorney, requiring him to pay part of Google's legal expenses.[78][79]

See also

[edit]

- Competitor backlinking
- List of search engines
- Search engine marketing
- Search neutrality, the opposite of search manipulation
- User intent
- Website promotion
- Search engine results page
- Search engine scraping

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- Webmaster Guidelines from Microsoft Bing
- The Dirty Little Secrets of Search in The New York Times (February 12, 2011)

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Search engine optimization

Exclusion standards	Robots exclusion standard Meta element nofollow

Marketing topics	Online advertising Email marketing Display advertising Web analytics
Search marketing	Search engine marketing Social media optimization Online identity management Paid inclusion Pay per click Google bomb
Search engine spam	Spamdexing Web scraping Scraper site Link farm Link building
Linking	Backlink Link building Link exchange Organic linking
People	Danny Sullivan Matt Cutts Barry Schwartz
Other	Geotargeting Human search engine Stop words Content farm

Authority control databases: **National** Image not found or type unknown **Edit this at Wikidata**

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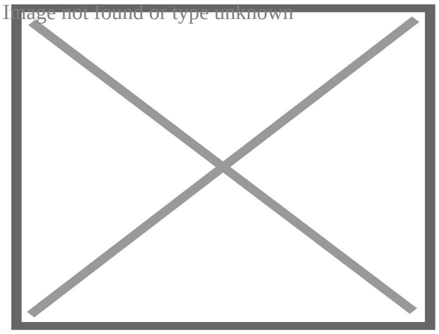
About Web crawler

This article is about the internet bot. For the search engine, see WebCrawler. "Web spider" redirects here; not to be confused with Spider web. "Spiderbot" redirects here. For the video game, see Arac (video game).



Architecture of a Web crawler

A **Web crawler**, sometimes called a **spider** or **spiderbot** and often shortened to **crawler**, is an Internet bot that systematically browses the World Wide Web and that is typically operated by search engines for the purpose of Web indexing (*web spidering*).[1]

Web search engines and some other websites use Web crawling or spidering software to update their web content or indices of other sites' web content. Web crawlers copy pages for processing by a search engine, which indexes the downloaded pages so that users can search more efficiently.

Crawlers consume resources on visited systems and often visit sites unprompted. Issues of schedule, load, and "politeness" come into play when large collections of pages are accessed. Mechanisms exist for public sites not wishing to be crawled to make this known to the crawling agent. For example, including a robots.txt file can request bots to index only parts of a website, or nothing at all.

The number of Internet pages is extremely large; even the largest crawlers fall short of making a complete index. For this reason, search engines struggled to give relevant search results in the early years of the World Wide Web, before 2000. Today, relevant results are given almost instantly.

Crawlers can validate hyperlinks and HTML code. They can also be used for web scraping and data-driven programming.

Nomenclature

[edit]

A web crawler is also known as a *spider*,[2] an *ant*, an *automatic indexer*,[3] or (in the FOAF software context) a *Web scutter*.[4]

Overview

[edit]

A Web crawler starts with a list of URLs to visit. Those first URLs are called the *seeds*. As the crawler visits these URLs, by communicating with web servers that respond to those URLs, it identifies all the hyperlinks in the retrieved web pages and adds them to the list of URLs to visit, called the *crawl frontier*. URLs from the frontier are recursively visited according to a set of policies. If the crawler is performing archiving of websites (or web archiving), it copies and saves the information as it goes. The archives are usually stored in such a way they can be viewed, read and navigated as if they were on the live web, but are preserved as 'snapshots'.[5]

The archive is known as the *repository* and is designed to store and manage the collection of web pages. The repository only stores HTML pages and these pages are stored as distinct files. A repository is similar to any other system that stores data, like a modern-day database. The only difference is that a repository does not need all the functionality offered by a database system. The repository stores the most recent version of the web page retrieved by the crawler.[*citation needed*]

The large volume implies the crawler can only download a limited number of the Web pages within a given time, so it needs to prioritize its downloads. The high rate of change can imply the pages might have already been updated or even deleted.

The number of possible URLs crawled being generated by server-side software has also made it difficult for web crawlers to avoid retrieving duplicate content. Endless combinations of HTTP GET (URL-based) parameters exist, of which only a small selection will actually return unique content. For example, a simple online photo gallery may offer three options to users, as specified through HTTP GET parameters in the URL. If there exist four ways to sort images, three choices of thumbnail size, two file formats, and an option to disable user-provided content, then the same set of content can be accessed with 48 different URLs, all of which may be linked on the site. This mathematical combination creates a problem for crawlers, as they must sort through endless combinations of relatively minor scripted changes in order to retrieve unique content.

As Edwards *et al.* noted, "Given that the bandwidth for conducting crawls is neither infinite nor free, it is becoming essential to crawl the Web in not only a scalable, but efficient way, if some reasonable measure of quality or freshness is to be maintained."[6] A crawler must carefully choose at each step which pages to visit next.

Crawling policy

[edit]

The behavior of a Web crawler is the outcome of a combination of policies:[7]

- a *selection policy* which states the pages to download,
- a *re-visit policy* which states when to check for changes to the pages,
- a *politeness policy* that states how to avoid overloading websites.
- a *parallelization policy* that states how to coordinate distributed web crawlers.

Selection policy

[edit]

Given the current size of the Web, even large search engines cover only a portion of the publicly available part. A 2009 study showed even large-scale search engines index no more than 40–70% of the indexable Web;[8] a previous study by Steve Lawrence and Lee Giles showed that no search engine indexed more than 16% of the Web in 1999.[9] As a crawler always downloads just a fraction of the Web pages, it is highly desirable for the downloaded fraction to contain the most relevant pages and not just a random sample of the Web.

This requires a metric of importance for prioritizing Web pages. The importance of a page is a function of its intrinsic quality, its popularity in terms of links or visits, and even of its URL (the latter is the case of vertical search engines restricted to a single top-level domain, or search engines restricted to a fixed Web site). Designing a good selection policy has an added difficulty: it must work with partial information, as the complete set of Web pages is not known during crawling.

Junghoo Cho *et al.* made the first study on policies for crawling scheduling. Their data set was a 180,000-pages crawl from the stanford.edu domain, in which a crawling simulation was done with different strategies.[10] The ordering metrics tested were breadth-first, backlink count and partial PageRank calculations. One of the conclusions was that if the crawler wants to download pages with high Pagerank early during the crawling process, then the partial Pagerank strategy is the better, followed by breadth-first and backlink-count. However, these results are for just a single domain. Cho also wrote his PhD dissertation at Stanford on web crawling.[11]

Najork and Wiener performed an actual crawl on 328 million pages, using breadth-first ordering.[12] They found that a breadth-first crawl captures pages with high Pagerank early in the crawl (but they did not compare this strategy against other strategies). The explanation given by the authors for this result is that "the most important pages have many links to them from numerous hosts, and those links will be found early, regardless of on which host or page the crawl originates."

Abiteboul designed a crawling strategy based on an algorithm called OPIC (On-line Page Importance Computation).[13] In OPIC, each page is given an initial sum of "cash" that is distributed equally among the pages it points to. It is similar to a PageRank computation, but it is faster and is only done in one step. An OPIC-driven crawler downloads first the pages in the crawling frontier with higher amounts of "cash". Experiments were carried in a 100,000-pages synthetic graph with a power-law distribution of in-links. However, there was no comparison with other strategies nor experiments in the real Web.

Boldi *et al.* used simulation on subsets of the Web of 40 million pages from the .it domain and 100 million pages from the WebBase crawl, testing breadth-first against depth-first, random ordering and an omniscient strategy. The comparison was based on how well PageRank computed on a partial crawl approximates the true PageRank value. Some visits that accumulate PageRank very quickly (most notably, breadth-first and the omniscient visit) provide very poor progressive approximations.[14][15]

Baeza-Yates *et al.* used simulation on two subsets of the Web of 3 million pages from the .gr and .cl domain, testing several crawling strategies.[16] They showed that both the OPIC strategy and a strategy that uses the length of the per-site queues are better than breadth-first crawling, and that it is also very effective to use a previous crawl, when it is available, to guide the current one.

Daneshpajouh *et al.* designed a community based algorithm for discovering good seeds.[17] Their method crawls web pages with high PageRank from different communities in less iteration in comparison with crawl starting from random seeds. One can extract good seed from a previously-crawled-Web graph using this new method. Using these seeds, a new crawl can be very effective.

Restricting followed links

[edit]

A crawler may only want to seek out HTML pages and avoid all other MIME types. In order to request only HTML resources, a crawler may make an HTTP HEAD request to determine a Web resource's MIME type before requesting the entire resource with a GET request. To avoid making numerous HEAD requests, a crawler may examine the URL and only request a resource if the URL ends with certain characters such as .html, .htm, .asp, .aspx, .php, .jsp, .jspx or a slash. This strategy may cause numerous HTML Web resources to be unintentionally skipped.

Some crawlers may also avoid requesting any resources that have a "?" in them (are dynamically produced) in order to avoid spider traps that may cause the crawler to download an infinite number of URLs from a Web site. This strategy is unreliable if the site uses URL rewriting to simplify its URLs.

URL normalization

[edit]
Main article: URL normalization

Crawlers usually perform some type of URL normalization in order to avoid crawling the same resource more than once. The term *URL normalization*, also called *URL canonicalization*, refers to the process of modifying and standardizing a URL in a consistent manner. There are several types of normalization that may be performed including conversion of URLs to lowercase, removal of "." and ".." segments, and adding trailing slashes to the non-empty path component.[18]

Path-ascending crawling

[edit]

Some crawlers intend to download/upload as many resources as possible from a particular web site. So *path-ascending crawler* was introduced that would ascend to every path in each URL that it intends to crawl.[19] For example, when given a seed URL of http://llama.org/hamster/monkey/page.html, it will attempt to crawl /hamster/monkey/, /hamster/, and /. Cothey found that a path-ascending crawler was very effective in finding isolated resources, or resources for which no inbound link would have been found in regular crawling.

Focused crawling

[edit]
Main article: Focused crawler

The importance of a page for a crawler can also be expressed as a function of the similarity of a page to a given query. Web crawlers that attempt to download pages that are similar to each other are called **focused crawler** or **topical crawlers**. The concepts of topical and focused crawling were first introduced by Filippo Menczer[20][21] and by Soumen Chakrabarti *et al.*[22]

The main problem in focused crawling is that in the context of a Web crawler, we would like to be able to predict the similarity of the text of a given page to the query before actually downloading the page. A possible predictor is the anchor text of links; this was the approach taken by Pinkerton[23] in the first web crawler of the early days of the Web. Diligenti *et al.*[24]

propose using the complete content of the pages already visited to infer the similarity between the driving query and the pages that have not been visited yet. The performance of a focused crawling depends mostly on the richness of links in the specific topic being searched, and a focused crawling usually relies on a general Web search engine for providing starting points.

Academic focused crawler

[edit]

An example of the focused crawlers are academic crawlers, which crawls free-access academic related documents, such as the *citeseerxbot*, which is the crawler of CiteSeer^X search engine. Other academic search engines are Google Scholar and Microsoft Academic Search etc. Because most academic papers are published in PDF formats, such kind of crawler is particularly interested in crawling PDF, PostScript files, Microsoft Word including their zipped formats. Because of this, general open-source crawlers, such as Heritrix, must be customized to filter out other MIME types, or a middleware is used to extract these documents out and import them to the focused crawl database and repository.[25] Identifying whether these documents are academic or not is challenging and can add a significant overhead to the crawling process, so this is performed as a post crawling process using machine learning or regular expression algorithms. These academic documents are usually obtained from home pages of faculties and students or from publication page of research institutes. Because academic documents make up only a small fraction of all web pages, a good seed selection is important in boosting the efficiencies of these web crawlers.[26] Other academic crawlers may download plain text and HTML files, that contains metadata of academic papers, such as titles, papers, and abstracts. This increases the overall number of papers, but a significant fraction may not provide free PDF downloads.

Semantic focused crawler

[edit]

Another type of focused crawlers is semantic focused crawler, which makes use of domain ontologies to represent topical maps and link Web pages with relevant ontological concepts for the selection and categorization purposes.[27] In addition, ontologies can be automatically updated in the crawling process. Dong et al.[28] introduced such an ontology-learning-based crawler using a support-vector machine to update the content of ontological concepts when crawling Web pages.

Re-visit policy

[edit]

The Web has a very dynamic nature, and crawling a fraction of the Web can take weeks or months. By the time a Web crawler has finished its crawl, many events could have happened, including creations, updates, and deletions.

From the search engine's point of view, there is a cost associated with not detecting an event, and thus having an outdated copy of a resource. The most-used cost functions are freshness and age.[29]

Freshness: This is a binary measure that indicates whether the local copy is accurate or not. The freshness of a page *p* in the repository at time *t* is defined as:

{\displaystyle F_{p}(t)={\begin{cases}1&{\rm {if}}~p~{\rm {~is~equal~to~the~local~copy~at~time

Image not found or type unknown

Age: This is a measure that indicates how outdated the local copy is. The age of a page *p* in the repository, at time *t* is defined as:

{\displaystyle A_{p}(t)={\begin{cases}0&{\rm {if}}~p~{\rm {~is~not~modified~at~time}}~t\\t-{\rm {r

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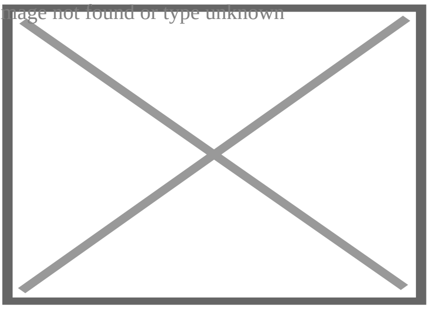
Coffman *et al.* worked with a definition of the objective of a Web crawler that is equivalent to freshness, but use a different wording: they propose that a crawler must minimize the fraction of time pages remain outdated. They also noted that the problem of Web crawling can be modeled as a multiple-queue, single-server polling system, on which the Web crawler is the server and the Web sites are the queues. Page modifications are the arrival of the customers, and switch-over times are the interval between page accesses to a single Web site. Under this model, mean waiting time for a customer in the polling system is equivalent to the average age for the Web crawler.[30]

The objective of the crawler is to keep the average freshness of pages in its collection as high as possible, or to keep the average age of pages as low as possible. These objectives are not equivalent: in the first case, the crawler is just concerned with how many pages are outdated, while in the second case, the crawler is concerned with how old the local copies of pages are.

Image not found or type unknown



Evolution of Freshness and Age in a web crawler

Two simple re-visiting policies were studied by Cho and Garcia-Molina:[31]

- Uniform policy: This involves re-visiting all pages in the collection with the same frequency, regardless of their rates of change.
- Proportional policy: This involves re-visiting more often the pages that change more frequently. The visiting frequency is directly proportional to the (estimated) change frequency.

In both cases, the repeated crawling order of pages can be done either in a random or a fixed order.

Cho and Garcia-Molina proved the surprising result that, in terms of average freshness, the uniform policy outperforms the proportional policy in both a simulated Web and a real Web crawl. Intuitively, the reasoning is that, as web crawlers have a limit to how many pages they can crawl in a given time frame, (1) they will allocate too many new crawls to rapidly changing pages at the expense of less frequently updating pages, and (2) the freshness of rapidly changing pages lasts for shorter period than that of less frequently changing pages. In other words, a proportional policy allocates more resources to crawling frequently updating pages, but experiences less overall freshness time from them.

To improve freshness, the crawler should penalize the elements that change too often.[32] The optimal re-visiting policy is neither the uniform policy nor the proportional policy. The optimal method for keeping average freshness high includes ignoring the pages that change too often, and the optimal for keeping average age low is to use access frequencies that monotonically (and sub-linearly) increase with the rate of change of each page. In both cases, the optimal is closer to the uniform policy than to the proportional policy: as Coffman *et al.* note, "in order to minimize the expected obsolescence time, the accesses to any particular page should be kept as evenly spaced as possible".[30] Explicit formulas for the re-visit policy are not attainable in general, but they are obtained numerically, as they depend on the distribution of page changes. Cho and Garcia-Molina show that the exponential distribution is a good fit for describing page changes,[32] while Ipeirotis *et al.* show how to use statistical tools to discover parameters that affect this distribution.[33] The re-visiting policies considered here regard all pages as homogeneous in terms of quality ("all pages on the Web are worth the same"), something that is not a realistic scenario, so further information about the Web page quality should be included to achieve a better crawling policy.

Politeness policy

[edit]

Crawlers can retrieve data much quicker and in greater depth than human searchers, so they can have a crippling impact on the performance of a site. If a single crawler is performing multiple requests per second and/or downloading large files, a server can have a hard time keeping up with requests from multiple crawlers.

As noted by Koster, the use of Web crawlers is useful for a number of tasks, but comes with a price for the general community.[34] The costs of using Web crawlers include:

- network resources, as crawlers require considerable bandwidth and operate with a high degree of parallelism during a long period of time;
- server overload, especially if the frequency of accesses to a given server is too high;
- poorly written crawlers, which can crash servers or routers, or which download pages they cannot handle; and
- personal crawlers that, if deployed by too many users, can disrupt networks and Web servers.

A partial solution to these problems is the robots exclusion protocol, also known as the robots.txt protocol that is a standard for administrators to indicate which parts of their Web servers should not be accessed by crawlers.[35] This standard does not include a suggestion for the interval of visits to the same server, even though this interval is the most effective way of avoiding server overload. Recently commercial search engines like Google, Ask Jeeves, MSN and Yahoo! Search are able to use an extra "Crawl-delay:" parameter in the robots.txt file to indicate the number of seconds to delay between requests.

The first proposed interval between successive pageloads was 60 seconds.[36] However, if pages were downloaded at this rate from a website with more than 100,000 pages over a perfect connection with zero latency and infinite bandwidth, it would take more than 2 months to download only that entire Web site; also, only a fraction of the resources from that Web server would be used.

Cho uses 10 seconds as an interval for accesses,[31] and the WIRE crawler uses 15 seconds as the default.[37] The MercatorWeb crawler follows an adaptive politeness policy: if it took *t* seconds to download a document from a given server, the crawler waits for 10*t* seconds before downloading the next page.[38] Dill *et al.* use 1 second.[39]

For those using Web crawlers for research purposes, a more detailed cost-benefit analysis is needed and ethical considerations should be taken into account when deciding where to crawl and how fast to crawl.[40]

Anecdotal evidence from access logs shows that access intervals from known crawlers vary between 20 seconds and 3–4 minutes. It is worth noticing that even when being very polite, and taking all the safeguards to avoid overloading Web servers, some complaints from Web server administrators are received. Sergey Brin and Larry Page noted in 1998, "... running a crawler which connects to more than half a million servers ... generates a fair amount of e-mail and phone calls. Because of the vast number of people coming on line, there are always those who do not know what a crawler is, because this is the first one they have seen."[41]

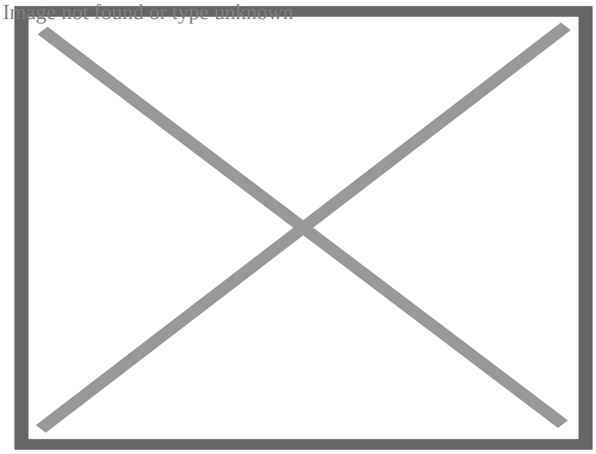
Parallelization policy

[edit]
Main article: Distributed web crawling

A parallel crawler is a crawler that runs multiple processes in parallel. The goal is to maximize the download rate while minimizing the overhead from parallelization and to avoid repeated downloads of the same page. To avoid downloading the same page more than once, the crawling system requires a policy for assigning the new URLs discovered during the crawling process, as the same URL can be found by two different crawling processes.

Architectures

[edit]



High-level architecture of a standard Web crawler

A crawler must not only have a good crawling strategy, as noted in the previous sections, but it should also have a highly optimized architecture.

Shkapenyuk and Suel noted that:[42]

> While it is fairly easy to build a slow crawler that downloads a few pages per second for a short period of time, building a high-performance system that can download hundreds of millions of pages over several weeks presents a number of challenges in system design, I/O and network efficiency, and robustness and manageability.

Web crawlers are a central part of search engines, and details on their algorithms and architecture are kept as business secrets. When crawler designs are published, there is often an important lack of detail that prevents others from reproducing the work. There are also emerging concerns about "search engine spamming", which prevent major search engines from publishing their ranking algorithms.

Security

[edit]

While most of the website owners are keen to have their pages indexed as broadly as possible to have strong presence in search engines, web crawling can also have unintended consequences and lead to a compromise or data breach if a search engine indexes resources that should not be publicly available, or pages revealing potentially vulnerable versions of software.

Main article: Google hacking

Apart from standard web application security recommendations website owners can reduce their exposure to opportunistic hacking by only allowing search engines to index the public parts of their websites (with robots.txt) and explicitly blocking them from indexing transactional parts (login pages, private pages, etc.).

Crawler identification

[edit]

Web crawlers typically identify themselves to a Web server by using the User-agent field of an HTTP request. Web site administrators typically examine their Web servers' log and use the user agent field to determine which crawlers have visited the web server and how often. The user agent field may include a URL where the Web site administrator may find out more information about the crawler. Examining Web server log is tedious task, and therefore some administrators use tools to identify, track and verify Web crawlers. Spambots and other malicious Web crawlers are unlikely to place identifying information in the user agent field, or they may mask their identity as a browser or other well-known crawler.

Web site administrators prefer Web crawlers to identify themselves so that they can contact the owner if needed. In some cases, crawlers may be accidentally trapped in a crawler trap or they may be overloading a Web server with requests, and the owner needs to stop the crawler. Identification is also useful for administrators that are interested in knowing when they may expect their Web pages to be indexed by a particular search engine.

Crawling the deep web

[edit]

A vast amount of web pages lie in the deep or invisible web.[43] These pages are typically only accessible by submitting queries to a database, and regular crawlers are unable to find these pages if there are no links that point to them. Google's Sitemaps protocol and mod oai[44] are intended to allow discovery of these deep-Web resources.

Deep web crawling also multiplies the number of web links to be crawled. Some crawlers only take some of the URLs in <a href="URL"> form. In some cases, such as the Googlebot, Web crawling is done on all text contained inside the hypertext content, tags, or text.

Strategic approaches may be taken to target deep Web content. With a technique called screen scraping, specialized software may be customized to automatically and repeatedly query a given Web form with the intention of aggregating the resulting data. Such software can be used to span multiple Web forms across multiple Websites. Data extracted from the results of one Web form submission can be taken and applied as input to another Web form thus establishing continuity across the Deep Web in a way not possible with traditional web crawlers.[45]

Pages built on AJAX are among those causing problems to web crawlers. Google has proposed a format of AJAX calls that their bot can recognize and index.[46]

Visual vs programmatic crawlers

[edit]

There are a number of "visual web scraper/crawler" products available on the web which will crawl pages and structure data into columns and rows based on the users requirements. One of the main difference between a classic and a visual crawler is the level of programming ability required to set up a crawler. The latest generation of "visual scrapers" remove the majority of the programming skill needed to be able to program and start a crawl to scrape web data.

The visual scraping/crawling method relies on the user "teaching" a piece of crawler technology, which then follows patterns in semi-structured data sources. The dominant method for teaching a visual crawler is by highlighting data in a browser and training columns and rows. While the technology is not new, for example it was the basis of Needlebase which has been bought by Google (as part of a larger acquisition of ITA Labs[47]), there is continued growth and investment in this area by investors and end-users.[*citation needed*]

List of web crawlers

[edit]
Further information: List of search engine software

The following is a list of published crawler architectures for general-purpose crawlers (excluding focused web crawlers), with a brief description that includes the names given to the different components and outstanding features:

Historical web crawlers

[edit]

- WolfBot was a massively multi threaded crawler built in 2001 by Mani Singh a Civil Engineering graduate from the University of California at Davis.
- World Wide Web Worm was a crawler used to build a simple index of document titles and URLs. The index could be searched by using the grep Unix command.
- Yahoo! Slurp was the name of the Yahoo! Search crawler until Yahoo! contracted with Microsoft to use Bingbot instead.

In-house web crawlers

[edit]

- Applebot is Apple's web crawler. It supports Siri and other products.[48]
- Bingbot is the name of Microsoft's Bing webcrawler. It replaced *Msnbot*.
- Baiduspider is Baidu's web crawler.
- DuckDuckBot is DuckDuckGo's web crawler.
- Googlebot is described in some detail, but the reference is only about an early version of its architecture, which was written in C++ and Python. The crawler was integrated with the indexing process, because text parsing was done for full-text indexing and also for URL extraction. There is a URL server that sends lists of URLs to be fetched by several crawling processes. During parsing, the URLs found were passed to a URL server that checked if the URL have been previously seen. If not, the URL was added to the queue of the URL server.
- WebCrawler was used to build the first publicly available full-text index of a subset of the Web. It was based on lib-WWW to download pages, and another program to parse and order URLs for breadth-first exploration of the Web graph. It also included a real-time crawler that followed links based on the similarity of the anchor text with the provided query.
- WebFountain is a distributed, modular crawler similar to Mercator but written in C++.
- Xenon is a web crawler used by government tax authorities to detect fraud.[49][50]

Commercial web crawlers

[edit]

The following web crawlers are available, for a price::

- Diffbot - programmatic general web crawler, available as an API
- SortSite - crawler for analyzing websites, available for Windows and Mac OS
- Swiftbot - Swiftype's web crawler, available as software as a service
- Aleph Search - web crawler allowing massive collection with high scalability

Open-source crawlers

[edit]

- Apache Nutch is a highly extensible and scalable web crawler written in Java and released under an Apache License. It is based on Apache Hadoop and can be used with Apache Solr or Elasticsearch.
- Grub was an open source distributed search crawler that Wikia Search used to crawl the web.
- Heritrix is the Internet Archive's archival-quality crawler, designed for archiving periodic snapshots of a large portion of the Web. It was written in Java.
- ht://Dig includes a Web crawler in its indexing engine.
- HTTrack uses a Web crawler to create a mirror of a web site for off-line viewing. It is written in C and released under the GPL.
- Norconex Web Crawler is a highly extensible Web Crawler written in Java and released under an Apache License. It can be used with many repositories such as Apache Solr, Elasticsearch, Microsoft Azure Cognitive Search, Amazon CloudSearch and more.
- mnoGoSearch is a crawler, indexer and a search engine written in C and licensed under the GPL (*NIX machines only)
- Open Search Server is a search engine and web crawler software release under the GPL.
- Scrapy, an open source webcrawler framework, written in python (licensed under BSD).
- Seeks, a free distributed search engine (licensed under AGPL).
- StormCrawler, a collection of resources for building low-latency, scalable web crawlers on Apache Storm (Apache License).
- tkWWW Robot, a crawler based on the tkWWW web browser (licensed under GPL).
- GNU Wget is a command-line-operated crawler written in C and released under the GPL. It is typically used to mirror Web and FTP sites.

- YaCy, a free distributed search engine, built on principles of peer-to-peer networks (licensed under GPL).

See also

[edit]

- Automatic indexing
- Gnutella crawler
- Web archiving
- Webgraph
- Website mirroring software
- Search Engine Scraping
- Web scraping

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- **v**
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Internet search

Types	Web search engine (List) Metasearch engine Multimedia search Collaborative search engine Cross-language search Local search Vertical search Social search Image search Audio search Video search engine Enterprise search Semantic search Natural language search engine Voice search

	○ Cross-language information retrieval ○ Search by sound ○ Search engine marketing ○ Search engine optimization ○ Evaluation measures ○ Search oriented architecture ○ Selection-based search ○ Document retrieval ○ Text mining ○ Web crawler
Tools	○ Multisearch ○ Federated search ○ Search aggregator ○ Index/Web indexing ○ Focused crawler ○ Spider trap ○ Robots exclusion standard ○ Distributed web crawling ○ Web archiving ○ Website mirroring software ○ Web query ○ Web query classification
Protocols and standards	○ Z39.50 ○ Search/Retrieve Web Service ○ Search/Retrieve via URL ○ OpenSearch ○ Representational State Transfer ○ Wide area information server
See also	○ Search engine ○ Desktop search ○ Online search

- **v**
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- **e**

Web crawlers

Internet bots designed for Web crawling and Web indexing

Active	○ 80legs ○ bingbot ○ Crawljax ○ Fetcher ○ Googlebot ○ Heritrix ○ HTTrack ○ PowerMapper ○ Wget
Discontinued	○ FAST Crawler ○ msnbot ○ RBSE ○ TkWWW robot ○ Twiceler
Types	○ Distributed web crawler ○ Focused crawler

Authority control databases: **National** Image not found or type unknown Germany **Edit this at Wikidata**

About Local search engine optimisation

v t e

Part of a series on

Internet marketing

Search engine optimization Local search engine optimisation Social media marketing Email marketing Referral marketing Content marketing Native advertising

Search engine marketing

Pay-per-click Cost per impression Search analytics Web analytics

Display advertising
Ad blocking Contextual advertising Behavioral targeting
Affiliate marketing
Cost per action Revenue sharing
Mobile advertising

Local search engine optimization (**local SEO**) is similar to (national) SEO in that it is also a process affecting the visibility of a website or a web page in a web search engine's unpaid results (known as its SERP, search engine results page) often referred to as "natural", "organic", or "earned" results.[1] In general, the higher ranked on the search results page and more frequently a site appears in the search results list, the more visitors it will receive from the search engine's users; these visitors can then be converted into customers.[2] Local SEO, however, differs in that it is focused on optimizing a business's online presence so that its web pages will be displayed by search engines when users enter local searches for its products or services.[3] Ranking for local search involves a similar process to general SEO but includes some specific elements to rank a business for local search.

For example, local SEO is all about 'optimizing' your online presence to attract more business from relevant local searches. The majority of these searches take place on Google, Yahoo, Bing, Yandex, Baidu and other search engines but for better optimization in your local area you should also use sites like Yelp, Angie's List, LinkedIn, Local business directories, social media channels and others.[4]

The birth of local SEO

[edit]

The origin of local SEO can be traced back[5] to 2003-2005 when search engines tried to provide people with results in their vicinity as well as additional information such as opening times of a store, listings in maps, etc.

Local SEO has evolved over the years to provide a targeted online marketing approach that allows local businesses to appear based on a range of local search signals, providing a distinct difference from broader organic SEO which prioritises relevance of search over a distance of searcher.

Local search results

[edit]

Local searches trigger search engines to display two types of results on the Search engine results page: local organic results and the 'Local Pack'.[3] The local organic results include web pages related to the search query with local relevance. These often include directories such as Yelp, Yellow Pages, Facebook, etc.[3] The Local Pack displays businesses that have signed up with Google and taken ownership of their 'Google My Business' (GMB) listing.

The information displayed in the GMB listing and hence in the Local Pack can come from different sources:[6]

- The owner of the business. This information can include opening/closing times, description of products or services, etc.
- Information is taken from the business's website
- User-provided information such as reviews or uploaded photos
- Information from other sources such as social profiles etc.
- Structured Data taken from Wikidata and Wikipedia. Data from these sources is part of the information that appears in Google's Knowledge Panel in the search results.

Depending on the searches, Google can show relevant local results in Google Maps or Search. This is true on both mobile and desktop devices.[7]

Google Maps

[edit]

Google has added a new Q&A features to Google Maps allowing users to submit questions to owners and allowing these to respond.[8] This Q&A feature is tied to the associated Google My Business account.

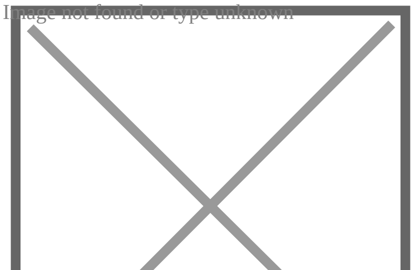
Google Business Profile

[edit]

Google Business Profile (GBP), formerly Google My Business (GMB) is a free tool that allows businesses to create and manage their Google Business listing. These listings must represent a physical location that a customer can visit. A Google Business listing appears when customers search for businesses either on Google Maps or in Google SERPs. The accuracy of these listings is a local ranking factor.

Ranking factors

[edit]



Local Online Marketing

Major search engines have algorithms that determine which local businesses rank in local search. Primary factors that impact a local business's chance of appearing in local search include proper categorization in business directories, a business's name, address, and phone number (NAP) being crawlable on the website, and citations (mentions of the local business on other relevant websites like a chamber of commerce website).[9]

In 2016, a study using statistical analysis assessed how and why businesses ranked in the Local Packs and identified positive correlations between local rankings and 100+ ranking factors.[10] Although the study cannot replicate Google's algorithm, it did deliver several interesting findings:

- Backlinks showed the most important correlation (and also Google's Toolbar PageRank, suggesting that older links are an advantage because the Toolbar has not been updated in a long time).
- Sites with more content (hence more keywords) tended to fare better (as expected).
- Reviews on GMB also were found to strongly correlate with high rankings.
- Other GMB factors, like the presence of photos and having a verified GMB page with opening hours, showed a positive correlation (with ranking) albeit not as important as reviews.
- The quality of citations such as a low number of duplicates, consistency and also a fair number of citations, mattered for a business to show in Local Packs. However, within the pack, citations did not influence their ranking: "citations appear to be foundational but not a competitive advantage."
- The authors were instead surprised that geotargeting elements (city & state) in the title of the GMB landing page did not have any impact on GMB rankings. Hence the authors suggest using such elements only if it makes sense for usability reasons.
- The presence of a keyword in the business name was found to be one of the most important factors (explaining the high incidence of spam in the Local Pack).
- Schema structured data is a ranking factor. The addition of the 'LocalBusiness' markup will enable you to display relevant information about your business to Google. This includes opening hours, address, founder, parent company information and much more.[11]
- The number of reviews and overall star rating correlates with higher rankings in the Google map pack results.

Local ranking according to Google

[edit]

Prominence, relevance, and distance are the three main criteria Google claims to use in its algorithms to show results that best match a user's query.[12]

- Prominence reflects how well-known is a place in the offline world. An important museum or store, for example, will be given more prominence. Google also uses information obtained on the web to assess prominence such as review counts, links, articles.
- Relevance refers to Google's algorithms attempt to surface the listings that best match the user's query.
- Distance refers to Google's attempt to return those listings that are the closest the location terms used in a user's query. If no location term is used then "Google will calculate distance based on what's known about their location".

Local ranking: 2017 survey from 40 local experts

[edit]

According to a group of local SEO experts who took part in a survey, links and reviews are more important than ever to rank locally.[13]

Near Me Queries

[edit]

As a result of both Google as well as Apple offering "near me" as an option to users, some authors[14] report on how Google Trends shows very significant increases in "near me" queries. The same authors also report that the factors correlating the most with Local Pack ranking for "near me" queries include the presence of the "searched city and state in backlinks' anchor text" as well as the use of the " 'near me' in internal link anchor text"

Possum Update

[edit]

An important update to Google's local algorithm, rolled out on the 1st of September 2016.[15] Summary of the update on local search results:

- Businesses based outside city physical limits showed a significant increase in ranking in the Google Local Pack
- A more restrictive filter is in place. Before the update, Google filtered listings linking to the same website and using the same phone number. After the update, listings get filtered if they have the same address and same categories though they belong to different businesses. So, if several dentists share the same address, Google will only show one of them.

Hawk update

[edit]

As previously explained (see above), the Possum update led similar listings, within the same building, or even located on the same street, to get filtered. As a result, only one listing "with greater organic ranking and stronger relevance to the keyword" would be shown.[16] After the Hawk update on 22 August 2017, this filtering seems to apply only to listings located within the same building or close by (e.g. 50 feet), but not to listings located further away (e.g.325 feet away).[16]

Fake reviews

[edit]

As previously explained (see above), reviews are deemed to be an important ranking factor. Joy Hawkins, a Google Top Contributor and local SEO expert, highlights the problems due to fake reviews:[17]

- Lack of an appropriate process for business owners to report fake reviews on competitors' sites. GMB support will not consider requests about businesses other than if they come from the business owners themselves. So if a competitor nearby has been collecting fake reviews, the only way to bring this to the attention of GMB is via the Google My Business Forum.
- Unlike Yelp, Google does not show a label warning users of abnormal review behavior for those businesses that buy reviews or that receive unnatural numbers of negative reviews because of media attention.
- Current Google algorithms do not identify unnatural review patterns. Abnormal review patterns often do not need human gauging and should be easily identified by algorithms. As a result, both fake listings and rogue reviewer profiles should be suspended.

See also

[edit]

- Local search (optimization)

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[edit]

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External links

[edit]

- Google Search Engine Optimization (SEO) Starter Guide
- Google Local Businesses Guide

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