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## Acknowledgement

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### CHAPTER 1

### Introduction

**1.1 Introduction to Search Engine**

Search Engine refers to a huge database of internet resources such as web pages, newsgroups, programs, images etc. It helps to locate information on World Wide Web User can search for any information by passing query in form of keywords or phrase. It then searches for relevant information in its database and return to the user.

**1.2 Introduction to Search Engine Optimization (SEO)**

Search engine optimization(SEO) is a set of rules for optimizing your website so that it can achieve higher rankings in search engines’ organic results. It is a great way to increase the quality of a web site by making it user-friendly, faster, and easier to navigates can be considered as a complete framework since the whole process has several rules ,a number of stages, and a set of controls

### CHAPTER 2

### Search Engine

**2.1 Search Engine Components**

 There are three basic components of a search engine

* Web Crawling **:** It is also known as spider or bots**.** It is a software component that traverses the web to gather information.
* Database : All the information on the web is stored in database. It consists of huge web resources.
* Search Interfaces : This component is an interface between user and the database. It helps the user to search through the database.

**2.2 Fundamentals of Search Engine**

**2.2.1 Crawling**

Search engines have their own crawlers, small bots that scan websites on the world wide web. These little bots scan all sections, folders, subpages, content, everything they can find on the website. Crawling is based on finding hypertext links that refer to other websites. By parsing these links, the bots can recursively find new sources to crawl.

**2.2.2 Indexing**

Once the bots crawl the data, it’s time for indexing. The index is basically an online library of websites. A website has to be indexed in order to be displayed in the search engine results page. Indexing is a constant process. Crawlers come back to each website to detect new data.

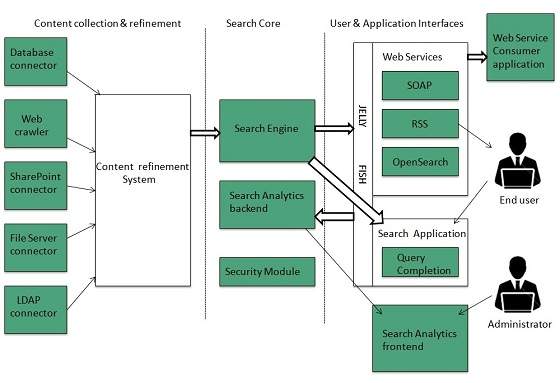
**2.2.3 Creating Results**

Search engines create the results once the user submits a search query. It’s a process of checking the query against all website records in the index. Based on the algorithm, the search engine picks the best results and creates an ordered list.

**2.3 Architecture**

The search engine architecture comprises of the three basic layers listed below:

* Content collection and refinement.
* Search core
* User and application interfaces



**2.4 Fundamentals of Search Engine**

Web crawler, database and the search interface are the major component of a search engine that makes search engine to work. Search engines make use of Boolean expression AND, OR, NOT to restrict and widen the results of a search.

Following are the steps that are performed by the search engine:

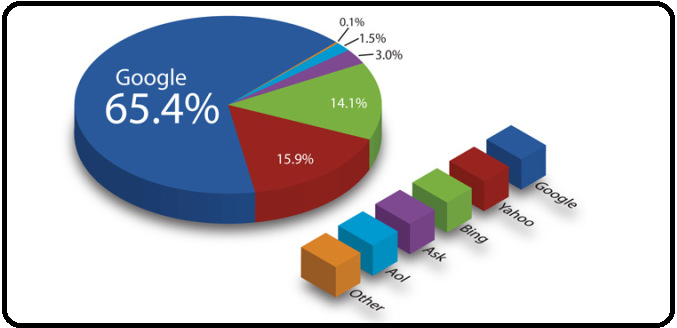
1. The search engine looks for the keyword in the index for predefined database instead of going directly to the web to search for the keyword.
2. It then uses software to search for the information in the database. This software component is known as web crawler.
3. Once web crawler finds the pages, the search engine then shows the relevant web pages as a result. These retrieved web pages generally include title of page, size of text portion, first several sentences etc.
4. User can click on any of the search results to open it.

**2.5 Search Engine Algorithm**

A search engine algorithm is a unique formula that determines how the websites are sorted in the search engine results page. It’s a trademark of each search engine. The algorithm is a mixture of various ranking factors. The most important ranking factor of all search engines is the relevancy. The main goal of search engines is to find what the internet user is looking for.

**2.6 Some Popular Search Engines**

|  |  |
| --- | --- |
| Search Engine | Description |
| Google | It was originally called Backrub. It is the most popular search engine globally. |
| Bing | It was launched in 2009 by Microsoft. It is the latest web-based search engine that also delivers Yahoo’s results. |
| Ask | It was launched in 1996 and was originally known as Ask Jeeves. It includes support for match, dictionary, and conversation question. |
| AltaVista | It was launched by Digital Equipment Corporation in 1995. Since 2003, it is powered by Yahoo technology. |



### CHAPTER 3

### Search Engine Optimization (SEO)

**3.1 Importance of SEO**

* Majority of search engine users are more likely to click on one of the top 5 suggestions in the search engine results pages. To take advantage of this and gain visitors to your web site or customers to your online store, your website needs to appear in one of the top positions.
* Search engines serve millions of users per day looking for answers to their questions or for solutions to their problems.
* SEO is not only about search engines, but good SEO practices improve the user experience and usability of a web site.
* Users trust search engines and having a presence in the top positions for the keywords the user is searching, increases the web site’s trust.
* SEO is important for the smooth running of a big web site. Web sites with more than one author can benefit from SEO in a direct and indirect way. Their direct benefit is an increase in search engine traffic and their indirect benefit is having a common framework to use before publishing content on the site.
* SEO can put you ahead of the competition. If two web sites are selling the same thing, the search engine optimized website is more likely to have more customers and make more sales.

**3.2 Types Of SEO**

**3.2.1 Traditional SEO**

When optimizing a website for search engine visibility there are two distinct aspects the optimization.

* + ON PAGE SEO
  + OFF PAGE SEO

A picture containing meter, drawing

Description automatically generated

**3.2.1.1 On page SEO**

On page optimization refers to any changes that you make to the actual content of the website. This on page optimization may relate to the text that visitors can see when they visit a website, or it may relate to the code behind the website that the search engine will able to read it but not the viewer. For instance, within the ‘head’ section of the HTML code for each page of the website, one may optimize the title, description and keywords. There are also many other on page optimization opportunities, such as using header tags and alt tags. The most important part of on page optimization is to make sure that all the keyword phrases are displayed within the body text of the page.

**3.2.1.2 Off page SEO**

Offsite search engine optimization consists of numerous activities, such as requesting links from other websites to our website. The most important offsite activity is the acquiring of links from other websites, to your website. the more of these links the better will be the result. However, it is also to be ensured that these links are high quality links, which means that one should be linking from related sites and sites that host quality information and that are highly rated by search engines like google. Links from sites with a high Google PageRank are much more valuable than links from website pages that have a low PageRank value.

**3.2.2 Technical SEO**

It is the advanced seo while on page and off page seo are traditional ones. Technical SEO refers to the process of optimizing your website for the crawling and indexing phase. Technical SEO can help search engines access, crawl, interpret and index your website without any problems. Technical SEO has nothing to do with the actual content of a website or with website promotion methods. This is the first stage in seo process.

**3.2.3 Based on Guidelines**

* + - 1. **White hat SEO**

**White hat SEO** means following the guidelines for optimization. Using only ethical tactics and following search engine guidelines . Usually take longer and costs more to implement. White hat SEO carries far less risk and tends to deliver lasting and compounding value over time. Most reputable SEO and content marketing companies use white hat SEO tools and techniques.

* + - 1. **Black hat SEO**

**Black hat SEO** will help in times when you want to go faster. It usually costs less because you are taking shortcuts to the top by going against Guidelines. In fact, many black hat SEO tactics are specifically called out in the guidelines. They carry the risk that your website or content will rank lower, or even being banned from search results.

* + - 1. **Grey hat SEO**

**Grey hat SEO** falls somewhere in the middle of the above two as these tactics are not specifically called out in Guidelines. One must be cautious taking this path as it is not safe to assume that just because a specific technique isn’t labeled or mentioned as being deceptive, that it will shield you from demotion or penalty.

**3.2.4 Negative SEO**

Negative SEO refers to the practice of using black hat and unethical techniques to sabotage a competitor’s rankings in search engines. Negative SEO attacks can take several different forms:

* Hacking your website.
* Building hundreds or thousands of spammy links to your website.
* Copying your content and distributing it all over the internet.
* Pointing links to your website using keywords like Viagra, poker online, and many others.
* Creating fake social profiles and ruining your reputation online.
* Removing the best backlinks a website has.

**3.3 Ranking and Visibility**

Ranking : This is a process that search engines use to determine where to place a web page in SERPs.

Visibility : This term describes how prominent a particular domain is in search engine results. With high visibility, your domain is prominent in SERPs. Lower search visibility occurs when a domain isn’t visible for many relevant search queries.

**3.4 Core Components of Strong SEO**

To optimize a site, one need to improve ranking factors in three areas technical website setup, content, and links.

**3.4.1 Technical Setup**

For a website to get rank, three things must happen:

1. A search engine needs find the pages on the Web.
2. Then, it must scan them to understand their topics and identify their keywords.
3. And finally, it needs to add them to its index — a database of all the content it has found on the web.

**3.4.1.1 Factors affecting Technical Setup**

* Simple URL Structures
* Website navigation and links
* Page speed
* Broken redirects
* Sitemaps

**3.4.2 Content**

Content is what customers want when searching. Regardless of what they’re looking for, it’s content that provides it. And the more of it you publish, the higher your chance for greater search visibility. Search engines use content to determine how to rank a page. It’s the idea of relevance between a page and a person’s search query.

**3.4.2.1 Keyword**

A keyword is a word or phrase an Internet user will enter into a search engine when trying to locate something, i.e., a product or information. For example, a website selling herbal tea will list keywords such as, “herbal,” “tea,” and “tea bags,” etc.

**3.4.2.2 Keyword density**

Keyword density is the numerical factor derived from dividing the number of words on the page of a website, by the number of keywords that are used within it. The more keywords used throughout a web, the better the website will rank for that keyword or phrase. Websites that have too high a density tend be considered as spam by search engines and may be excluded.

**3.4.2.2 Keyword research**

Keyword research is a core SEO task that involves identifying popular words and phrases people enter into search engines -make in an attempt to figure out what to rank for. Researching keywords gives marketers a better understanding of how high the demand is for certain keywords and how hard it would be to compete for those terms in the organic search results, offering some direction to optimization efforts.

**3.4.3 Links**

The first two areas, technical setup and content, are focused on increasing relevancy. Links are responsible for popularity. Links, also called backlinks, are references to your content on other websites. Every time another website mentions and points their readers to your content, you gain a backlink to your site.

Links Quality Factors:

* The popularity of a linking site.
* Topic relevance
* Trust in domain

**3.4 Monitoring and tracking SEO results**

Technical setup, content, and links are critical to getting a website into the search results. Monitoring the efforts helps improve your strategy further. Measuring SEO success means tracking data about traffic, engagement, and links. Key Performance Indicators (KPIs) are used to estimate the results of seo.

Some of the most common KPIs

* Organic traffic growth
* Keyword rankings (split into branded and non-branded terms)
* Conversions from organic traffic
* Average time on page and the bounce rate
* Top landing pages attracting organic traffic
* Number of indexed pages
* Links growth (including new and lost links)

**3.5 Limitations**

It is important to understand the limitations of search engine optimization techniques. For example ,there are a lot of companies sending out spam emails offering to get your website onto the first page of Google in a next week and so. This is not practically possible as seo has its own limitations .

* Good SEO takes effort and good SEO takes time.
* One of the other limitations is that SEO doesn’t promise results.
* One can be penalized if done in a wrong way.
* Left at the mercy of an algorithm.

### CHAPTER 4

### Google

**4.1 Google – Popular search engine**

Google is the giant in the industry and has probably the most sophisticated algorithm. It includes machine learning, AI and RankBrain, another algorithm that can tweak the weights of ranking factors according to user’s behavior and quality of previous results. More than 70% internet users worldwide do their searches on Google since 1998. Google uses more than 200 ranking factors. Some of the factors google consider while optimize the content are Crawlability, Page speed, Backlinks, Content quality and many more.

**4.2 Google Algorithms**

Algorithm : An algorithm is a well-defined procedure that allows a computer to solve a problem.

Google uses different algorithms to optimize the search results. There are many algorithms used by google, each algorithm has a particular purpose to serve. Each algorithm aims at a specific task. One of the most important things is Google ranks web pages, not web sites meaning all the web pages of a web site are ranked individually aiming better results.

Some of the algorithms are as followed :

* **Panda** : Panda assigns a “quality score” to web pages. This score is then used as a ranking factor.
* **Penguin** : Google Penguin’s objective is to down-rank sites whose links it deems manipulative. Penguin has been part of Google’s core algorithm. It works in real time.
* **Hummingbird** : Hummingbird helps Google better interpret search queries and provide results that match searcher intent. While keywords continue to be important, Hummingbird makes it possible for a page to rank for a query even if it doesn’t contain the exact words the searcher entered. This is achieved with the help of natural language processing that relies on latent semantic indexing, co-occurring terms and synonyms.
* **Pigeon** : Pigeon affects those searches in which the user’s location plays an important part. The update created closer ties between the local algorithm and the core algorithm: traditional SEO factors are now used to rank local results.

**4.3 PageRank**

PageRank is a mathematical formula that judges the “value of a page” by looking at the quantity and quality of other pages that link to it. Its purpose is to determine the relative importance of a given webpage in a network. . It determines the number of links pointing to a website, the amount of relevant content it contains, and then assigns it a number between 1 and 10; The higher a page rank, the better chance a website has of appearing at the top of an Internet search result page.

**4.4 Optimization Factors**

Factors that play a vital role in google search optimization are

* Crawlability
* Page speed
* Mobile friendliness
* Search intent
* Quality content
* Authority

### CHAPTER 5

### Conclusion

Without actively positioning its content in search results, no website can get the desired traffic. By increasing the search visibility, you can bring more visitors, and in turn, conversions and sales. Ultimately, SEO is good for several things and should be a foundational element of your overall marketing strategy. However, it does have a its limitations (just like everything) and those should be considered when determining your marketing strategy. Without actively positioning its content in search results, no business can survive long. By the end of this one can understand the importance of seo and how it works.

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