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Effects of Web3 on Search Engines



Abstract:

The decentralized solution provided by Web3 empowers users and gives them back control over the Internet. Web3 focuses on data ownership and protection in order to increase the Internet's security and fairness for all users. In order to carry out research on the data stored in a blockchain database for various purposes as search engines optimization are proposed to access the data. Search engine is still to be emerged area in blockchain technology. The security level that the user and data supplier require should be taken into account by the search system. It seeks to guarantee the availability, confidentiality, and integrity of the data stored in a blockchain. Although blockchain technology may offer us more dependable and practical services. We also need to address the security concerns and difficulties like scalability, latency, usability etc. associated with this method

Keywords: SEO, Web3.0, Blockchain, Security, Privacy.

1. Introduction:

The basic principle of applications developed for Web3 is that users hold full control over the data, including ownership, identifiers, and tokens, as opposed to having that power centralised as it was in Web1 and Web2.

The process of making changes to a web page or website in order to increase the frequency and volume of organic traffic through search engines is known as Search engine optimization (SEO) according to [1]. Google has taken recourse to its dominant position inside the web search market to create a sizable network of extra useful and appealing customer services. SEO is the process of assisting in increasing the position of your web page on Google as well as other search engines [2]. Mainly to the constraints of today's internet era, search engine providers like Google have started publishing significant research and studies that support business growth by using user-based statistics.

These services appeal to users since they are reasonably priced and at times even free. But this centralization is disturbing because all of these offerings are linked to your unique Google identity. As a result, Google collects data from tracking your online activities and puts it all into a special algorithm.

Search engines have three primary stages [3]

- **Crawling:** It is a kind of computer programme that gathers web pages and builds and outputs an index based on text. Crawling is the process through which web-surfing spiders used by search engines or crawlers locate and collect available content.
- **Indexing:** The process of content processing and database storage. In order to allow people to search internet information effectively, it must first be analyzed, organized, and kept in sizable databases.
- **Ranking:** Ranking pertains to the placement of online information on a search engine's results page based on the specific user query. A search query that returns a list of pertinent search results. It is an element of the internet. It responds to the inquiries. The algorithm uses a number of factors to determine how to rank pages, including PageRank, the volume of hyperlinks, the bounce rate, etc. The level of quality of webpages at different levels of proximity is measured by click through rates. After passing through several lookup tables, these counts are converted to ranks. SEO demands a substantial investment of time and effort, encompassing tasks such as keyword selection and continuous monitoring of changes in search engine algorithms. SEO follows a unique strategy to attain these results [4].

2. Decentralized Search Engine:

Web3 technologies are gaining popularity because of particular to their utilisation of online environments, bitcoin, and electronic currencies like NFTs.. In the future, search engine optimisation will make use of blockchain technology, virtual reality, and the metaverse to improve human-machine interaction [5].

Decentralized search engines lack a central point of administration. The tasks of crawling, the indexing, mining data, and processing are shared among a number of network peers. Effective Web searching is more important than ever these days since both the Internet's technology and user base are expanding quickly.

FAROO and YaCy represent instances of decentralized search engines that perform crawling, data mining, indexing, and query processing in a distributed manner [6].

The process of optimizing a website or web page to raise its visibility and position of search engine results pages (SERPs) is known as search engine optimization (SEO). By making a website more useful and attractive to search engines, SEO aims at increasing natural (non-paid) traffic to that website. In order to optimize a website's structure and content, target certain keywords, build high-quality backlinks, make sure the page is mobile-friendly, and ensure a

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quick page load time are all part of SEO[7]. Webmasters and businesses can improve their online presence, draw in more visitors, and possibly improve conversions and revenue by putting efficient SEO practises into practice [8].

3. Architecture of Blockchain Search Engine:

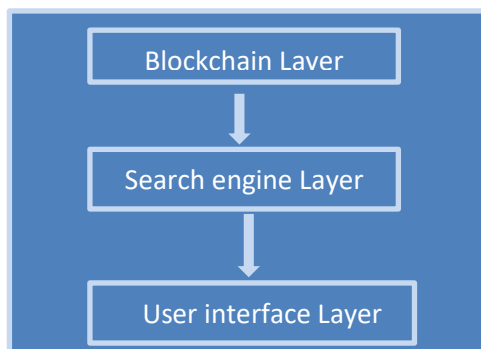


Figure1: Architecture of Blockchain Search Engine

In Figure1. describe the distributed ledger system that underpins the blockchain collects and analyses all of the searchable data. To retrieve search results, a searching engine is a software program that communicates with the blockchain. The search engine receives user-submitted search queries and then searches the blockchain for pertinent information. The user can view the results after the search engine gives them to them. Here is a more detailed explanation of each component of the block diagram:

- **Blockchain layer:** A technology for distributed ledgers called the blockchain stores data in chunks. Each block includes a hash of the block before it as well as a series of transactions. Each of the blocks are connected together as a chain thanks to this hash, which guarantees that any modifications to the contents in one block will be recorded throughout each of the succeeding blocks.
- **Search Engine layer:** To retrieve search results, the search engine is a computer programme that communicates with the blockchain. Users can often enter search queries through the search engine's user interface. The user is then presented with the results once the search engine has searched the blockchain for pertinent info
- **Users interface layer:** The people who utilize the based on blockchain technology search engine are called users. They enter search terms into the search engine and then look through the results.

The architecture of a blockchain search engine is similar to that of a traditional search engine, but with the addition of a blockchain layer. The blockchain layer is responsible for storing and indexing the data that is being searched. This data can be anything from web pages to documents to images.but it has the potential to revolutionize the way we search for information online. By offering greater decentralization, transparency, and privacy, blockchain search engines could help to create a more open and democratic internet.

Blockchain is distributed [9-11] database of recorded data Each block is identified with hash value,which is linked with previous hash.

Blockchain-powered search engines (BPSE) operate in a decentralized manner. In a blockchain search system, no company can assert ownership of user data or gain access to search histories. Instead, the data is securely recorded on a blockchain, ensuring both context-awareness and privacy preservation

4. Literature Review:

SONG et al. [12] suggested that to do a single-keyword search for encrypted data, a keyword trapdoor was created to compare with each encrypted text keywords in the cipher text document.

Golle et al. [13] proposed the first search encryption method based on concatenated keywords.

The literature [16] blockchain-based multi-keyword sorted search with a fair payment mechanism in a blockchain-based verified scheme that gives the data user accurate and thorough search results.

The literature [17] developed Bitmaps were used to form a search index, which improved search effectiveness and allowed blockchain to confirm the veracity of the search results.

Wood [18] proposed that distributed internet services will be provided without the usage of trusted third parties, giving customers more control over their data.

Through the application of cryptography and consensus mechanisms [19]. Blockchain technology presents a fresh perspective on addressing privacy and monopoly concerns. With the use of encryption and the creation of a private key, cryptography provides a means of preserving user privacy by safeguarding their data. Users can utilize their private key to exercise control and ensure the security of all their stored data.

[20] Blockchain technology possesses the qualities of immutability, portability, and decentralization, with decentralization, anonymity, persistence, and auditability being four of its core attributes.

Within the blockchain network, any two peers (P2P) can execute a transaction without the necessity for authentication from a central authority.

To safeguard their identity, a user can create numerous pseudonyms, and to some extent, blockchain helps maintain transaction privacy.

All transactions must undergo verification and be recorded in blocks distributed across the network. Each broadcasted block is validated by additional nodes, and every transaction is scrutinized, making any attempt at falsification easily detectable.

Every transaction within a blockchain network is documented in a digitally distributed ledger, which also verifies it through a digital timestamp

The relevant security and fairness issues, such as hostile or hacked nodes, online keyword guessing violence, appropriate payments, sharing of data and key leakages, integrity of data, and security have been taken into consideration using blockchain approaches [21-29].

Crawlers are used to collect and update a search engine's core library. However, it fails to function adequately in a particular aspect of its duty. As a result based on the features of distribution, expansion, load balancing, and reliability in this study [30].

N. Kumar et al. [32] introduced an approach aimed at pinpointing these issues in relation to parallel-oriented web crawlers, emphasizing web spiders and parallel-oriented crawlers.

A SE can effectively reduce the utilisation of the shared network resources by using the sophisticated XML-based web crawling method provided in this research. Based on a tightly concentrated set of phrases that are directly tied to each crawler's individual domain, this focused-based architecture provides the retrieved URLs a greater importance [33].

J. Mor et al. [34] described a search system design that includes operational modelling and web browsing techniques. Examining previous work that has been done to improve search system architectures is the key objective.

The author [35] discussed how SEO can specialize in various aspects such as video search, local search, academic search, and image search. One facet of optimizing a webpage entails making adjustments to the text and HTML code to enhance its relevance to specific keywords and ensure effective indexing by search engines. These text and coding modifications are made to align with the indexing patterns of search engines, a process overseen by a web crawler like Google Bot.

5. Problem Formulation:

Here are several difficulties blockchain search engines encounter:

- **Scalability:** Because they need a huge network of nodes to function, blockchain-based search engines might be challenging to grow.
- **Latency:** Since data must first be authenticated and uploaded to the blockchain prior it can be provided to consumers, blockchain-based search engines may experience latency problems.
- **Usability:** Blockchain-based search engines might be challenging to use since they demand that users comprehend how the technology works.

Blockchain-based engines of search have an opportunity to dominate the search engine business despite these obstacles. Blockchain-based search engines may provide a more private, safe, and democratic way to conduct online information searches as the technology develops and these issues are resolved [36].

6. Related Work:

A blockchain technology search engine is an internet-based search engines that stores and indexes data using the blockchain technology. Compared to conventional search engines, this technique has a variety of benefits [38-40].

- **Transparency:** Users can trust that the outcomes of their searches are not being changed because every record on the blockchain is open and unchangeable.
- **Privacy:** Because their search histories are not kept on a centralised database, a blockchain-based search engine may offer users with greater anonymity [37].
- **Decentralization:** Because they aren't controlled or owned by a single party, blockchain-based engines of search are more resilient to censorship and manipulation.

Although they are still in the early phases of development, blockchain-based search engines have the potential to completely change how we look for information online. These search engines might contribute to the development of a more transparent and democratic internet by providing increased decentralisation, transparency, and privacy used to purchase targeted ads.

7. Advantages over traditional search engine:

Blockchain search engines are still in their early stages of development, but they have the potential to revolutionize the way we search for information [41-43]. By storing data in a decentralized and tamper-proof manner, blockchain search engines can offer a number of advantages over traditional search engines, such as:

- **Privacy:** Blockchain search engines do not collect or store user data, which means that users can search the web without fear of their privacy being violated.
- **Transparency:** Blockchain search engines are transparent, which means that users can see how their queries are being processed and how the results are being ranked [44].
- **Security:** Blockchain search engines are secure, which means that users can be confident that their data is safe from unauthorized access [45].
- **Transaction data:** Blockchain search engines can be used to search for information about transactions that have taken place on a blockchain, such as the sender, recipient, and amount of the transaction.

- **Smart contract data:** Blockchain search engines can be used to search for information about smart contracts that have been deployed on a blockchain, such as the contract code, the contract's current state, and the contract's history of transactions [46].
- **Decentralized applications (dApps):** Blockchain search engines can be used to search for dApps that are running on a blockchain, such as the dApp's name, description, and website address.

8. Future Work:

The future of blockchain search engines is bright. As the technology continues to mature, we can expect to see more innovative and user-friendly blockchain search engines that make it easier for us to find the information we need.

There is a need to develop blockchain search engines that can balance the need for security and transparency with the need to protect user privacy.

There is a growing demand for blockchain search engines that can also search for data on private and permissioned blockchains. There is also a need to develop blockchain search engines that can search for data across multiple blockchains. If search engine concept applied properly with machine learning [56-57] models and iteratively, their accuracy can surpass 95% [57-59]. This can enhance the quality and security in outcomes [60-61] across several domains such as image processing [62], technology [56, 63], block chain with NLP [64].

9. Conclusion:

A decentralized search engine is an innovative technology that has great potential since it combines the decentralized and secure characteristics of the technology's blockchain with the features of a conventional search engine [47-52] It provides a number of possible advantages, including improved security [53], accuracy of data, and resisting censorship.

To fully realize the potential of the blockchain search engine concept, more study and development are required [54-55]. Blockchain search engines have the potential to revolutionize the way we look for information by enhancing privacy, reliability of data, and trust in the digital era.

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