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META SEARCH ENGINE

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Abstract: Meta search engines are designed to improve the efficiency and breadth of online searches by aggregating results from multiple search engines. Unlike traditional search engines, which rely on their own indexed databases and algorithms, meta search engines query several search engines simultaneously and present a unified set of results. This approach addresses limitations in single search engines, such as limited coverage, ranking biases, and incomplete results (Zhang & Wu, 2005; Jansen & Pooch, 2001). Meta search engines work by distributing user queries to various search engines, collecting the results, and then aggregating and ranking them based on their own algorithms (Kumar & Desai, 2021). This enables users to access a broader range of information, combining results from different sources and increasing the likelihood of finding relevant content. Additionally, meta search engines offer features like result filtering, customization, and privacy protection to enhance the overall search experience. By combining results from multiple sources, meta search engines help mitigate ranking biases present in individual search engines (Yuwono & Lee, 1997).

Keywords: *User Interface (UI), Query Distribution, Search Engine Wrappers API, Integration Result Aggregation, Deduplication Ranking Algorithms, API Rate Limits, HTML, CSS, JavaScript, Machine Learning, etc.*

I. INTRODUCTION

The internet has become an indispensable resource for information retrieval, with vast data across numerous fields. However, finding relevant and accurate information within this immense sea of content can be challenging. Traditional search engines like Google, Bing, and Yahoo have served as the primary tools for navigating the web. Each engine offers a different set of results for the same query due to unique methods of data collection, indexing, and ranking (Järvelin & Kekäläinen, 2002). Despite their effectiveness, no single search engine can index the entire internet or consistently provide the best results for every query. This limitation has led to the development of meta search engines, which aggregate results from multiple sources, thereby reducing the need to search each engine individually and increasing the likelihood of obtaining the most relevant information (Meta Crawler, 2023; Zhang & Wu, 2005).

II. LITERATURE REVIEW

Meta search engines have garnered attention in academic and technological research due to their ability to enhance web search efficiency. These engines distinguish themselves by integrating search results from multiple sources, offering access to a broader range of information (Jansen & Pooch, 2001).

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The development of meta search engines began in the mid-1990s, with early pioneers such as MetaCrawler and Dogpile leading the charge (Meta Crawler, 2023). Early meta search engines primarily served as aggregation tools, forwarding queries to multiple search engines and collecting the returned results, but conducted minimal internal processing (Zhang & Wu, 2005). For example, a query sent to Google, Yahoo, and Bing would result in a combined display of results from all three platforms without additional filtering or re-ranking.

With the introduction of more sophisticated algorithms, meta search engines evolved to offer refined search results, paralleling advancements in traditional search engines like Google (Kumar & Desai, 2021). Core technological components include query distribution, result aggregation, and ranking mechanisms (Jansen & Pooch, 2001). Query distribution involves sending the user's query to various external search engines, often through APIs or web scraping techniques, while result aggregation ensures users receive a coherent and organized list of results (Callan et al., 1995). Advanced engines have since developed the ability to intelligently combine and organize results, ensuring a more useful search experience.

An essential aspect of modern meta search engines is their implementation of ranking mechanisms. Although individual search engines like Google and Bing have proprietary algorithms, meta search engines incorporate their own ranking systems to assess relevance across aggregated results (Li & Li, 2008). Contemporary meta search engines also employ filtering techniques and advanced algorithms to eliminate redundancy, enhancing user experience and result relevance (Kumar & Desai, 2021).

III. EXISTING SYSTEM

Meta search engines rely on a sophisticated, multi-layered architecture that aggregates search results from multiple individual search engines. A key aspect of this architecture is search engine selection, which involves collecting and storing "representatives"—metadata that reflects the content and strengths of each search engine (Järvelin & Kekäläinen, 2002). This metadata, or representatives, is pre-collected and maintained in the meta search engine's internal system. When a user submits a query, the meta search engine compares it to the representatives of various search engines, directing the query to the most relevant engines (Yuwono & Lee, 1997).

Through intelligent search engine selection and result aggregation, meta search engines provide a unified search experience, continuously refining processes based on user interactions to enhance relevance and efficiency over time (Jansen & Pooch, 2001).

IV. PROPOSED SYSTEM

The proposed framework for a meta search engine (MSE) integrates ranking and clustering mechanisms to organize and present search results to users effectively. When a user submits a query, it is forwarded to multiple search engines, which search the web for relevant information, and the returned results are stored in a local database (Li & Li, 2008). To evaluate relevancy, the framework employs a Relevancy Calculator (RC) module, assigning a score based on how closely the content

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matches the query. Various similarity measures exist, including the Vector Space Model (VSM), Okapi, and CDR. This framework utilizes the Okapi similarity measure, which performs well for both single-term and multi-term queries (Zhang & Wu, 2005).

After relevancy scores are calculated, the Cluster Generator (CG) module organizes web pages into clusters based on scores, grouping similar results for easier navigation. The algorithm behind this clustering process ensures clusters form based on similarity rankings, allowing users to navigate through organized groups of relevant results efficiently (Järvelin & Kekäläinen, 2002).

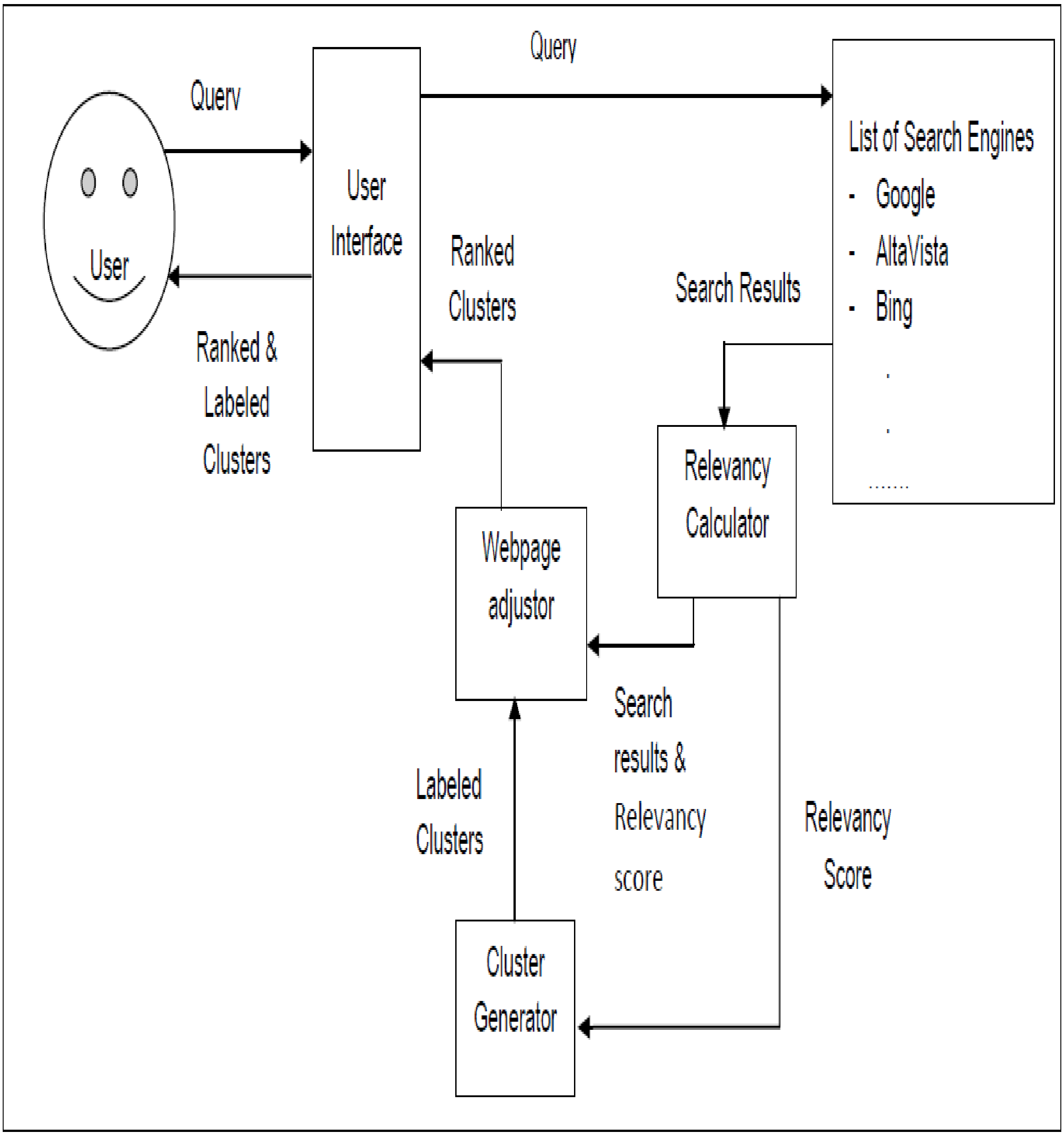

Figure 1: Proposed MSE Framework

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V. CONCLUSION

This paper presents the "Extended Eddystone-TLM Frame" as a lightweight protocol for short-range data broadcasting, focusing on low-latency, low-power consumption communications. The proposed protocol broadcasts data through Eddystone-TLM without disrupting the standard frame, compatible with any BLE scanner. The Extended Eddystone-TLM Frame has been embedded into a standard Eddystone Beacon, demonstrating feasibility through experiments that showed the protocol's superiority in latency and energy consumption. The protocol suits scenarios prioritizing low-energy consumption over power level and signal strength, broadcasting sensor data over short distances with efficiency.

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