

WEB SERVICE RECOMMENDATION BASED ON HYBRID SEARCH

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Semantic search in service-oriented architecture (SOA) is intended to overcome the limitations of traditional keyword search by capturing user intent and data context in a dynamic environment where the catalog of services is constantly changing, and clients interact through discovery services without knowing the specific locations of the services. Classical approaches that rely on inverted indexes and term frequency are effective for fast matching but do not interpret word meaning or account for the ambiguity of natural language, which reduces relevance for complex queries and high-dimensional data. Auxiliary techniques such as lexical variants and fuzzy matching reduce sensitivity to typos and grammatical variations but do not solve the problem of abbreviations and can introduce noise.

In the SOA context, service profiles (name, description, categories/tags, versions) form the basis for recommendations; however, sufficiently accurate results require deeper text analysis than simple tag matching. A combination of TF-IDF and the Universal Sentence Encoder (USE) is proposed for feature extraction. TF-IDF reliably identifies key terms based on their frequency in a document and rarity across documents, but it does not "understand" context. USE encodes sentences into 512-dimensional vectors, capturing semantic relationships and enabling computation of content similarity between descriptions and queries.

In conclusion, semantic search is a key component of modern search and recommendation systems in SOA, as it can interpret query intent and context, narrowing the gap between user phrasing and the actual content of data. Combining TF-IDF and USE provides a comprehensive view of relevance, improves the accuracy and usefulness of recommendations, remains flexible for domain-specific tuning, and is compatible with scalable vector storage and search. Despite computational costs and the need for continuous model improvement, the benefits—relevance, contextuality, and adaptability—make it a well-founded choice for building reliable service recommendations in dynamic ecosystems.

Resources: **1.** Manning, Christopher D., Prabhakar Raghavan, and Hinrich Schütze. Introduction to Information Retrieval. Cambridge University Press, 2008. **2.** Cer, Daniel, et al. "Universal Sentence Encoder." arXiv preprint arXiv:1803.11175 (2018). **3.** Papazoglou, Michael P., and Willem-Jan van den Heuvel. "Service oriented architectures: approaches, technologies and research issues." The VLDB Journal 16, no. 3 (2007): 389-415.