

A Verifiable Semantic Searching Scheme by Optimal Matching over Encrypted Data in Public Cloud

ABSTRACT

Semantic searching over encrypted data is a crucial task for secure information retrieval in public cloud. It aims to provide retrieval service to arbitrary words so that queries and search results are flexible. In existing semantic searching schemes, the verifiable searching does not be supported since it is dependent on the forecasted results from predefined keywords to verify the search results from cloud, and the queries are expanded on plaintext and the exact matching is performed by the extended semantically words with predefined keywords, which limits their accuracy. In this paper, we propose a secure verifiable semantic searching scheme. For semantic optimal matching on ciphertext, we formulate word transportation (WT) problem to calculate the minimum word transportation cost (MWTC) as the similarity between queries and documents, and propose a secure transformation to transform WT problems into random linear programming (LP) problems to obtain the encrypted MWTC. For verifiability, we explore the duality theorem of LP to design a verification mechanism using the intermediate data produced in matching process to verify the correctness of search results. Security analysis demonstrates that our scheme can guarantee verifiability and confidentiality. Experimental results on two datasets show our scheme has higher accuracy than other schemes.

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