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TOWARD PRACTICAL PRIVACY-PRESERVING FREQUENT ITEMSET MINING ON ENCRYPTED CLOUD DATA

ABSTRACT

Frequent itemset mining, which is the essential operation in association rule mining, is one of the most widely used data mining techniques on massive datasets nowadays. With the dramatic increase on the scale of datasets collected and stored with cloud services in recent years, it is promising to carry this computation intensive mining process in the cloud. Amount of work also transferred the approximate mining computation into the exact computation, where such methods not only improve the accuracy also aim to enhance the efficiency. However, while mining data stored on public clouds, it inevitably introduces privacy concerns on sensitive datasets. In this project, we propose a new framework for enforcing privacy in frequent itemset mining, where data are both collected and mined in an encrypted form in a public cloud service. We specifically design three secure frequent itemset mining protocols on top of this framework. To guarantee data privacy and computation efficiency, we adopt two different homomorphic encryption schemes and design a secure and effective comparison scheme. Our first protocol achieves more efficient mining performance while our second protocol provides a stronger privacy guarantee. In order to further optimize the performance of the second protocol, we leverage a minor trade-off of privacy to get our third protocol. Finally, we evaluate the performance of our protocols with extensive experiments, and the results demonstrate that our protocols obviously outperform previous solutions in performance with a similar security level.