State Channel Networks for the Healthcare Data Security and Scalability with Blockchain

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Abstract:

Every person in our technologically advanced society requires adequate data security. The process of transmitting healthcare information is becoming more focused on ensuring data privacy. Due to the rapid advancement of telecommunication technology, it has become an unavoidable trend to share scattered data across many domains and improve the transmission of data value. Federated learning (FL) is a novel data-sharing technique that combines intelligence with privacy computing. It is capable of achieving both data value delivery and data privacy protection, it lacks monitoring throughout the application process, which compromises the dependability. Blockchain, as a form of distributed ledger technology, possesses the characteristic of trustworthiness; however, it is deficient in terms of computational capacity with an increasing scalability problem. Hence, we suggest to enhance the computational and monitoring powers of blockchain by incorporating state channels. These state channels can be utilized to efficiently execute the tasks of federated learning models sharing and to solve the scalability problem. This work presents a distributed healthcare FL-based model sharing architecture to ensure healthcare data privacy and scalability. Additionally, we provide a trust monitoring method for healthcare model sharing to detect malicious nodes in the FL network and use state channels to overcome the scalability problem.