**INTRODUCTION**

For the rapid development of the Internet and computer technology, a large number of network information services haveentered people's daily life, providing users with many conveniences.Meanwhile, due to the rapid growth of Internet users,the information generated by users also presents an explosivegrowth, leading to the problem of ``information overload''.It is an important challenge for producers and consumersin today's society: for Internet service providers, it is verydifficult for Internet service providers to select the servicesthrough user information quickly and make their servicespopular with the public. For Internet users, it is not easy to select the services they are interested in from the vast amountof information, which requires a lot of time and energy.

In order to solve above problems, a lot of recommendationalgorithms have been proposed, among which collaborativefiltering recommendation is a common method. It providespersonalized recommendation for target user according to thescoring records of resources. Moreover, the algorithm hasa good recommendation effect and is widely used in personalizedsites, e-commerce, and other fields. Although thecollaborative filtering recommendation algorithm has highrecommendation accuracy, it still faces a series of challenges:the data used in the collaborative filtering recommendationalgorithm is often stored on the centralized server, so there isno historical data for new users or new items to refer to, andit may encounter cold start problem and cannot complete therecommendation. However, by collecting the data of users on different platforms, the problem of cold start can be solvedeffectively. For example, user *A* has called the services ofAmazon and user *B* has called the services of IBM. If *A*and *B* are similar users, they can recommend services to *A*by analyzing the services of *B*, or recommend services to*B* by analyzing the services of *A*. Nonetheless, a maliciousrecommendation may lead to data abuse or privacy leakageissues. Therefore, in order to protect users' privacy information,Amazon and IBM are reluctant to share user data witheach other. In this case, we cannot obtain similar users ofnew users, which greatly reduces the quality of recommendation.Besides, assume that two platforms agree to share data,and obtain the data from different platforms to improve therecommendation accuracy. But there still exists the problemthat the data stored in different distributed platforms greatlyincreases the communication overhead between cloud platforms,which cannot response quickly when online.

In order to solve the above problems, in this paper, we proposea novel block chain-assisted collaborative service recommendationscheme with data sharing (*BC*-*SRDS*), withwhich every platform can share their data securely based onblock chain. And locality-sensitive hash (LSH) is an efficientdata search algorithm that can quickly find similar data, therefore,the LSH is adopted to perform quick recommendation.The main contribution can be summarized as follows V

1) To the best of our knowledge, many recommendation algorithms are based on centralized data, but little ofthem adopt block chain to realize the recommendation.Moreover, it is difficult to combine distributed cloudplatforms to share their data with each other for recommendationbecause of users' privacy. In order to realizebetter recommendation, in this paper, we introduceblock chain to provide a secure sharing environment foraccurate recommendation.

2) Different from most existing recommendation works,we adopt the CP-ABE (cipher text-policy attribute basedencryption) to promote the data sharing amongthe cloud platforms and combine block chain toensure the security of data provenance, avoid the riskon the failure of single point, improve data integrity,and defend against DOS or DDOS attacks.

3) Based on the real distributed QOS (quality of service)dataset WS-DREAM,1 the experimental results showthe effectiveness of *BC*-*SRDS*. The analysis of themetrics such as CPU consumption, memory consumption,throughput, latency, MAE (Mean Absolute Error),RMSE (Root Mean Square Error), the usage of gas andthe number of similar neighbors proves that *BC*-*SRDS*can significantly improve the accuracy and gain mor pro\_ts.The rest of this paper is organized as follows. Section IIelaborates the related work in this paper. And in section III,we present the preliminaries of this paper. Then, section IVintroduces the overview of our proposed scheme. Section V1https://wsdream.github.io/proposes a novel block chain-assisted collaborative servicerecommendation in detail. Section VI analyzes the securityand evaluates the performance of the proposed scheme.Finally, section VII summarizes the paper.