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Advances in Blockchain technology

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Blockchain open source projects

China's first blockchain open source working group was established, and Baidu was among the first to join and donate blockchain kernels. In September 2018, Baidu published a white paper[1] on Baidu Blockchain to highlight the blockchain lab's self-developed "XuperChain" network system. The whitepaper also elaborated on how Baidu implemented blockchain in six primary areas, including content copyright, information traceability, cultural entertainment, information security, individual information management, and digital advertising.

The research team from University of Stavanger, SINTEF and SimulaMet, proposed[2] the open-source OpenIaC initiative. They stated that there was a need to re-optimize current cloud services and architectures. Their vision was to enhance existing cloud computing and networking solutions to support seamless integration of multiple cloud architectures and cloud-based microservices. To address these issues, they proposed a framework called Open Infrastructure as Code (OpenIaC) to integrate cloud computing and blockchain technologies to address the needs of modern information architecture. The core of their framework was to build a platform for sharing infrastructure (sensing, storage, computing, 3D printing) resources based on decentralized identity and zero-trust architecture. Their framework was based on a decentralized identity and zero-trust architecture to build a platform for sharing infrastructure resources (like sensing, storage, computing, 3D printing) and implement fine-grained access control for openness and connectivity. Their proposed precautions could provide new avenues for new platforms, new business models, and 5G applications.

Blockchain related Surveys

There have been a lot of noteworthy blockchain technology related surveys recently. Yue, Kaifeng, et al. [3] gave a thorough analysis of the prospects of blockchain in decentralized applications gold and 5G and beyond. They reviewed the latest developments of blockchain in DApp. They argued for the ability of blockchain technology to transform traditional applications that rely on trusted third parties, and they summarized the advantages and potential impacts of application decentralization. They discussed about decentralized modes and gave suggested about mode selection based on application scenarios

Wu, Mingli, et al.[4] conducted comprehensive research on blockchain theory and applications in the IoT field. They divided blockchain technology into four layers, namely data layer, network layer, consensus layer and application layer. When introducing each layer, they not only summarized related work, but also discussed basic issues and future research directions.

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Blockchain and Federated Learning

More and more research is focused on combining blockchain technology and federated learning technology, as they are both based on distributed technology and usage scenarios.

Blockchains are immutable and traceable and can be used to prevent malicious attacks in federated learning effectively. Geng, Jiahui, et al.[5] implemented a blockchain technology-based identity management system, the Decentralized Identity, in an open federated learning service platform. Decentralized identity as a digital identifier of a natural person can be applied to many scenarios, such as e-health, e-insurance, etc. And the decentralized technology will ensure the identity information is tamper-evident and verifiable. In their federal learning open platform, people with valid claims will have the right to access private medical data.

Shayan, Muhammad, et al. [6] proposed approach that directly applied blockchain technology to federal learning to prevent data poisoning attacks. Each participant's contribution to the model would have been linked to a distributed blockchain ledger to allow for auditing of these model updates. At the same time, they used differential privacy and secret key sharing mechanism and the Multi-Krum algorithm to prevent data poisoning during model uploading, model validation, and model selection to ensure security and privacy of federal learning.

References:

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