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CERTIFICATE NO : **ICASEMH /2023/C0223255**

## **Applications of Federated Learning in Secure and Private Data Analysis**

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### **ABSTRACT**

Applications of federated learning in secure and private data analysis have gained significant attention in recent years due to increasing concerns about data privacy and security. Federated learning is a decentralized machine learning approach that allows multiple devices or organizations to collaboratively train a model without sharing their raw data. Instead of sending sensitive information to a central server, the data remains on local devices and only the model updates are shared. This approach helps protect personal and confidential information while still enabling effective data analysis. Federated learning is widely used in various fields. In healthcare, it allows hospitals and research institutions to build accurate medical prediction models while keeping patient records private. In the financial sector, banks can detect fraud and analyze transaction patterns without exposing customers' financial data. Similarly, in mobile applications, federated learning helps improve services such as personalized recommendations, keyboard predictions, and voice recognition while maintaining user privacy. It is also used in smart devices and Internet of Things (IoT) systems to analyze distributed data securely.