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Secure E-Learning Activity Tracking using Federated Learning

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Abstract: *E-learning platforms are increasingly popular, providing flexible and accessible education opportunities. However, tracking learner activities and performance while preserving privacy remains a challenge. Federated learning offers a promising solution by enabling collaborative model training across decentralized devices while keeping sensitive data on the local device. In this study, we propose a federated learning framework for e-learning activity tracking, where machine learning models are trained across multiple devices without exchanging raw data. The proposed approach allows e-learning platforms to analyze user behaviour, predict learning outcomes, and personalize recommendations while protecting user privacy.We test our federated learning framework through simulations and experiments, showing its capacity to enhance e-learning experiences while safeguarding data privacy and security.*

Keywords: E-learning, Activity tracking, Federated learning, Privacy-preserving, Machine learning, Personalization, Data privacy, Decentralized, Collaborative learning, Education technology

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