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(57) Abstract :
ABSTRACT [0011] In today's evolving healthcare landscape, preserving patient privacy while developing advanced diagnostic tools is a growing challenge. Medical imaging plays a crucial role in disease detection and treatment planning, but traditional centralized learning approaches often risk exposing sensitive data. To address this, the project proposes a privacy-preserving medical image classification system using federated learning and convolutional neural network (CNN) architectures. Federated learning enables collaborative training across decentralized medical datasets without transferring raw data. This ensures that sensitive information remains local while still allowing model improvement through shared learning. [0012] The system employs CNN-based models, specifically COVID-Net and ResNet, which are fine-tuned on MRI and CT scan datasets. These models independently extract relevant visual features, and only their trained parameters are transmitted to a central server to construct a unified global model. The architecture includes modules for image preprocessing, local model training, parameter aggregation, and inference. This decentralized framework enhances model generalization, lowers the risk of data leakage, and enables deployment in settings with limited computational resources. By combining federated learning with robust CNN architectures, the system supports secure, efficient, and distributed medical image classification. The modular design allows integration with existing hospital infrastructure, reduces reliance on centralized data storage, and promotes collaborative model development. This project contributes to the implementation of privacy-aware and scalable diagnostic solutions across healthcare environments.

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