

RESEARCH ARTICLE

# Federated Learning in Healthcare: Privacy-Preserving AI for Medical Data Analysis

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**Abstract:**

This review paper surveys the rapidly evolving landscape of federated learning applications in healthcare. We examine how federated learning enables collaborative model training across hospitals and research institutions while preserving patient data privacy and regulatory compliance (HIPAA, GDPR). The review covers successful deployments in medical imaging diagnosis, electronic health record analysis, drug discovery, and genomics research. We analyze the technical challenges including data heterogeneity, communication efficiency, and model convergence, and discuss emerging solutions such as differential privacy, secure aggregation, and personalized federated learning approaches.

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