

(12) PATENT APPLICATION PUBLICATION

(19) INDIA

(22) Date of filing of Application :30/08/2025

(21) Application No.202511082508 A

(43) Publication Date : 19/09/2025

(54) Title of the invention : PneumoFed-ViT: A Federated Vision Transformer Approach for Pneumonia Detection

(51) International classification	:G16H0010600000, H04L0009400000, G06F0021620000, G16H0050200000, G06N0003080000	(71) Name of Applicant : 1)Pranveer Singh Institute of Technology ,Kanpur Address of Applicant :Pranveer Singh Institute of Technology National Highway, NH-19, Kanpur, Uttar Pradesh 209305 Kanpur ----- Name of Applicant : NA Address of Applicant : NA
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(57) Abstract :

Abstract The Federated ViT Health Project is a novel AI system that uses federated learning and Vision Transformer (ViT) models to improve pneumonia identification from chest X-ray pictures. It prioritizes privacy. This method tackles one of the most difficult difficulties in healthcare AI: how to cooperatively train reliable models without centralizing sensitive patient data. Instead of collecting data from hospitals and storing it in a central location, the approach allows each institution to train the ViT model locally using its own data. Only trained model updates, not patient records, are delivered to a central server, where they are aggregated using the Federated Averaging (FedAvg) technique. This strategy enables compliance with severe healthcare data protection standards such as HIPAA and GDPR while also allowing for effective shared learning. The application of Vision Transformers improves picture processing by capturing global relationships in chest X-rays, resulting in higher diagnostic accuracy even across various hospital datasets. The system also offers advanced capabilities including secure model communication (SSL/TLS), token-based authentication, model compression, and performance monitoring dashboards. The technology is designed to be adaptable and expandable, supporting both high-performance GPU servers and low-resource clinical configurations. After training, hospitals can tailor the global model to their specific patient demographics. To maintain data security, final evaluation measures such as accuracy, precision, recall, F1-score, and specificity are only displayed after all training rounds have been completed. The Federated ViT Health Project, which combines cutting-edge AI techniques with a privacy-preserving architecture, allows for faster, more accurate disease diagnosis while respecting patient privacy and promoting cross-institutional collaboration in modern healthcare.

No. of Pages : 19 No. of Claims : 9