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Privacy-Preserving Federated Differential Protein Expression Analysis with FedProt

Integrating distributed patient-derived proteomics data poses privacy concerns, risking genotype reconstruction attacks. To enable privacy-preserving analysis of distributed data, we developed FedProt, the first tool for federated differential protein expression analysis. Based on DEqMS and utilizing the hybrid methodology of federated learning and additive secret sharing from Flimma, FedProt allows collaborative model training without violating data privacy. Tested on a DIA dataset of 99 Escherichia coli samples from five research centers, FedProt results matched the centralized DEqMS results and did it more precisely than typical meta-analyses. FedProt manages proteomic complexity, enhancing statistical power without sacrificing accuracy. Its user-friendly implementation will be accessible as a FeatureCloud App (https://featurecloud.ai), making privacy-aware differential protein expression analysis available to a broad community.

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Keywords

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