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Investigation of Using Explainable AI to Balance Genetic Discovery and Data Privacy

The rapid growth of artificial intelligence (AI) in genomics has transformed our ability to identify complex genetic patterns and disease associations. However, as models become more powerful, the risks to data privacy also intensify, raising critical questions about how to achieve transparency without compromising sensitive genetic information. This poster explores how Explainable AI (XAI) can serve as a bridge between interpretability and privacy in genomic research. We review current methodologies that employ XAI to make black-box models more interpretable while maintaining robust data security through federated learning, differential privacy, and encryption-based frameworks. This poster highlights practical pathways for implementing privacy-preserving XAI in real-world biomedical contexts. We further discuss ethical considerations, regulatory implications, and the potential of XAI to foster trust and reproducibility in precision medicine.

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