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Abstract

Human digital twins (HDTs) are dynamic, data-driven virtual representations of individuals, continuously updated with multimodal data to simulate, monitor, and predict health trajectories. By integrating clinical, physiological, behavioral, and environmental inputs, HDTs enable personalized diagnostics, treatment planning, and anomaly detection. This paper reviews current approaches to HDT modeling, with a focus on statistical and machine learning techniques, including recent advances in anomaly detection and failure prediction. It also discusses data integration, computational methods, and ethical, technological, and regulatory challenges in deploying HDTs for precision healthcare.

Keywords:

Human Digital Twin, Precision Healthcare, Health