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Urban Metaverse Cybercommunities & Blockchain-Based Privacy-Preserving Deep Learning Authentication and Verification With Immersive Metaverse Devices

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Abstract

Urban life has already embraced many urban metaverse use cases to increase the Quality of Life (QoL) by overcoming temporal and spatial restrictions, and the trend indicates that this would expedite exponentially in the years to come. Cybercommunities instilled with metaverse technologies should provide their residents with functional, safe, secure, and private worlds with high Quality of Experiences (QoE) to readily evolve and mitigate the problems of urbanisation. Cybersecurity and privacy protection are the two crucial challenges in making secure and reliable urban metaverse cyberspaces thrive, as cybercrime activities are expected to be rampant in this ecosystem with trillion dollars of economic value in the years to come. Ensuring seamless connectivity, data accuracy, and user privacy are critical aspects that need further attention for the efficacy of urban metaverse cyberspaces with Urban Twins (UTs), particularly, from technical, legislative, and ethical standpoints. A large number of transactions and immersive experiences shall be managed safely in an automated manner in urban metaverse cyberspaces. In this direction, this paper proposes a blockchain-based Decentralised Privacy-Preserving Deep Learning (BB-DPPDL) authentication and verification technique, which uses the metaverse immersive devices and can be instrumented effectively against identity impersonation and theft of credentials, identity, or avatars.

Index Terms—Metaverse, Urban Twins (UTs), Digital Twins (DTs), cybersecurity, cyberthreats, blockchain.

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