

Chapter 21

Hybrid Optimization Techniques for Data Privacy Preserving in the Metaverse Ecosystem

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ABSTRACT

Large-scale electronic databases are being maintained by businesses and can be accessed via the internet or intranet. Employing data mining techniques, significant information was extracted from the data. The privacy of the data is inherently at risk while data mining operations are being carried out. All users shouldn't have access to the private information stored in the database. Methods for protecting privacy have been suggested in the literature. Algorithms used in privacy-preserving data mining (PPDM) on private data are unknown even to the algorithm operator. Personal information about users and data on their collective behaviour are the two main aspects of privacy preservation. The majority of privacy-preserving techniques rely on reducing the level of granularity used to represent the data. Although privacy is improved, information is lost as a result. As a result, with PPDM, there is a trade-off between privacy and information loss. Effective methods that don't undermine the security defences are needed.

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INTRODUCTION

Since computer technology affects and enhances social connections, communication, and touch, it has a tremendous impact on daily life. From the viewpoint of final customers, three main waves of technical advancement have been noted. During these waves, the development of mobiles, personal computers, and the internet technologies received more and more attention. Innovators in the fourth wave of computers are two spatial, immersive technologies called augmented reality (AR) and the virtual reality (VR). The next paradigm for ubiquitous computing, which has the potential to alter (online) business, education, remote labour, and entertainment, is expected to be produced by this wave. This new paradigm is the metaverse. The word “metaverse” is derived from the Greek word Meta, which means beyond, beyond, or after, and universe. In alternative words, an after-reality universe is the Metaverse. Where the real world and digital virtuality are continuously combined among numerous people. In order to solve the underlying issues with web-based 2D e-learning technologies, online distance education can use Metaverse (Mystakidis & Stylianos, 2022).

Despite major technological improvements, textbooks, classrooms, and content distribution continue to be the primary implementation tactics in the field of education. The creation of the structure, laws, and regulations that will regulate the Metaverse is the subject of a vigorous struggle. In an effort to entice customers many businesses are attempting in an endeavour to develop their own closed, proprietary hardware and software ecosystems promote themselves as the primary Metaverse destinations (Sparkes, 2021). Divergent methods and numerous systemic approaches clash over ideas like transparency and confidentiality. The winner of this contest will determine if user privacy rights are broad enough to include or not students and schoolchildren are permitted access to the Metaverse. Both obstacles will determine whether or not the Metaverse can be widely employed in e-learning, which will have a big impact on education. In order to develop the purpose of this essay is to increase understanding of the history and potential uses of the Metaverse by providing a cohesive vision for meta-education and Metaverse-enabled online distant learning (Lee et al., 2021).

In the science fiction book *Snow Crash* by Neal Stephenson, the phrase “metaverse” first appeared which was released in 1992. But it didn’t become well-known until Facebook changed its name to Meta in 2021. The first Metaverse Summit, which gathered thousands of attendees and inaugurated the Metaverse period in Asia in December 2021, was hosted via live social media broadcast in China. A large number of new technology start-ups focused on creating platforms and apps for the Metaverse soon after that. The rapid creation and use of the Metaverse, mostly in entertainment, e-commerce, and education, was sparked by a new wave of entrepreneurship (Kye et al., 2021).

Figure 1 explains the metaverse interaction between physical world and In-world Ecosystem. This metaverse vision depicts three stages of evolution. When our real environments are digitalized and have the potential to periodically reflect changes to their virtual counterparts, we start with the concept of “digital twins” (Wang et al., 2022). According to the physical world, individuals who develop new objects in these virtual environments with their avatars are referred to as “digital natives.” It is claimed that A There are “many” digitally accurate virtual worlds that closely resemble the actual world are created by digital twins. It’s crucial to remember that these virtual worlds first suffer from a lack of communication either an information silo or with one another and the outside world. They eventually come together amid a vast landscape. The merging of The digitised physical and virtual worlds represent the last stage of the coexistence of physical and virtual reality. This is similar to virtual reality (Laeq, 2022). The conditions for the metaverse an eternal, 3D virtual cyberspace are distinct in a connected physical-virtual cosmos.

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