An International Journal
JSCDSS
http://www.jscdss.com
Vol.10 No.5 October 2023: 1-3
Article history:
Accepted 22 September 2023
Published online 22 September 2023

Journal of Soft Computing and Decision Support Systems

E-ISSN: 2289-8603

Metaverse: Statistics and Facts

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The term "Metaverse" (Mystakidis, 2022; Nilashi & Abumalloh, 2023b) originated in Neal Stephenson's 1992 science fiction novel "Snow Crash," where it describes a virtual realm where humans engage with each other through digital avatars. Stephenson's concept depicted a digital universe accessible via Virtual Reality (VR). This narrative theme has since been explored in various science fiction works, notably the "Matrix" film series, and it served as a foundational source of inspiration for the creators of major tech companies like Google, Amazon, and Facebook. Mark Zuckerberg's frequent mentions of the Metaverse in 2020 and 2021 propelled the concept into the global spotlight.

The metaverse, a multifaceted digital concept (Ramadan, 2023), is distinguished by several fundamental attributes that collectively shape its unique character and transformative potential (Nilashi & Abumalloh, 2023a; Onggirawan et al., 2023). Firstly, it embodies persistence, constituting a continuously active and evolving digital landscape, free from pauses or resets. Secondly, the metaverse thrives on the collaborative contributions of a diverse community of creators, resulting in a rich tapestry of content and experiences. Thirdly, its hallmark lies in its unparalleled interoperability, allowing for seamless interaction and data sharing across various virtual realms, forging connections between disparate elements of the metaverse. Moreover, the metaverse represents a convergence of both physical and digital dimensions, encompassing open and closed platforms, public and private experiences, and diverse networks to create a holistic hybrid reality. It operates as a fully functional economy where startups and individuals can actively participate, engage in various activities, generate value, and be duly recognized and rewarded for their contributions. The metaverse unfolds in real-time, mirroring the pace of real-life events while accommodating both pre-scheduled occurrences and spontaneous, ongoing interactions. Furthermore, its inclusivity knows no bounds, allowing an unlimited number of simultaneous users, each experiencing a personalized sense of presence and participation. However, it is imperative to distinguish the metaverse from related concepts, such as virtual reality, digital worlds, theme parks, or user-generated content platforms, as it represents an innovative and expansive digital frontier, characterized by its distinct attributes and limitless potential for transformation.

The COVID-19 pandemic has catalyzed a profound shift in the way we interact with the digital realm (Abumalloh et al., 2021; Kerdvibulvech, 2022; Nilashi et al., 2023; Nilashi et al., 2020; Onggirawan et al., 2023), propelling the metaverse into the forefront of technological and societal discourse. This nascent concept represents a dynamic convergence of virtual and physical realities, with a particular emphasis on its application in commerce. The metaverse, as an emerging phenomenon, transcends its initial manifestations within the fashion and retail sectors and is poised to encompass a sweeping array of technologies, standards, conventions, and monetization models. The impact of this transformation is anticipated to be enduring, reshaping fundamental aspects of our lives and redefining the boundaries of human experience in unprecedented ways. As we peer into the future, it becomes evident that the metaverse is on the brink of expanding its reach into uncharted territories, promising a profound and lasting generational shift. This impending transformation has the potential to finally unlock the full transformative potential of mobile technology and the internet, as it seeks to revolutionize long-standing paradigms in various domains that have thus far resisted substantial change.

Accoring to the statistics (Statista, 2023), in the Metaverse market, the projected market size is set to reach a substantial US$55.0 billion in 2023, marking a significant presence in the digital landscape. This market is expected to demonstrate robust growth with an impressive annual growth rate (CAGR) of 36.71% from 2023 to 2030, leading to a projected market volume of US$490.4 billion by the end of the decade. Notably, the United States is expected to be the primary driver of this market's growth, generating the largest market size with a projection of US$17.5 billion in 2023. This suggests a strong early foothold for the Metaverse within the U.S. market. Furthermore, the Metaverse market is anticipated to witness a substantial surge in the number of users, with expectations to reach a remarkable 1,461.0 million users by 2030. This growth trajectory is underscored by a user penetration rate of 6.0% in 2023, poised to surge to 17.9% by 2030. In terms of revenue per user, the Average Market Size Per User (ARPU) is anticipated to stand at US$119.4, highlighting the potential for substantial monetization and economic activity within the Metaverse ecosystem.

The metaverse is rapidly evolving into a colossal digital realm, as indicated by compelling statistics and developments (Mitic, 2023). With an estimated market value projected to reach a staggering $800 billion by 2024, the metaverse is poised for exponential growth. Nvidia's Omniverse Beta Version has already garnered significant traction, with 50,000 individual creators embracing the technology, contributing to Nvidia's remarkable market cap of $251 billion. Microsoft's strides in mixed reality technology, particularly with its groundbreaking Microsoft Mesh, culminated in a monumental $22 billion military contract, heralding one of the largest metaverse projects to date. Sony, too, has invested around $200 million to secure rights to music and sounds for integration into the metaverse. Epic Games' Fortnite has demonstrated the metaverse's potential with over 10.7 million users participating in online concerts, while Meta (formerly Facebook) is leaving an indelible mark by investing $10 billion and creating 10,000 metaverse-related jobs. Epic Games has also raised a substantial $1 billion for its metaverse endeavors, signifying industry enthusiasm and substantial investment in metaverse ventures. These statistics collectively underscore the metaverse's rapid emergence as a dynamic and transformative digital frontier, attracting significant attention and resources across diverse sectors.

The contemporary metaverse is neatly categorized into four key domains (Mckinsey, 2022): Content and Experiences, Platforms, Infrastructure and Hardware, and Enablers. Within the Content and Experiences layer, users, creators, and developers generate content that enhances metaverse encounters, encompassing applications tailored for specific use cases, such as educational or event-centric virtual realms where communities can congregate, interact, and craft collectively. In the Platforms domain, various platforms are instrumental in facilitating the accessibility and exploration of metaverse content, experiences, and applications, including those expressly designed to empower creators in the realm of 3-D experiences. The Infrastructure and Hardware layer incorporates the vital interface between users and the metaverse, encompassing devices, operating systems, and accessories, while the metaverse itself relies on a bedrock of underlying infrastructure, comprising cloud computing, semiconductor technologies, networks, and more. Lastly, the Enablers category assumes a pivotal role in ensuring the metaverse functions seamlessly and equitably, encompassing aspects like security, privacy, and governance, alongside tools and applications for managing digital identity and facilitating economic transactions and monetization within the metaverse ecosystem. This intricate framework lays the foundation for the multifaceted metaverse experience and underscores the intricate interplay of these layers in shaping the metaverse's evolution.

The Metaverse presents several challenges to overcome (Lucid-Reality-Labs, 2023). One significant challenge relates to the establishment of secure digital identities and reputations within the Metaverse. While identity verification is relatively straightforward in the physical world, the virtual realm presents novel complexities. Ensuring that users can trust and verify each other's identities, rather than falling prey to impersonation by bots or malicious actors, is a critical concern. It's anticipated that new verification methods will need to emerge, potentially relying on technologies beyond traditional usernames and passwords. Another pressing challenge pertains to data privacy and security in the Metaverse. Despite ongoing advancements in IT security, concerns over data breaches and privacy violations persist in online environments. The Metaverse's expansion demands that security measures evolve to match the scale and complexity of this virtual universe. This involves developing robust methods for safeguarding personal data and privacy, which may require users to share more information than they do currently to establish secure identities. Furthermore, the issue of currency and payment systems is central to the successful adoption of virtual reality technology in the Metaverse. The Metaverse is expected to feature its own virtual marketplace where users can engage in transactions using a combination of real-world and digital currencies. However, ensuring the safety and trustworthiness of these transactions presents a challenge. Users must be convinced that these systems are reliable and secure, especially if entirely new forms of payment, such as Metaverse-specific cryptocurrencies, become commonplace. The Metaverse's global nature brings forth the complex challenges of law and jurisdiction. As users from around the world converge in this virtual space, defining the boundaries of legal jurisdiction becomes paramount. Determining which laws apply to virtual interactions and disputes within the Metaverse is an intricate puzzle. Developing a framework for jurisdiction and legislation that ensures the safety and security of all users is a substantial challenge in itself. Ownership and property rights also become issues as the Metaverse takes shape. In this unified virtual universe, individuals will likely seek to purchase and possess various virtual assets and items. Non-Fungible Tokens (NFTs) have gained prominence as a means of representing ownership of digital assets, but creating a unified system to verify the ownership of virtual items within the Metaverse remains a challenge. Additionally, fostering a connected and vibrant community within the Metaverse presents its own set of obstacles. While online communication has become the norm, creating an environment in which users can feel both emotionally and physically present is essential. Advancements in haptic and motion capture technology are needed to enable more immersive interactions, allowing users to not only see but also touch and feel their surroundings. Finally, the Metaverse introduces novel concepts of time and space perception. The immersive nature of virtual reality can blur the lines between the real world and the virtual one, potentially leading users to spend excessive amounts of time in the Metaverse. Managing users' perception of time and space will be crucial to ensuring a balanced and healthy relationship with this virtual environment.

Much like blockchain has revolutionized the decentralized creator economy, the imminent convergence of cutting-edge technologies promises to unlock the vast potential of the metaverse, fostering seamless interconnectivity between virtual realms. The forthcoming deployment of 5G networks will empower users to access and engage with expansive metaverse environments on their mobile devices, while advancements in back-end engines will democratize content creation, enabling a shift from 2-Dimensional internet spaces to fully immersive experiences. Edge computing will deliver the necessary computational power, addressing latency and bandwidth challenges, and the integration of innovative hardware devices like VR headsets, gloves, and bodysuits will bridge the gap between physical and virtual realities. Software development remains at the forefront, driving metaverse applications atop this evolving infrastructure. It's essential to acknowledge that the metaverse's full potential relies on future advancements in compute and network infrastructure, as well as interface hardware, underscoring the ongoing nature of technological innovation in realizing the metaverse's transformative capabilities.

Keywords: Metaverse, Statistics and Facts, Virtual reality, Augmented reality

An International Journal
JSCDSS
E-ISSN: 2289-8603

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