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Metaverse - The Future of Virtual World

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ABSTRACT
Since the popularization of the Internet in the 1990s, cyberspace has kept evolving. In addition to social networks, video conferencing, virtual 3D worlds (like VR Chat), augmented reality software (like Pokemon Go), and non-fungible token games, we have also developed other computer-mediated virtual environments (e.g., Upland). Such virtual environments, albeit non-perpetual and unconnected, have brought us various degrees of digital transformation. The term `Metaverse' has been coined to further facilitate digital transformation in every aspect of our physical lives. At the core of the metaverse stands the vision of an immersive Internet as a gigantic, unified, persistent and shared realm. While the metaverse may seem futuristic, catalyzed by emerging technologies such as Extended Reality, 5G and Artificial Intelligence, the digital `big bang' of our cyberspace is not far away. Technologies are the enablers that drive the transition from the current Internet to the metaverse. Enabling technologies that drive this transition rigorously are Extended Reality, User Interactivity (Human-Computer Interaction), Artificial Intelligence, Blockchain, Computer Vision, IoT and Robotics, Edge and Cloud computing and Future Mobile Networks. In terms of applications, the metaverse ecosystem allows human users to live and play within a self-sustaining, persistent, and shared realm. User-centric factors are Avatar, Content Creation, Virtual Economy, Social Acceptability, Security and Privacy and Trust and Accountability.
Keywords—Augmented Reality, 3D world, Digital Transformation, User Interactivity, Cloud Computing

1. Introduction

Geppetto has 200 million subscribers, and Animal Crossing is hosting an election in the metaverse, demonstrating how quickly it is growing. In particular, Roblox has 150 million monthly active users (MAU), of which 2/3 are US children between the ages of 9 and 12 and 1/3 are under the age of 16 [1]–[3]. Second Life was the subject of early investigations for the Metaverse in 2006 [4]–[6]. The present Metaverse, however, is built on the social norms of Generation Z, which hold that an individual's online and offline selves are identical [7]. A new definition is therefore required for the current Metaverse because it differs from the prior Metaverse due to the growing share of social activities and contents.

Three things set the Metaverse apart from augmented reality (AR) and virtual reality (VR). First, Metaverse has a strong aspect as a service with more lasting content and social meaning, whereas VR-related studies focus on a physical approach and rendering. Second, AR and VR technologies are not always used in the Metaverse. It can be a Metaverse application even if the platform does not support VR and AR. Last but not least, the Metaverse offers a scalable environment that can support multiple users, which is necessary for human-robot interaction and visual-language interaction, both of which are egocentric views utilised as foundational technologies for user interactions.

2. Experimental Methods or Methodology

To find credible references for this paper, we used systematic literature reviews (SLRs) methodologies in part [11]. The secret method for choosing references is: 1) combine relevant

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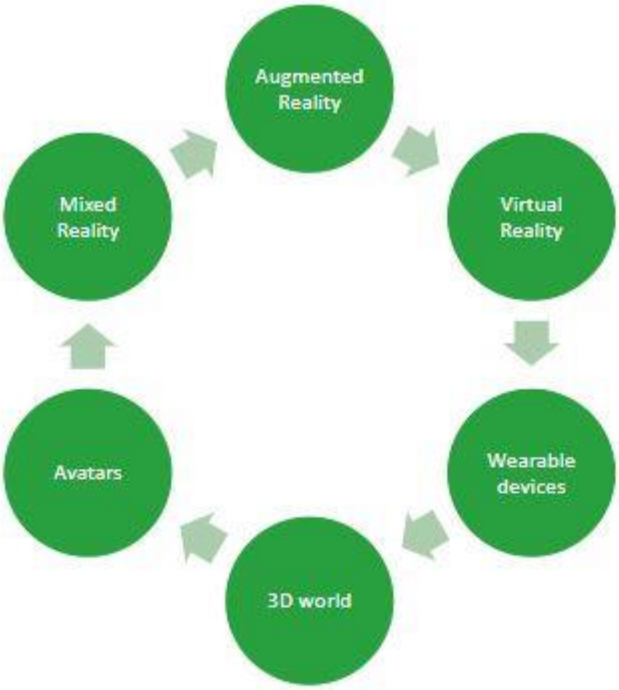
keywords when searching 2) Pick out articles with keywords in the title and content. 3) Delete any papers with keywords but no relevant Metaverse-related content. 4) group papers that are related. 5) Set up the taxonomy. First, we extract keywords for Metaverse concepts (such as Metaverse, Avatar, and Extended Reality). Out of a total of 260 papers, including 130 papers from Elsevier and 130 papers from Google Scholar based on relevancy, the definitions and characteristics of the Metaverse are studied for each paper in chronological order. It summarises the key concepts and definitions from 54 works [4], [7]–[10], [12]–[60] that directly discuss the Metaverse.



With the same process and a total of 15 subcategories, we create the component taxonomy (i.e., hardware, software, and contents) that is required to build the Metaverse in Section III. In a similar manner, we create a taxonomy of techniques (i.e., interaction, implementation, and application) in Section IV that includes 16 sub-categories for Metaverse approaches. Finally, we select exemplary Metaverse services and assess taxonomy by reference mapping. We evaluate papers that are announced on the papers published in Facebook Research from January to June 2021, particularly in the case of Facebook.

The representative applications in the areas of infrastructure, interaction, and ecosystem were presented by Duan et al. [7]. Additionally, they offer a three-layer design for the Metaverse that includes a brief history of its development. A virtual environment where hundreds of users can interact at once in a single simulated 3D space was introduced by Messinger et al. [23]. It discussed how social computing, business, education, and the social and technical sciences all impact our society as a whole. According to Müller [33], the Internet is a virtual reality that users log into every day, and the world is an electronic memory.

They emphasise perception, data evaluation, and information preservation safely. Dionisio et al[43] .'s emphasis was on the immersive realism, identity ubiquity, interoperability, and scalability of the Metaverse.Nevelsteen [56] concentrated on the relationship between terminologies and acronyms as ontology. Additionally, they expanded the definition of pseudo persistence to include technologies that just simulate persistence. Comprehensive research on Metaverse technology is scarce as a result of the fact that many Metaverse surveys primarily concentrate on applications and societal significance. Investigating a complete picture of the most recent technological elements,

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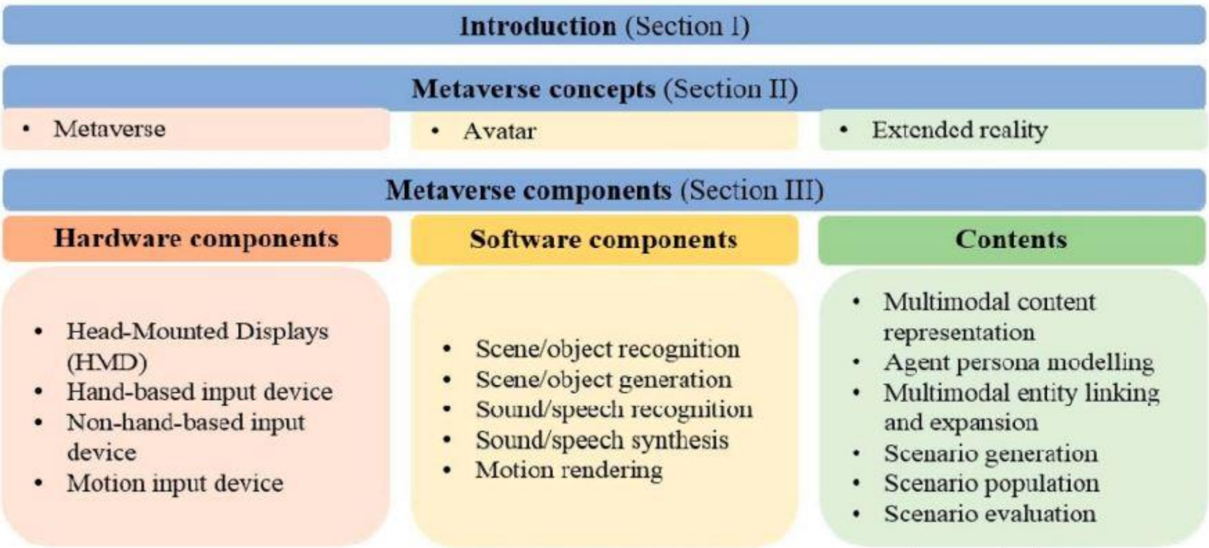
methods, and services is important to build the Metaverse. In Table 1, we examine the definitions of Metaverses from 54 additional surveys and go into great detail about HW, SW, and Contents. We specifically assess the proposed taxonomy using three distinct kinds of use cases.

3.Results and Discussion

3.1 Avatars

An avatar is an alter ego that has come to earth, and the term originated with the idea that a primordial being (such as God) may transform into a person. In the past, rather than representing the real world, the avatar was utilized as a pre-defined exaggerated shape in the virtual world.
But over time, it transforms into an ideal shape that represents the ego and conveys the appearance. In the Metaverse, an avatar plays a social role appropriate for their identity and line of work.



3.2. Hardware components (Physical devices and sensors)

Hardware in Metaverse not only contributes significantly to the immersive experience but also presents a technological challenge. Technology's impacts on hardware in the Metaverse are rapid, but they still leave room for improvement when compared to real-world usage. An HMD that blocks the vision to enable immersive involvement is a necessary piece of Metaverse hardware. Birnie et al[70] .'s fovea rendering method retains the centre portion in high resolution similar to human eyesight for a more effective visual experience. Resolution, field of view, and latency are crucial elements for physical devices and sensors.

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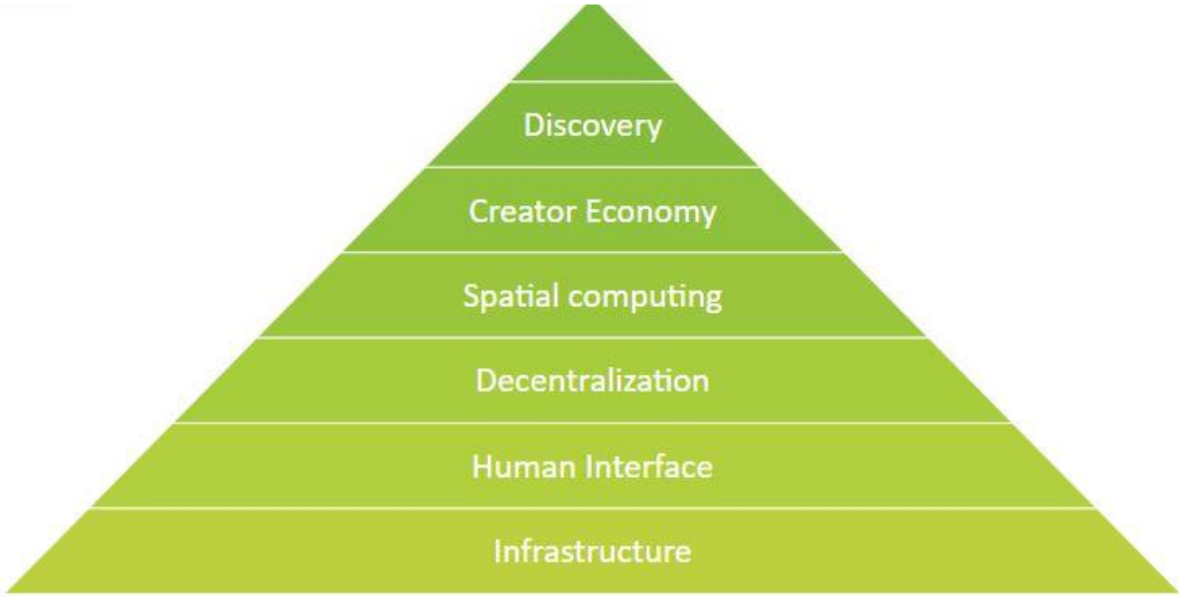
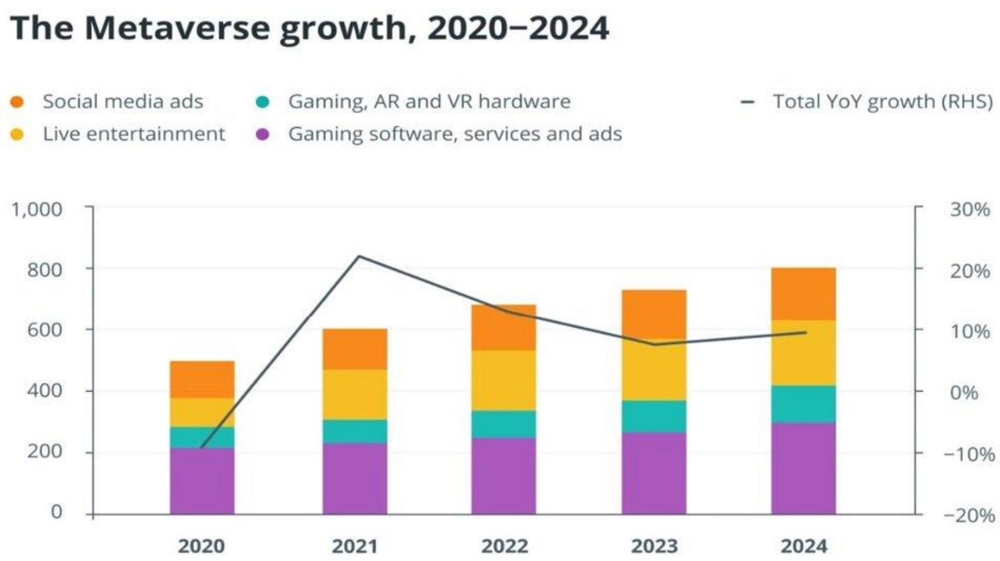
3.3 Metaverse Concepts

Based on contrasts of comparable concepts, this section explains the notions of the Metaverse, avatar, and extended reality (XR). The avatar is the user's alter ego and acts as the active subject in the virtual world known as the "Metaverse." The avatar is the user. XR serves as the conduit between users in the real world and avatars in the Metaverse.



3.4 Meta-Knowledge templates

Researchers and developers of data mining are given practical support by meta-knowledge and meta-learning. We must gather real world raw data from various sources in order to comprehend and derive meaningful meaning from it. This procedure might be challenging because the successful collection and processing of the raw data accounts for 80% of all knowledge and insight discoveries. Meta-knowledge templates are crucial in processing raw data and identifying its hidden significant value. Building robust and scalable meta-learning systems that include all the essential elements for knowledge discovery is essential and unavoidable in today's high tech environment, where big data is posing a significant challenge to researchers and organisations [9].



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CONCLUSION

As per preceding research and findings,We have seen a deluge of Big Data from numerous web applications, as we have already mentioned.

This data has to be clustered by researchers and developers in a more organised, useful way. The present clustering algorithms face significant difficulties processing massive amounts of data and grouping uncategorized objects to categorised objects due to their current design. By producing a faster, clustered data object in a linear amount of time, the invention of the 23-bit queries meta-knowledge template revolutionary approach to clustering for the amorphous, unstructured Big Data offers this special, quicker processing strategy for amorphous and unstructured data.

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