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Mapping technological dimensions of XR-based cognitive augmentation systems

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Abstract

Extended Reality (XR) systems enable immersive interaction in hybrid physical-virtual environments, delivering new perceptual and cognitive experiences compared to traditional digital applications. However, research in this area remains fragmented due to the diversity of XR devices and interaction modalities underlying these experiences. This paper analyzes a corpus of twenty-seven scientific articles on XR-based cognitive augmentation through the lens of a framework involving device type and output modality. By using clustering analysis, we identify specific patterns in how these dimensions have been combined in prior XR systems designed for human cognitive augmentation. Our results reveal a strong dominance of head-mounted displays for visual output, while audio and haptics remain underexplored, a finding that reveals new opportunities for future research in this space.

Keywords: *cognitive augmentation; extended reality; research implications; technological dimensions*

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