ActiveAR: Augmented Reality Task Support System with Proactive Context and Virtual Content Management

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Abstract (should be within 1st page)

Augmented Reality (AR) has long been expected to help users improve their working efficiency. However, due to the absence of intelligent systems, existing AR applications are greatly affected by the virtual content interference with real-world activities. Unlike existing work, which focuses more on hiding virtual content to reduce interference, in this work, we propose an innovative AR Task Support System where virtual contents actively guide users with task completion. During task execution, our system proactively searches for and tracks key objects in the scene, and uses this context information to automatically select appropriate virtual content and display positions. Through introducing open-world prompt-based visual models, our system can effectively retrieve few-shot or even zero-shot objects that are uncommon in the dataset. This approach extends the use of AR Task Support System beyond controlled industrial settings to more uncontrolled daily scenarios, overcoming the limitations of existing systems. It also significantly reduces development costs for developers. We demonstrate the advantages of our system over traditional virtual content management systems through a series of experiments that are closer to users' real usage situations. Based on this system, we further improve the system from the system with enhanced object retrieval ability. We also discussed the possibility of using gaze data for solving the long-standing automatic instruction switching problem in the society of AR Task Support Systems.