

Some 3D model rendering techniques and applications for displaying the 3D model of the Patuxay monument

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Abstract: This thesis explores advanced 3D model visualization techniques and their application in digitally reconstructing the Patuxay monument. The study addresses the challenges of rendering complex architectural heritage with high fidelity, focusing on Level of Detail (LOD) management, texture mapping optimization, and real-time rendering algorithms. By integrating photogrammetry data with geometric modeling, the research develops a framework for efficient visualization that balances visual quality with computational performance. The proposed system implements occlusion culling and adaptive tessellation to handle the monument's intricate details, including bas-reliefs and structural elements. A case study on the Patuxay monument demonstrates the effectiveness of these techniques in preserving cultural heritage through interactive 3D models. The results indicate significant improvements in rendering speed and visual accuracy compared to conventional methods. This work contributes to the field of digital heritage by providing a scalable solution for displaying large-scale architectural models, with potential applications in virtual tourism, education, and conservation documentation.

Keywords: 3D rendering, Patuxay monument, 3D model visualization, cultural heritage