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Visualization of Large-Scale Urban Models through Multi-level Relief Impostors

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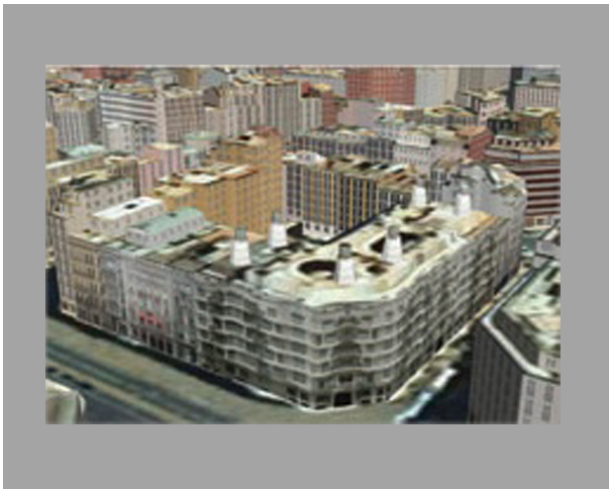

In this paper, we present an efficient approach for the interactive rendering of large-scale urban models, which can be integrated seamlessly with virtual globe applications. Our scheme fills the gap between standard approaches for distant views of digital terrains and the polygonal models required for close-up views. Our work is oriented towards city models with real photographic textures of the building facades. At the heart of our approach is a multi-resolution tree of the scene defining multi-level relief impostors. Key ingredients of our approach include the pre-computation of a small set of zenithal and oblique relief maps that capture the geometry and appearance of the buildings inside each node, a rendering algorithm combining relief mapping with projective texture mapping which uses only a small subset of the pre-computed relief maps, and the use of wavelet compression to simulate two additional levels of the tree. Our scheme runs considerably faster than polygonal-based approaches while producing images with higher quality than competing relief-mapping techniques. We show both analytically and empirically that multi-level relief impostors are suitable for interactive navigation through large urban models.

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