Using augmented reality in 3D modeling and geovisualization of urban design patterns and landscape projection

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Abstract:

The research goal was to create two 3D scenes of locations in Warsaw where Pattern Language objects appear. Architect Christopher Alexander developed Pattern Language, a theory that enables the construction of urban areas using a set of strictly connected rules. Each pattern is an object in space that may have a different form and scale depending on the spatial problem and spatial context. The main hypothesis of this paper is that 3D modeling enables the identification of characteristic landscape features. Two 3D scenes were built using Unreal Engine 5 software. Virtual rig rails and cameras were used for searching for the proper angle and perspective for both showing on the foreground and isolating Pattern Language from a background. Apart from the localization of the camera, other parameters, like focal length, were tested. Moreover, Unreal Engine 5 offers unlimited possibilities for manipulating weather conditions and artificial lighting, which are critical factors in spatial visibility and atmosphere creation. In order to mark characteristic features of landscape features on the area of 3D models, all described tools—multiple perspectives and imaging angles, different weather conditions, time of day, and artificial lighting—were used to prepare visualizations and were found to be significant factors for Pattern Language visibility.