Digital Twin and 3D Scene Virtual Tour Explorer Using Artificial Intelligence

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Digital Era and artificial intelligence (AI) nowadays have been showing interesting contributions for our life. Digital twin and virtual tour help us manage and plan better such as digital copy of heritage samples, city planning and explore new regions through virtual tour. This work presents our AI technologies to generate quality 3D digital models and 3D scenes to explore virtual world. We first employ high resolution satellite images to map a real territory onto a high quality map, then utilizes novel proposed AI techniques to render the 3D scenes. Using high resolution satellite images, a 3D digital twin model from level of detail (LOD) 0 to 3 with hundreds km^2 is generated just in a few days. It does not use any drones or aircrafts. To present the details of each object or virtual tour, we first use an intelligent algorithm to estimate camera poses from a captured video. Second, a technique is applied to remove blur or redundant frames. Next, proposed AI techniques are employed to render objects. Then, the high quality mesh of an object is generated by using estimated depth information. Finally, the texture of the object is mapped onto its generated mesh to build the 3D model. With our proposed AI rendering model, we can achieve to present the details of each explored object in real-time and in an immersive manner. It is also able to build the 3D model for an object using just a simple camera without any expensive support systems. Compared with other state-of-the-art methods, our model achieves superior results with aspects of real-time, low noise and texture quality.