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Real-Time Exploration of the Virtual Reconstruction of the Entrance of the Ripoll Monastery

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This paper presents the project of the virtual reconstruction and inspection of the "Portalada", the entrance of the Ripoll Monastery. In a first step, the monument of 7 x 11 meters was acquired using triangulation laser scanning technology, producing a dataset of more than 2000 range maps for a total of more than one billion triangles. After alignment and registration, a nearly complete digital model with 173M triangles and a sampling density of the order of one millimeter was produced and repaired. The paper describes the model acquisition and construction, the use of specific scalable algorithms for model repair and simplification, and then focuses on the design of a hierarchical data structure for data managing and view-dependent navigation of this huge dataset on a PC. Finally, the paper describes the setup for a usable, user-friendly and immersive system that induces a presence perception in the visitors.

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