Reconstructing History

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ABSTRACT

The digital preservation of historical artifacts creates huge data sets. Applications used to explore and search these data sets test the limits of existing hardware and software. These applications are often proprietary. Visualization techniques play an important role in viewing data at various scales to allow for more insight into known as well as unknown secrets the data might hold. The goal of this research project was to explore methods for visualizing data from laser scans of the Fort Sumter National Monument. Data, provided by the Warren Lasch Conservation Center (WLCC), part of the Clemson University Restoration Institute (CURI), consisted of coordinates in 3d space for 35 million points with associated surface normal vectors. After analyzing the range of the coordinates and available tools to process them, a small python script was used to divide the scene into more manageable pieces based on spatial location; the data was outputted in Stanford PLY format. Next, the "PoissonRecon" program, a utility for applying screened Poisson surface reconstruction developed and made available online by researchers at John Hopkins University, was used to convert the points into polygonal data. The resulting model was rendered with ParaView, a popular open-source visualization tool by Kitware. All data processing steps were done via Clemson University's Palmetto Cluster. The PoissonRecon program ran for 38 minutes on the largest piece (10,884,699 points), using 11GB RAM and 24 2.3GHz x64 cores on a single cluster node; the final model consisted of 16,707,527 polygons. The visible brick walls and pillars in the reconstructed model constitute only a portion of the available scan data. Future work will include refining the approach used to create a high-resolution model of the entire monument

Categories and Subject Descriptors

I.3.5 [**Computer Graphics**]: Computational Geometry and Object Modeling—*geometric algorithms, physically based modeling*

General Terms

Algorithms, Performance, Experimentation

Keywords

Visualization, big data, surface reconstruction