Photorealistic Image Based Objects from Uncalibrated Images

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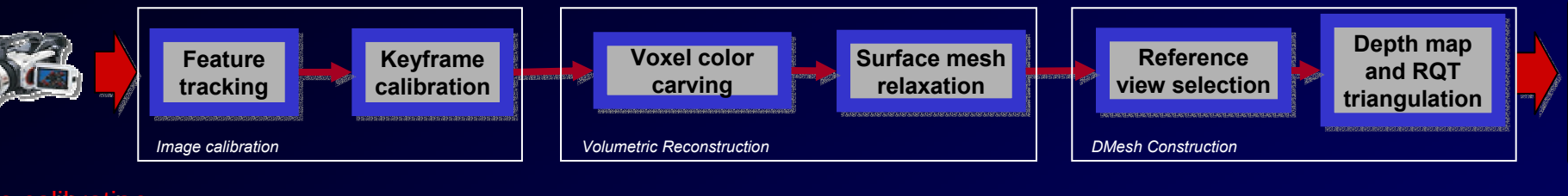
e Reconstruction Pipeline



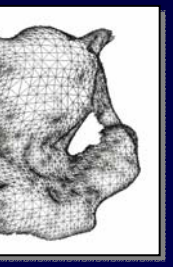
e calibration

The first step of the pipeline consists of recovering the 3D geometry of a scene from the 2D projections of measurements obtained from the digital images of multiple reference views, taking into account the motion of the camera. The proposed calibration approach [3] is based on a divide and conquer strategy.

omatically fragment the original sequence into subsequences and, in each of them, a set of key-frames ted and calibrated recovering both camera parameters and structure of the scene. When the different uences have been successfully calibrated a merging process groups them into a single set of cameras onstructed features of the scene. A final nonlinear optimization is performed in order to reduce the 2D re-projection error.

metric Reconstruction

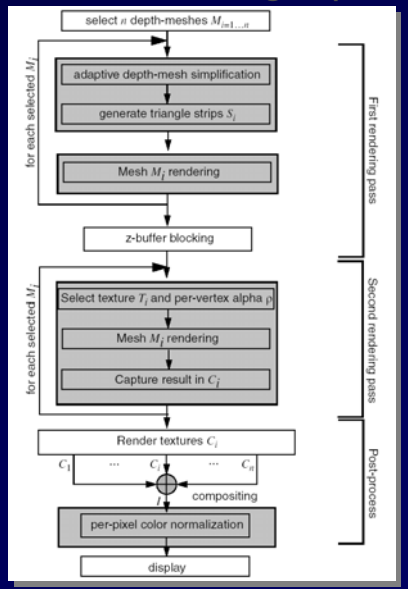
r to reconstruct the volume occupied by the object in the scene we have improved the approach ed in [2], that is based on carving a bounding volume using a color similarity criterion. The algorithm is d to use hardware accelerated features from the videocard. Moreover, the data structures have been optimized in order to minimize run-time memory usage. Additional techniques such as hardware ve texture mapping and shadow maps are used to avoid redundant calculations.



DMesh Construction

The final representation of the reconstructed object is based on an efficient depth-image representation and warping technique called DMesh ([1]) which is based on a piece-wise linear approximation of each the reference depth-images as a textured and simplified triangle meshes. This approach combines the available information from multiple overlapped reference images generating a generate a full 3D photo-realistic reconstruction.

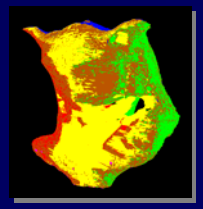
The Rendering Pipeline



During rendering the algorithm selects the closest reference the novel viewpoint, and it renders them and combines th using a per-pixel weighted sum of the respective cont obtaining the final colored image. This weighted sum corresponding final normalization are achieved in real-time u programmability of today's GPU's.

- 16 keyframes
- 1349548 voxels
- Creation time 4 min.

- 6 reference views
- 36000 tris. per ref. view
- 400 fps



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2. SAINZ, M., BAGHERZADEH, N., AND SUSIN, A. 2002. Hardware accelerated voxel carving. In Proceedings of 1st Ibero-American Symposium in Graphics, 289–297.
3. SAINZ, M., BAGHERZADEH, N., AND SUSIN, A. 2003. Camera calibration of long image sequences with the presence of occlusions. In Proceedin International Conference on Image Processing 2003

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