

Photo Tourism: Exploring Photo Collections in 3D

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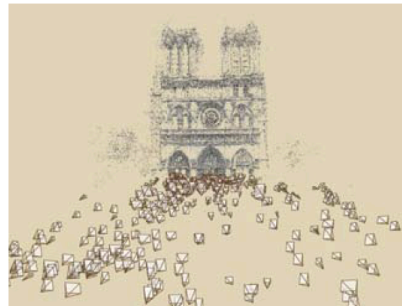
Steven M. Seitz

Richard Szeliski



(a)

Unstructured collections of photographs



(b)

constructed 3D points and viewpoints



(c)

Novel ways of browsing the photos

In this paper, the authors presented an interactive browsing tool of scenes of several virtual tourism sites. The system collects a large number of unstructured collections of photographs of a scene and enables browsing them using a novel 3D interface. It enables the construction of photo tours of scenic or historic locations. The system can handle large collections of unconstructed photographs taken by different cameras in widely different conditions. It provides the user with the following capabilities:

- **Scene visualization:** 3D exploring of popular world sites.
- **Object-based photo browsing:** to show more images about specific part or object of the scene.
- **Where was I?** To tell about the location where the picture was taken.
- **What am I looking at?** To tell about objects contained in current view.

The system uses the camera pose (location, orientation, and field of view) to automatically compute the viewpoint of each photograph. It also computes a sparse 3D model of the scene to automatically model correspondences of the scene and images. Camera pose parameters enable placing the image into the 3D coordinate system. The user is able to move from one image to another in 3D space for virtual exploring of the scene. Some morphing techniques are used to provide smooth transition between images.



One of the system capabilities is object-based browsing in which the user draw a box around an object of interest and the system move smoothly to the best view of that object. The scene representation consists of four components. First is a set of points where each point consists of a 3D location and a color. The color of each point obtained from one of the images where that point is observed. Another component is a set of cameras. Also a mapping points is required to map between cameras and points they observed. Finally is a set of 3D line segments.

The construction algorithm is evaluated by exploring several large sets of photos of popular sites gathered from the Internet and personal collections. Despite of the successful registration of several sites, the algorithm is still limited since it becomes slow as the number of registered photos grows.

This work showed some good results but I think the algorithm and the explorer interface need to be improved. The authors listed some future work and scalability that they intend to address in the future.

Reference

Snavely, Noah, Steven M. Seitz, and Richard Szeliski. "Photo tourism: exploring photo collections in 3D." *ACM transactions on graphics (TOG)*. Vol. 25. No. 3. ACM, 2006.