CS 63500

Spring 2018

Voicu Popescu

Due: Wednesday February 14 at 7am

**Assignment 2—Projective Texture Mapping**

***In a nutshell***

Implement a basic application that allows you to register a photograph to the geometric model of a real world scene, and render the scene by projective texture mapping.

***Details***

1. Model a real world 3D scene with a few rectangles (minimum 8).
2. Take a picture of the scene with your favorite camera.
3. Find the approximate field of view of your camera online, and build the camera model based on the field of view and the image resolution.
4. Register the camera to the scene, i.e. find the position and orientation of the camera when it took the picture, i.e. perform extrinsic calibration of the camera for the picture.
   1. Use manually established correspondences between vertices and their projections.
   2. Start from an initial camera pose that you establish either interactively, i.e. by navigating the camera to an approximate match with geometry, or by placing the camera directly in a plausible configuration.
   3. Find all six extrinsic parameters.
   4. Use an optimization method of your choice, it is OK to find the implementation of the optimization method online.
5. Render the scene by projective texture mapping using the registered picture.
6. Make a 10s video of the projective texture mapped scene
   1. The video should have a subtitle stating the calibration error you have achieved, and the number of error function evaluations performed during calibration.
7. Extra credit
   1. Automatic calibration, w/o manual correspondences (3%)
   2. Use of multiple textures, with correct arbitration at regions of overlap (3%)
   3. Anything else related to projective texture mapping that creates a compelling visual experience and/or gives you an opportunity to learn (negotiable%)

***Turn in via blackboard***

An archive that contains:

* Your source code and binaries
* Your output video
* A short report that lists the optimization method used, the error achieved, the number of error evaluations

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