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.
 - a. Use manually established correspondences between vertices and their projections.
 - b. 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.
 - c. Find all six extrinsic parameters.
 - d. 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
 - a. 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
 - a. Automatic calibration, w/o manual correspondences (3%)
 - **b.** Use of multiple textures, with correct arbitration at regions of overlap (3%)
 - c. 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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