

HOMEWORK ASSIGNMENT 6 (PRACTICE)

CO19-320322: COMPUTER GRAPHICS
320322: GRAPHICS AND VISUALIZATION

Fall 2016

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Due: Friday, November 4, 2016, at 8pm.

Problem 6: Raster Graphics (Part 2) (6+2+10+2+5=25 points)

Extend your ray caster of Problem 4 to scenes with explicitly defined objects in the form of arbitrary triangular mesh representation.

- (a) *Loading.* Load an arbitrary triangular mesh in OBJ format and store it as a (triangular) polygon soup. Objects in OBJ format are, among others, provided here: ¹. The format is explained and code for loading OBJ files is provided here: ².
- (b) *Set-up:* Using the same set-up as in Problem 4(a), place the loaded object fully inside the view frustum.
- (c) *Ray intersection.* Send a ray from the viewpoint through the center of each pixel of the screen (cf. Problem 4(b)) and compute its first intersection with the triangular mesh (if any). This requires you to perform a ray-triangle intersection (cf. Problem 3(b)).
- (d) *Returning colors.* In case the ray-mesh intersection did not deliver any intersection point, the respective pixel shall be assigned RGB color $(0, 0, 0)$. Otherwise, if (x, y, z) are the coordinates of the intersection point, then RGB color $(\frac{6+x}{12}, \frac{6+y}{12}, \frac{10-z}{10})$ shall be assigned to the pixel. Write the returned colors into a 2D image format according to the positions of the pixels on the screen and output the image (cf. Problem 4(c)).
- (e) *Anti-aliasing.* Apply a 2×2 subpixel supersampling anti-aliasing to improve the quality of your result. Compare the outputs with and without anti-aliasing.

Remarks: Solutions for the practical part have to be handed in via jGrader (<https://cantaloupe.eecs.jacobs-university.de/login.php>) by the due date. For late submissions you need to get in contact with the TA directly. You need to upload one zip-file that contains all source files (no executables or object files) for the programming assignments.

¹<http://www.prinmath.com/csci5229/OBJ/index.html>

²<http://www.opengl-tutorial.org/beginners-tutorials/tutorial-7-model-loading>