CS3570 Introduction to Multimedia

Homework #4

Due: 11:59pm, 2019/05/16

1. Bézier curve (50%)

You are given an svg file (vis.svg) containing 1 raster image (bg.png) and 1 path object (Bézier curve, extracted as points.txt) and a sample script (que.m).

a. Plot the image and curve (slide #14~#16), using 2 different settings.
   Low detail: t = {0, 0.2, 0.4, ..., 1.0}
   High detail: t = {0, 0.01, 0.02, ..., 1.0}
   Results are saved as **1a.png with 2 subplots.**

b. Scale up the svg file by 4 and plot it (using high detail).
   I. bg.png is scaled using Nearest-neighbor interpolation.
   II. the coordinates of the curve is scaled before the the curve is drawn.
   Result is saved as **1b.png**

2. 3D Models (50%)

Launch the script (p2.m) to load and draw the trump.obj file.

a. Shift the center of trump to (0, 0, 0) and save figure as **2a.png**. Center is defined as `[(max(x) + min(x)) / 2, (max(y) + min(y)) / 2, (max(z) + min(z)) / 2]` where x, y, z are the vertices of the object.

b. Based on (a), generate a HSV color cone (radius = 1, height = 1) on the x-y plane. Peak is at (0, 0, -1.4) and is pointing -z. Show both objects (trump & cone) at the same time and save the 3D figure as **2b.png**.

c. Based on (b), try 2 lightning: 1 positional light and 1 directional light. Other lighting parameters is up to you. Results are saved as **2c.png with 2 subplots**.

d. Based on (b), use the light `light('Position',[0 0 1], 'Style', 'infinite');` Try different ambient strength k_a, diffuse strength k_d, specular strength k_s.
   I. (k_a , k_d , k_s) = (1.0, 0.0, 0.0)
   II. (k_a , k_d , k_s) = (0.1, 1.0, 0.0)
   III. (k_a , k_d , k_s) = (0.1, 0.1, 1.0)
   IV. (k_a , k_d , k_s) = (0.1, 0.5, 1.0)
   Results are saved as **2d.png with 4 subplots**

Report

1. Describe how you implement the Bézier curve in (1a)
2. Discuss the results in (1b)
3. Discuss different lightning in (2c)
4. Discuss different strength in (2d)

You don't need to embed the result images into the report but the discussions are necessary.

Reminder

- You may refer to Matlab function **light**, **lighting**, **material,** Reference
- Your code should work correctly and the generated results (display or output files) must be consistent to your results in report.
- Pack "[YourID]_report.pdf", the result images, and codes in "HW4_[YourID].zip". Your package should also contain a README.md file describing how to execute your program.