24-681 COMPUTER-AIDED DESIGN Spring 16

Carnegie Mellon University

PROBLEM SET 7

Due: **3/3/2016 (Thu) 3:00PM @ DH A302**
Issued: 2/23/2016 (Tue)
Weight: 3% of total grade
Note: * **Attach the last page of the problem set as the cover page of your paper.**

PS7-1 De-noising of a laser-digitized polygonal mesh using Laplacian smoothing

In the previous problem set, PS6, you wrote a computer program that takes as input a geometry file and generates a VRML file that renders a zebra reflection pattern. Two of the geometry files that you used in PS6, car-panel1.txt, car-panel2, and face.txt, contain geometric noise, and their zebra reflection patterns are not smooth due to the noise.

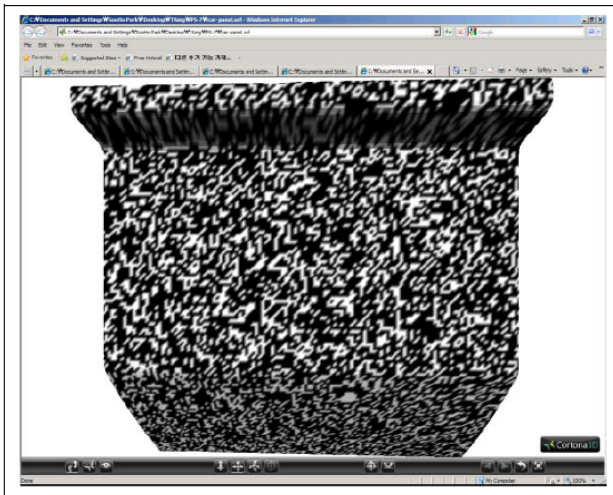
In this problem set, you will write a computer program that takes as input a geometry file and reduces the geometric noise by using Laplacian smoothing, a simple iterative algorithm for smoothing/de-noising a polygonal mesh.

Using your program you will observe how an initial noisy zebra pattern is "smoothed" as the Laplacian smoothing is applied multiple times. (Note that one known defect of the Laplacian smoothing is that the geometry will shrink dramatically as the smoothing is applied multiple times – there are more sophisticated versions of Laplacian smoothing that avoid the shrinkage.)

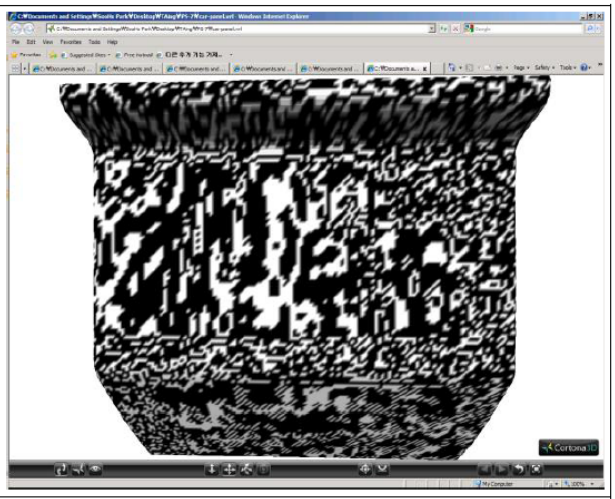
Apply your Laplacian smoothing program to two geometry files, car-panel.txt and face.txt, to study how a zebra reflection pattern changes as Laplacian smoothing is applied: (1) once, (2) five times, (3) 10 times, and (4) 50 times.

In your hand-in directory on AFS, make a new directory called ps7 (in lower case), and hand in:
- source code
- executable
- output VRML files (four VRML files for each of the *.txt files)
- "readme.txt" file that explains how to run your code

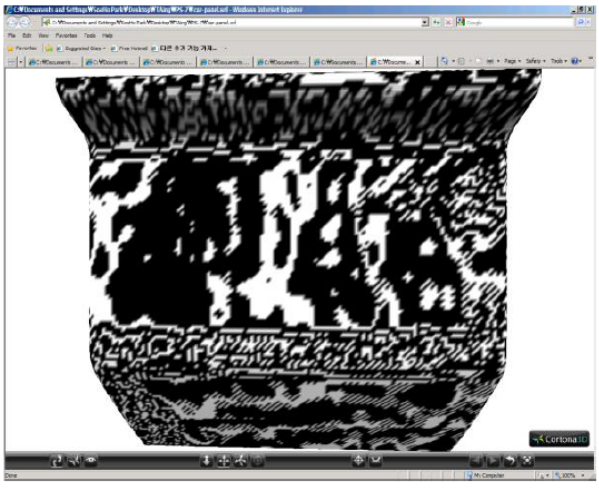
Also hand in a printout of the following:
- source code
- a screen shot of each of the polygonal surface with a zebra reflection pattern (four screen shots for each of the *.txt files)
- readme.txt file



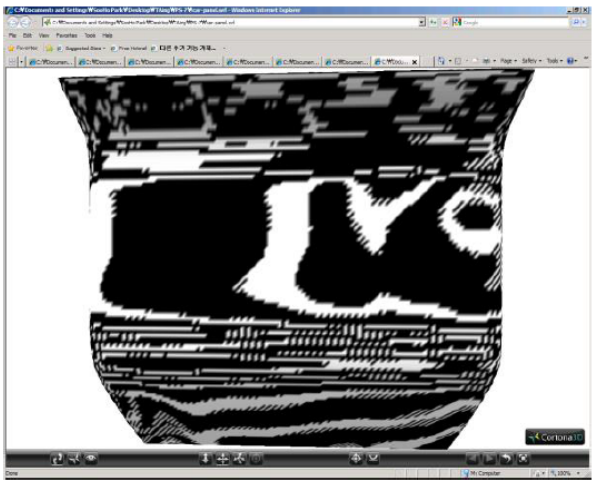
1 Step



5 Step

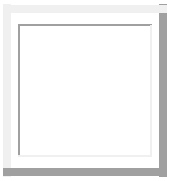


10 Step



50 Step

PS7



The first letter of your LAST name

First Name _____ Last Name _____

How many hours did you spend to complete this problem set?

_____ Hour(s)

How many no-penalty late days do you want to use for this problem set?

_____ Day(s)

24-681 COMPUTER-AIDED DESIGN Spring 16

Carnegie Mellon University

PROBLEM SET 7

Due: **3/3/2016 (Thu) 3:00PM @ DH A302**
Issued: 2/23/2016 (Tue)
Weight: 3% of total grade
Note: * **Attach the last page of the problem set as the cover page of your paper.**