Prof. Dr. Konrad Polthier
Eric Zimmermann
Version: 2

Scientific Visualization
Summer Semester 2023
Freie Universität Berlin

Exercise Sheet 3

Submission: 16.05.2023, 10:15 AM

Exercise 1. (4 points) Install[1] the Eclipse IDE and JavaView, create a new Java project for development and import the vgp.tutor sources into your project. Create a source subdirectory directly under your JavaView project which you name "myprojects" and which will contain your own projects later on. This can be done by right-clicking the JavaView project and selecting "New→Source Folder".

Understand the example project under vgp.tutor.firstProject. The GUI elements for the info panel are all defined in the class MyProject_IP. You can run it by right-clicking the MyApplet class and choosing "Run as→Java Application". Note that the runnable class is usually prefixed "Pa" in other JavaView projects, e.g. "PaLinear" in vgp.tutor.linear. When you feel comfortable with the code structure, do the following:

i) Create a new package under your "myprojects" folder (right-click it and select "New→Package") and name it "colorize". Copy the content from the example project vgp.tutor.firstProject to this package. You should then have 4 files in your colorize-package.

ii) Now add a button[2] to the info panel with name "Colorize" and implement a method to the project class such that every element of the animated surface with odd index becomes blue and every element with even index becomes white when you click on the button.

When your program is running correctly, export it to a runnable jar[3] as described on the web page with the usual file naming convention name1_name2_colorize.jar. Make sure that the jar works as intended.

Hints: You may want to disable backside colors. In JavaView go to "Method→Color" and disable "Show Backside Colors".

Exercise 2. (7 points) Consider the subdivision scheme for polygonal curves given by the averaging mask

$$r = \frac{1}{16}(-2, 5, 10, 5, -2).$$

i) Determine a local subdivision matrix L corresponding to r for the interpolating subdivision scheme presented in the lecture.

ii) Determine an eigensystem for L, i.e. a basis of eigenvectors and corresponding eigenvalues.

iii) For a point $p^0 \in S^0$ derive its limit $p^\infty \in S^\infty$ in terms of p^0 and its neighbors.

Exercise 3. (5 points) Let $S^0 \subset \mathbb{R}^2$ be a set of control points given by

$$S^0 = \left\{ P_0^0 = \begin{pmatrix} 4 \\ 0 \end{pmatrix}, P_1^0 = \begin{pmatrix} 0 \\ 4 \end{pmatrix}, P_2^0 = \begin{pmatrix} 2 \\ 6 \end{pmatrix}, P_3^0 = \begin{pmatrix} 4 \\ 4 \end{pmatrix} \right\}.$$

Determine the first two subdivision steps S^1 and S^2 starting with S^0 using Chaikin's corner cutting scheme explicilty. Illustrate your results.

[1] Guidelines for Installation for Developers with JV jars can be found in the JavaView wiki.
[2] Find an overview of relevant methods on http://www.mi.fu-berlin.de/w/AGGeom/JVEssentialClasses.
[3] See http://www.mi.fu-berlin.de/w/AGGeom/JVRunnableJar.