KTH Stockholm
CSC :: HPCViz
Visualization, Spring 2015, DD2257
Tino Weinkauf

Homework assignment No. 06

Due May 13, 2015

Task 6.1: Line Integral Convolution **20 P**

Implement the Line Integral Convolution algorithm. See also Figure 1. Each of the following features gives a certain number of points, summing up to the total of 20 points:

(a) Base algorithm creating a LIC texture from a loaded vector field. The LIC texture shall cover the entire domain of the vector field. You can use the box kernel for the convolution. The assignment comes with several data sets for testing. (8 P)

(b) FastLIC. (5 P)

(c) User-defined kernel size. (2 P)

(d) Contrast enhancement after the convolution by adjusting the mean and standard deviation. (2 P)

(e) User-defined texture sizes (number of pixels) in x-direction and y-direction. Note that GeoX only supports texture sizes that are a power of two, i.e., 64, 128, 256, 512, 1024, ... (1 P)

(f) Ability to choose between a grayscale texture and a black-white texture. (1 P)

(g) User-defined seed of the random number generator in order to create the same random texture with each run. (1 P)

Task 6.2: *(Bonus)* Line Integral Convolution ++ **3+5 BP**

Implement the following extras in your LIC implementation from the previous task:

(a) Ability to load an arbitrary image as input texture.

(b) Color the LIC texture according to the magnitude of the vector field.

Technical details for both tasks:

Use the class *ScalarField2* to represent a texture. You can set the value of the texture at each node using the method *setNodeScalar()*.

GeoX displays only one texture at a time. To display a (grayscale) texture, call *viewer->setTextureGray()*.

Color textures are represented using three independent textures (RGB) and they are displayed using *viewer->setTextureRGB()*.

The method *DrawTexture()* in the file `experiments/ExampleExperimentFields.cpp` shows how to use textures correctly.

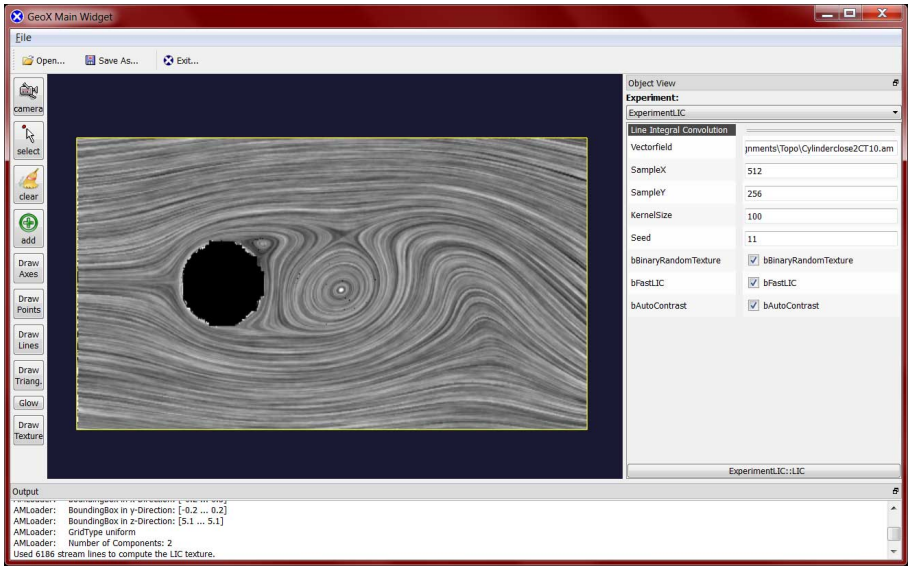

Figure 1: Line Integral Convolution in GeoX.