Vines

Kevin Kraemer Sunil Kavalan

December 3, 2012

0.1 Overview

In this project we created a puesdo-Hamiltonian path generator and used the resulting triangle set to animate the generation of vines. The generation should be seedable and will generate an approximation of the shape as the triangle count becomes high.

0.2 Hamiltonian Path

A Hamiltonian path is a traversal of a graph that visits every vertex exactly once. Unfortunately it is difficult to impossible to generate the path for an arbitrary shape. In "LR: Compact Connectivity Representation for Triangle Meshes" a method for getting an approximate path is given. We utilized the depth first method to generate the path. The path can be seeded using "s" and stepped in order using ">".

0.3 Vine Generation

For creating the vines, we decided to use a series of connected cylinders. We created a cylinder class that takes in a 3D point, a radius, a height, and a vector. A cylinder is created with the given radius and height and placed with the center at the 3D point. The cylinder is then able to rotate and orient itself in space so that the normal vector for the top face of the cylinder is equal to the given vector.

The cylinder class is used to create the vines during the Hamiltonian path walk. Whenever a new step in the path is found, the current triangle and the next triangle are saved to a 2d array which is used to generate the cylinders.

For the drawing process, a cylinder is created for each pair of triangles in the 2d array. We calculate two points from the centers of the two triangles. A cylinder is created with it's origin as the midpoint between the pair of points, the height set to the distance between the pair, and a normalized vector pointing from one point to the other is used for the rotation vector.

The vine drawing can also be animated by running the Hamiltonian path computation in a dedicated animation thread.