Stylized Trees and Landscapes

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Figure 1: *Stylized landscape examples based on the artwork of Eyvind Earle.*

1 Introduction

Eyvind Earle (1916-2000) is known in the animation community as the matte painter who painted the backgrounds in Sleeping Beauty. He was also a prolific artist and landscape painter who painted through the last year of his life [bio 2014]. After studying his paintings and methods, I derived my own method of digitally modeling trees and landscapes based on his work.

This poster describes my initial work on stylized trees and landscapes based on the artwork of Eyvind Earle. Using the 3D software package Houdini, I created node networks that create simple shapes, evenly scattered points, and separate shadow geometry. The shapes and points are rendered with flat colors or smooth gradients to complete the look for Eyvind Earle's distinctive graphic style.

2 Approach

My work started with an analysis of Eyvind Earle's artwork and methods. He loosely plans his compositions, beginning with rough outlines of terrain features, then moving to refined shapes, and finally a multitude of complex point work [Earle 1997]. My method uses a similar approach, generating geometry in two steps: first creating the simple color area base shapes, and then generating points using the base shape geometry. Special consideration is also taken for the level of detail based on distance from the camera. I will focus on the creation of one tree model in this poster. For a painted example, see Cachuma Ranch [Earle 1999].

The flatly rendered part of the tree is comprised of two parts: the canopy, and the trunk. Both are rendered with a Houdini constant black shader. The trunk is a simple L-System rule lofted with a tube. The canopy is made of three blobbies that are slightly jittered in size and position per tree instance. The tree canopy details are comprised of multiple circular sub-canopies that are modeled as flattened spheres scattered across the base canopy geometry.

A Houdini Scatter SOP (Surface OPerator) distributes points across the canopy geometry. The points function as the leafy green colored and lit part of the trees. The points are biased towards the edges (rim light) and in the direction of incoming light (direct illumination), just like Eyvind Earle's paintings.

Tree shadows are cast by different geometry that is simpler than the tree geometry. Much of Eyvind Earle's work features stylized shadows that are much simpler than the object casting the shadow. The shadows are often a different shape as well, being pointy when the casting geometry is curved or vise-versa.

To mimic the level of detail caused by atmospheric perspective, the trees closer to the camera have more detail. The closer a tree is, the more sub-canopies it has, and therefore has more detail. Also I attempt to maintain a fairly constant size of points and distance between points in the rendered image plane, regardless of depth in the scene. This is done by scaling key values according to distance from the camera. Intuitively this model breaks down with a moving camera. I have found by picking a position somewhere close to the camera to calculate depth instead of using the actual camera, you can at least avoid jittering caused by changes in depth.

I am continuing work finessing the rules for the tree described here, as well as developing other kinds of trees seen in Eyvind Earle's work. This tree in particular can be generalized further to describe dense fields of trees, tall bushy trees, and the leafless version of this tree. I plan to develop the capability to generate a variety of landscape compositions featuring a variety of trees. I thank my committee chair, Philip Galanter, for guiding me in this project.

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