Developing Stylized Trees and Landscapes Inspired by Eyvind Earle

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Figure 1: *Three scenes created in Houdini styled to look like Eyvind Earle's artwork.*

Abstract

This work uses Houdini to explore methods of generating and rendering landscapes stylized to mimic the artwork of artist Eyvind Earle (1916-2000). I present general guidelines and procedural characterizations of various trees, a forest, cliffs, mountains, an ocean, and waves. I developed methods for matching the shapes of the objects, relying on noise, L-systems, and other constraints. The graphic style places importance on the shape of the geometry, as it is rendered with simple toon-based shading techniques. Additionally, any intricate details are portrayed with point or line geometry instead of a traditional shader to mimic fine illustrative brushwork. Carefully chosen color palettes, separate shadow geometry, and level-of-detail rules also add to the likeness of Earle's style.

CR Categories: I.3.3 [Computer Graphics]: Three-Dimensional Graphics and Realism—Display Algorithms

Keywords: non-photorealistic rendering

1 Goals

The goal of this work is to characterize Eyvind Earle's artwork into a system. This means to find examples of his work, analyze the style of specific elements, and create a module that will produce a digital 3D version of that element. This results in digital 3D landscapes featuring a variety trees and landscape features that emulate Eyvind Earle's 2D graphic style. The technical problems consist of non-photorealistic shading, tree modeling, and creating the scenes as a loose mapping of a 2D source material to a 3D result. This was achieved through though visual analysis of Earle's work [WEB], as well as a study of his life and process to gain insight [Earle 1991; Earle 1990].

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2 Asset Construction

I developed node-based systems in Houdini to generate a variety of trees, several geological features, and a static (not animated) ocean. The result is 3D geometry, including custom shaders or custom geometry with embedded shading information. These generative systems leverage noise and other mathematic formulae to describe the form and details. Variations of each system's results are driven by randomness, reducing artist labor to obtain options or variety.

In general, my methods are similar to Eyvind Earle's in that most of the asset models follow these steps: base silhouette, and then details. Because the look is so stylized, I chose to create much of the detail with geometry and not within the shaders. Thus, the shading is closely tied to the geometry generation. To achieve stippling and contour lines, point and line geometry (respectively) is generated to create the effect.

Three kinds of trees are designed with stochastic L-System rule sets. These trees lack deciduous leaves and thus have prominent branching structures. A leafy tree I developed features detail stippling atop a black silhouette. The amount of canopy detail is driven by the object's depth in the scene. Other assets are created similarly, all with care to match the shapes exemplified in Earle's artwork.

3 Scenes

I created three main scenes using the assets: a hill with trees, a cliff surrounded by forest, and a coastal ocean wave (as shown in figure 1). The assets are tweaked to follow the vibrant color palette of the scene and to integrate with surrounding assets. Each individual system asset is placed manually (or by a manually defined scheme) within the scene. However, artist labor is greatly reduced by the procedural nature of the asset systems.

References

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Eyvind earle: Artist of the twenty-first century. http://www.eyvindearle.com.