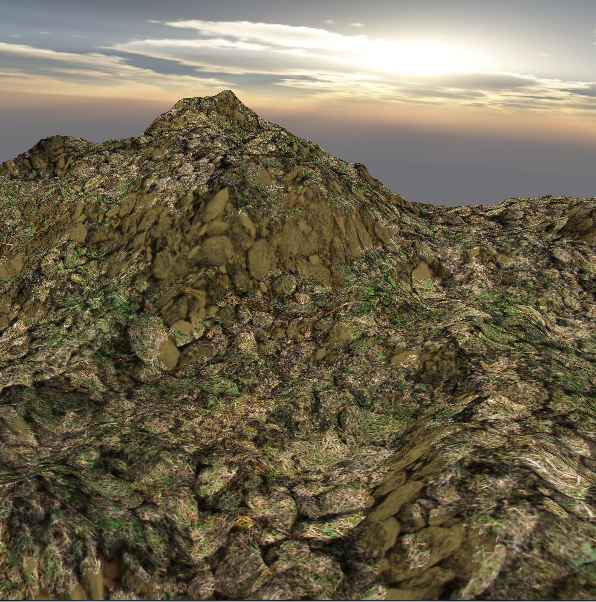
Karteek Kumar Mekala | Masters Project | March 2014

Rendering photorealistic mountain terrain

using PERLIN noise height map and slope-based multi texturing



# Abstract

Whether you are driving a tank through a war zone or watching a plane fly across Nevada, a common scene in many video games and animated movies is that of a beautiful mountain terrain. The goal of this project is to render a 3D scene of photorealistic mountain terrain that is vast and can be navigated through a fly through camera.

The first

The first task to do this is to generate a 2 dimensional array of heights. This is done using the popular ‘Diamond Square Recursive Subdivision’ algorithm. The next step is tessellation – where the 2 dimensional array of heights is converted to an array of quadrilaterals – which are the primitive polygons used for rendering the mountain terrain. The final step is to apply color to these quadrilaterals. This is done using the ‘Slope based multi-texturing’ technique – this technique tries to mimic real mountain terrain by applying higher degree of rocky textures to areas of the terrain with high slope, while applying higher degree of grass textures to areas that are more flat. Areas that are below a certain height are hidden under water and areas that are above a certain height have snow. In addition to rendering the mountain terrain, images of the sky are painted and a fly-though camera is provided to navigate the photorealistic scene.

/\*Virtual scenes with landscape, terrain and clouds are widely used in computer animation and video game scenes. These images are easily reproducible by using simple fractals generation algorithms.

The goal of the project is to render a realistic terrain scene. The scene consists of a terrain generation and a sky background. Rendering the scene involves generating a height map of the terrain, tessellating the terrain, applying texture to the terrain in multiple stages, rendering the terrain and rendering the sky. A fly through camera is provided to navigate through the scene. The height map is generated by recursive subdivision using the Diamond-Square algorithm. The recursive subdivision with diamond square algorithm is a simple and popular technique that has been in used since a long time to produce photorealistic landscapes. The terrain is tessellated using quads as the primitive. A slope based multi-texturing technique is used to apply texture to the tessellated terrain. The sky is rendered using the sky box technique. Skybox is a technique of adding background to a 3d scene by mapping images onto a cube, making the boundary of the scene to appear to be away at a large distance. A fly through camera is provided to navigate through the scene.\*/

# Introduction

# Background

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# Design and Architecture

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# Implementation

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# Conclusion

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# Deliverables

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# Schedule

# References