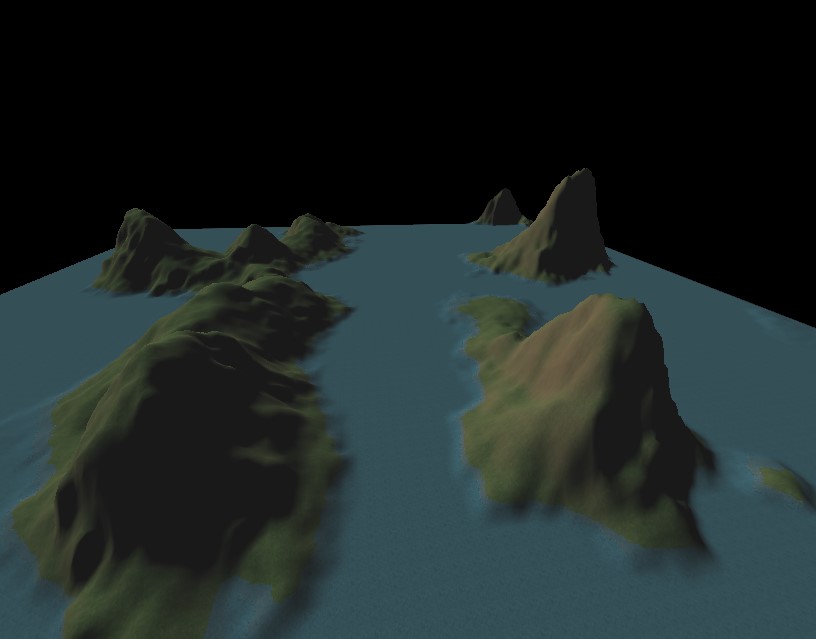
Rendering photorealistic mountain terrain

using PERLIN noise height map and intelligent multi-texturing



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# 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 using a fly through camera.

To render the scene - we first generate a map of heights. Using these heights we generate a list of triangles that can be rendered as a wire-mesh of the terrain. Multiple layers of grass, rock and water textures are applied to these triangles intelligently to mimic the look of real terrain. Lighting is applied, a skybox is rendered and a fly-through camera is provided to navigate through the scene.

# Introduction

This is it.

# Background

This is it.

# Approach

## Scene Description

This is it.

## Techniques

This is it.

### Height Map

The height map resource file is generated by storing the output of the Perlin noise algorithm in the form of a grey scale bitmap. The resource file is put through a smoothing face to avoid sharp transitions in height values.

### Tessellation

The height map needs to be converted into a set of triangles that can be rendered. We start with flat M \* N grid of rectangles in the XZ plane. The values from the height map are then applied to the vertices of the rectangles in the grid. This results in a grid of 3dimensional quads. Each quad is divided into two triangles which are used as the primitive for rendering the terrain.

### Calculating Normals

This is it.

### Lighting

This is it.

### Multi-Texturing

This is it.

### Skybox

This is it.

### Camera Controls

This is it.

## Performance Statistics

This is it.

# Implementation

## Technology

This is it.

## Software & Hardware Specifications

This is it.

## Overall Program Structure

This is it.

# Conclusion

This project intends to demonstrate that the combination of techniques described can be used to render photo-realistic mountain terrain. The performance statistics to be collected under different parameters are expected to prove that the solution is efficient and scales easily as per the scene requirements.

# Deliverables

1. Working demo of the described Mountain Terrain scene
2. A final report including the performance statistics observed using different scene-parameters
3. A presentation for the final project defense

# Schedule

|  |  |  |  |
| --- | --- | --- | --- |
| **Target Date** | **Actual Date** | **Event** | **Status** |
| 11/09/2012 | 11/09/2012 | Pre-Proposal | Accepted |
| 04/30/2013 | 04/30/2013 | Select frameworks & toolkit | Done |
| 05/01/2013 |  | Project Website | In-progress |
| 05/14/2013 |  | Project Proposal | In-progress |
| 06/21/2013 |  | Design 1 implementation |  |
| 07/08/2013 |  | Design 2 implementation |  |
| 07/22/2013 |  | Design 3 implementation |  |
| 07/29/2013 |  | Final Report |  |
| 08/01/2013 |  | Project Defense |  |

# References

This is it.