Technical Report

Extrapolate and Conquer

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Extrapolate and Conquer

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1 Introduction

The aim of this project was to develop a computer graphics application combining several state-of-the-art techniques into one beautiful and intelligent world.

2 System Core

Complex entity system..

2.1 Rendering

2.2 Physics

3 Graphics

Graphics graphics.

3.1 Generating a World

How to world

3.1.1 Sky

The sky is achieved using a high-resolution texture of a sky mapped to a skybox. The mathematical location of the sun is placed as close as possible to the sun appearing in this texture. This gives shadows and shading a natural feel. The texture has been manually modified at the horizon to fade towards a shadowish gray color. The color is the same as the one objects are distance-fogged with. This makes the sky melt into the ocean in a very nice way.

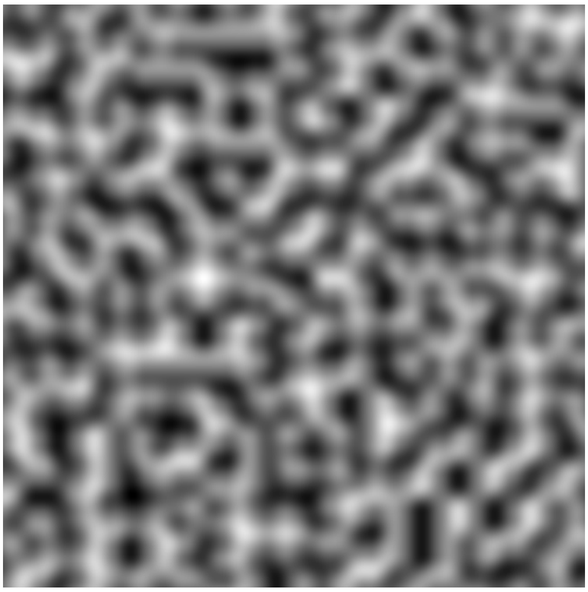
3.1.2 Ocean

Normal-mapped square

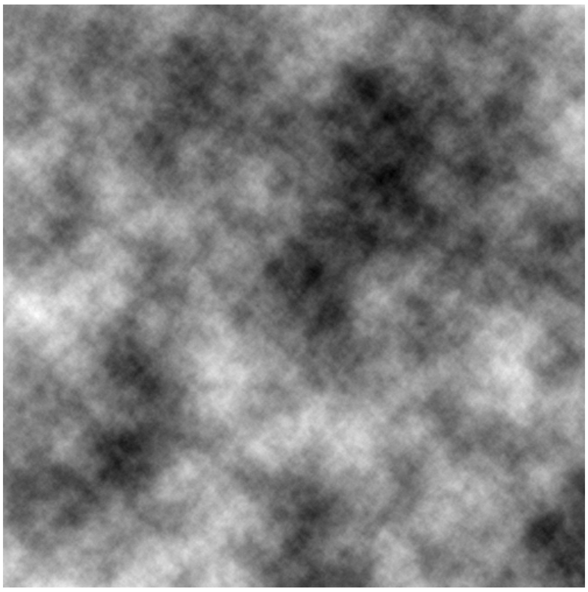
3.1.3 Terrain

The terrain is generated by sampling a noise function and translating its value into a height for the current vertex. The noise in this case originates from a Simplex function. However, to get a realistically looking terrain one it is not sufficient to sample this function only once for every vertex.

Fractional Brownian Motion is calculated by sampling the Simplex function at different frequencies and calculating a weighted sum over the samples [1]. The result is a nice looking height map.



(a) Height map generated from single-octave simplex noise



(b) Height map generated with Fractional Brownian Motion

Figure 3.1: *Comparison of noise functions*

3.1.4 Content

Trees and rocks

3.2 Visual Effects

Boom hacka lacka

3.2.1 Shadows

Shadows are one those things that can make a scene really come to life.

3.2.2 Fog

Misty ocean

3.2.3 Normal Mapping

Are there really ocean waves?

4 Artificial Intelligence

Ai ai ai ai ai ai ai ai.

5 Conclusions

Awesome

References

[1] Mandelbrot, B. & Van Ness, J. (1968)
"*Fractional Brownian Motions, Fractional Noises and Applications*"
SIAM Review, Vol. 10, No. 4, pp. 422-437

[2]

[3]

[4] Gardel, A., Bravo, I., Jimenez, P., Lazaro, J.L. & Torquemada, A.
"*Statistical Background Models with Shadow Detection for Video Based Tracking*,"
Intelligent Signal Processing, 2007. WISP 2007. IEEE International Symposium on?? Page: 1-6.

[5] Zivkovic, Z. & Heijden, F.
"*Efficient Adaptive Density Estimation per Image Pixel for the Task of Background Subtraction*,"
Pattern recognition letters, Vol. 27, No. 7. (2006), pp. 773-780.

[6] Bernardin, K. & Stiefelhagen, R (2008)
"*Evaluating Multiple Object Tracking Performance: The CLEAR MOT Metrics*,"
Interactive Systems Lab, Institut für Theoretische Informatik,
Universität Karlsruhe, 76131 Karlsruhe, Germany

[7] "*CAVIAR: Context Aware Vision using Image-based Active Recognition*,"
EC Funded CAVIAR project/IST 2001 37540
http://homepages.inf.ed.ac.uk/rbf/CAVIAR/

[8] Hirschmüller, H (2008)
"*Stereo Processing by Semiglobal Matching and Mutual Information*,"
IEEE Transactions on Pattern Analysis and Machine Intelligence, Volume 30(2) pp. 328-341.

[9] OpenCV *Open source computer vision*
http://docs.opencv.org/
Accessed on 2013-12-13