Toon shading

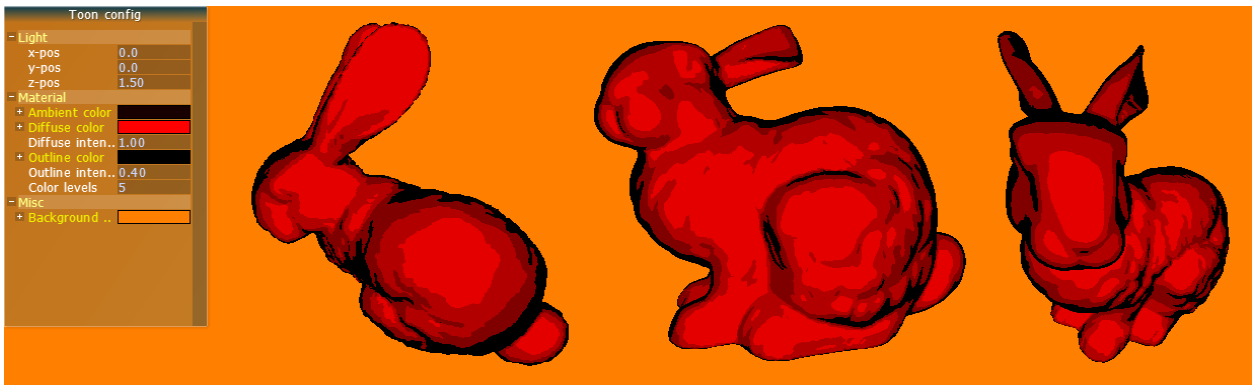

Figure 1: Toon shading on the Stanford bunny.

Introduction

Toon shading or cel shading is a technique that transforms the shading of a 3D model so that it resembles classical animation drawings. There are multiple techniques for achieving a toon shaded 3D model with varying results. The most simplest solution is to draw the 3D model using two shaders with different scales on the model. Using this technique does not however color the outline of inner structures within the 3D model. Another solution is to implement a two pass rendering whereas the outline color and the actual color of the 3D model is colored seperatly. The important parts for achieveing a toon shaded model is to emphasize the color of the outlines and to restrict the number of colors that is used to represent the 3D model.

My approach

As previously explained, there are multiple ways of achieving a toon shaded 3D model. The approach i used was using a variation of the blinn phong shading model. In order to color the outlines of the 3D model, a simple edge detection had to be implemented. This was done by using Lamberts cosine law to recognize the angle at which the fragments should be colored with a outline color. The results are not perfect for a toon shading since the outline color can sometimes excessivly color the outlines of the 3D model depending on the angle the model is rotated, it does however color the outline of inner structures of the 3D model. In the openGL program, the parameters for outline color and intensity can be configured with the provided anttweakbar. The ambient color is restricted to a maximum number of colors which can also be configured within the program, it exagerates the contrasts between the different colors which is typical for achieving toon shading.