INTRODUCTION TO PHOTOREALISTIC PATH TRACING

ARDEN RASMUSSEN

Abstract. This paper provides a brief introduction into advanced computer graphics techniques, such as path tracing, photorealistic rendering, BSDF, and volumetric rendering.

1. Introduction

Photorealistic based rendering is a common method that is used in modern computer graphics. It used to be limited to offline rendering, but has recently been improved to be usable in realtime rendering. This paper will primarily focus on the application of photorealistic rendering in offline systems. This means that the rendering process can be significantly slower, and thus allows the opportunity to produce more realistic images.

The fact that the image rendering is not being done in real time does not mean that it is not important to optimize the code. In fact the methods that are used for offline photorealistic rendering are significantly slower than the methods that are used for realtime rendering. However, they produce images that represent reality much more accurately.

This paper will discuss the following concepts:

- Path Tracing
- Ray Marching
- Signed Distance Functions
- Bidirectional Scattering Distribution Functions
- Volumetric Rendering
- Parallel Processing
- GPU Acceleration
- Neural Network Denoising

2. Ray Marching

3. Path Tracing

4. BSDF

5. Volumetric Rendering

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