

A MultiAgent System for Physically based Rendering Optimization

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Abstract. Physically based rendering is the process of generating a 2D image from the abstract description of a 3D Scene. Despite the development of various new techniques and algorithms, the computational requirements of generating photorealistic images still do not allow to render in real time. Moreover, the configuration of good render quality parameters is very difficult and often too complex to be done by non-expert users. This paper describes a novel approach called *MAGarRO* (standing for “*Multi-Agent Approach to Rendering Optimization*”) which utilizes principles and techniques known from the field of multi-agent systems to optimize the rendering process. Experimental results are presented which show the benefits of *MAGarRO* -based rendering optimization.

Key words: MultiAgent, Rendering, Global Illumination, Optimization

1 Introduction

The process of constructing an image from a 3D model comprises several phases such as modelling, setting materials and textures, placing the virtual light sources, and finally rendering. Rendering algorithms take a description of geometry, materials, textures, light sources and virtual cameras as input and produce an image or a sequence of images (in the case of an animation) as output. There are different rendering algorithms – ranging from simple and fast to more complex and accurate ones – which simulate the light behavior in a precise way. Such methods are normally classified in two main categories, namely, local and global illumination algorithms. High-quality photorealistic rendering of complex scenes is one of the key goals and challenges of computer graphics. Unfortunately this process is computationally intensive and may require a huge amount of time in some cases (especially when global illumination algorithms are used), and the generation of a single high quality image may take several hours up to several days, even on fast computers. As pointed out by Kajiya [1], all rendering algorithms aim to model the light behavior over various types of surfaces and try to