Thesis Defense

Computer Science Master's Program

"Balancing Darkness and Visibility: An Algorithmic Approach to Light Placement in Low-Light, Ray-Traced Scenes"

By **Briana Kuo**

Abstract:

In recent years, digital media has seen incredible advancements in rendering visually stunning computer graphics scenes. Photo-realistic games, animated films, and more leave viewers blown away by the sheer beauty of their graphics. However, challenges arise when depicting dark scenes, often resulting in visual monotony and difficulty in comprehension due to insufficient detail within the scene. In order to enhance readability and visual interest of a scene, additional, artificial lights can be placed throughout a scene to enhance the aesthetic. These lights, however, must be strategically placed in order to retain an essence of darkness and maintain the delicate balance between light and dark. In this thesis, we explore an algorithm for light placement within low light, ray-traced scenes which leverages a k-means layering scheme to partition a scene and place artificial lights for artistic enhancement. Multiple scenes were generated and user feedback was collected comparing various lighting configurations for each scene, assessing the algorithm's effectiveness in improving readability and maintaining the desired level of darkness as well as how additional lighting affects the user's perception of the scene.

Date: Tuesday, June 11th, 2024
Time: 4:00 PM – 5:30 PM
Location: 14-232b
Committee: Dr. Wood, Dr. Grow, Dr. Keen