Computer Graphics COMP3271
Programming Assignment 3:
Ray tracing

Date assigned: Nov. 11th, 2019
Date due: 11:59 pm Dec 9th, 2019

General Description

In this assignment you will implement ray tracing which is a useful technique to generate realistic image of 3D scene.

Requirements

- Diffuse, specular and ambient color shading.

- Shadow and reflection.

- Ray-quadratic intersection.

- Ray-triangle intersection.

Template

A project template as well as an executable sample is prepared for you to help you focus on the interface design.

Functions of the template include:

- Reading and parsing a scene file.

- Creating and editing 3D objects.

- Navigation.

- Rendering the scene with Gouraud Shading.

- Texture mapping of the sphere.

Implementation

There are five functions need to be implemented, all of them are in 'code.cpp'.

void RayTracing(V3 * colorMap);
Calculate the color of each pixel and save it in colorMap.

void Trace(V3& rayStart, V3& rayDir, int depth, V3& color);
Given a ray, calculate the color at the nearest intersection point.

void Shade(CPrimitive *obj, V3& rayStart, V3& rayDir, V3& intersection, V3& normal, int depth, V3& color);
Given a point, calculate the color of this point.

bool IntersectQuadratic(V3 rayStart, V3 rayDir, float * coeffMatrix, float& t, V3& intersection);
Do intersection of a ray and a quadratic surface.

bool IntersectTriangle(V3 rayStart, V3 rayDir, V3 v0, V3 v1,V3 v2, float& t, V3& intersection);
Do intersection of a ray and a triangle.

Hand in
Hand-in your 'code.cpp'. After deadline, the web handin will still be available for 1 more days for those who haven't uploaded the assignment by the deadline. Late policy is fifty percent penalty per day. Re-submission after deadline is treated as late submissions. No assignment will be accepted after 1 day.

Necessary comments to explain your code is required.