

Computer Graphics CSIS0271

Programming Assignment 3:

Ray tracing

Date assigned: **Apr. 10th, 2017**

Date due: **May. 2nd, 2017**

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'. Necessary comments to explain your code is required.