Computer Graphics

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ICL/ITRI

Assignment #1

Draw Some 3D Models

Solid / Wireframe Display

Purpose of the assignment

◆ **Know how to manipulate the 3D models**

◆ **Know what vertex attributes are and the result after rasterization**

◆ **Know how to render a model as expected**
  - **Position, size, and color**

◆ **Know how to display a 3D model in solid or in wireframe mode**
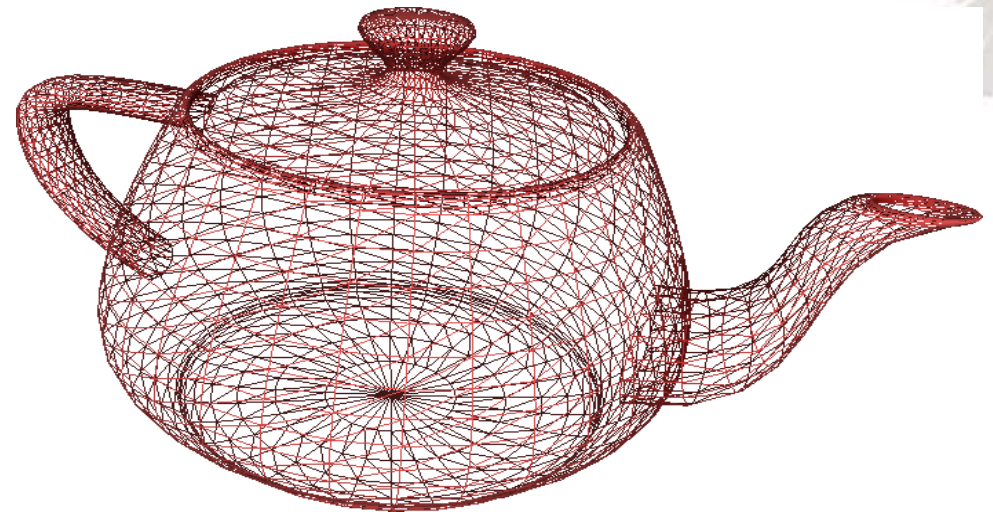
Requirements

◆ **You are required to use the framework that TA provided to draw some 3D models and display them in solid or in wireframe mode**

Solid mode   Wireframe mode

Requirements

- **Follow the guidelines that TA provided to write the required codes such as retrieve primitives and normalization**
  - **Retrieve primitives**
    - **Select a 3D model**
    - **Load the 3D model**
    - **Extract vertex data from the model data structure**
  - **Normalization**
    - **Make sure the 3D model can be displayed in the center with size no less than 70% of the window size**

Parsing 3D Models

- **Use *glm* to parse the input 3D model**
  - **Understand how a 3D model is organized in a data structure after the model is read and parsed**
- **Refer to the obj 3D model parser, *glm*, provided by TAs for how to use it**
- **Consult with TAs if you have problem in using the *glm* parser**

Normalization

- **Not every model has the same scale. You have to normalize first so that you can display it in the window properly**

- **Normalization: normalize the 3D model to have its coordinates located within (-1, 1)**
  - **Step 1: Move the model center to origin**
  - **Step 2: Scale model size properly**

Render the 3D Models

◆ **Write the corresponding vertex shader and fragment shader**

◆ **Set the proper pipeline states**
  ▪ **Enable depth test for correct 3D display**
    ▸ `glEnable(GL_DEPTH_TEST)`

◆ **Solid/Wireframe display mode switch**
  ▪ **Use key/keys to control the polygon mode**
    ▸ `glPolygonMode(GL_FRONT_AND_BACK, GL_FILL)`
    ▸ `glPolygonMode(GL_FRONT_AND_BACK, GL_LINE)`

Input Model Format

- **Wavefront 3D Graphics model description file with extension .obj**

- **Refer to** http://en.wikipedia.org/wiki/Wavefront_.obj_file **for detail file format**

- **Color model is the only one you need in this homework**

  - **Various 3D models with different complexity will be given for verification**

Due Date

- **Three weeks** **after announcement (should be 4/17)**
- **Late submission is allowed with less score**
- **No score if you fail to submit you work**
- **Plagiary is strictly forbidden**
  - **If you copy from others, your score will become zero**
  - **The score to the one who provide the original copy will also be downgraded**

Submission Guide

- **Please submit to course webpage at NTHU iLMS system**
  - *E-mail submission will not be accepted*
- **Submission should include**
  - **Source codes (including solution and project files)**
  - **Executable binary (can be run on PC/windows)**
  - **Documentation (explain how you did it and how to operate it)**
  - *Please do not include any 3D models to save the disk space*
- **Contact with TAs if you have problem in submission**

Q&A