

Lab 1 – CPE 471 – Software Rasterizer Stage 1

Due one week from when assigned (aim to finish the lab in one day)

This project is to be worked on in pairs or individually (any pairs you'd like)

Objective: Introduction to rasterization

We will be writing a program to render (draw) an indexed face set (aka polygonal mesh of triangles) as an image via software rasterization. In general the required steps for the program will be:

- Read in triangles
- Convert triangles to window coordinates
- Rasterize each triangle (using barycentric coordinates for linear interpolations and in-triangle test)
- Write color values per pixel (using a z-buffer test to resolve depth)

We will discuss the window coordinate transform, barycentric coordinates and z-buffers in the next few lectures.

For today, we will just be playing with the provided image code to build up functionality that will be useful in your rasterizer. Your program today is very simple. It must:

- read in three vertices which represent a triangle (from standard in)
- compute the bounding box of the triangle
- color all the pixels in the bounding box the color of your choice
- write out those pixels as a tga image (base code provided)

Each task is described in more detail here:

- 1) Write code to prompt a user for input in the form of three vertices (representing a triangle). For today only, we will assume the triangle's vertices are in "window coordinates", that is the data values are integer values that range from 0 to the value of width-1 of the window/image (or zero to the height-1 value of the window/image). You may choose to have the vertices be 2D (although for the final assignment they will need to be 3D). You will need to design a data structure to represent the triangle and its vertices.
- 2) Compute the bounding box of the triangle. You will need to design a data structure to represent the bounding box.
- 3) Using the provided image code, modify all pixels in the bounding box to be a color of your choice.
- 4) Write out the modified image and confirm your code is working as expected and show it to me for lab credit.