CS180 Programming Assignment #3

Due: 11:59pm, November 22nd, Wednesday

You are magically transported back 50 years in time to exercise your role as a producer of Children's video. Unfortunately, the powerful computers you are accustomed to today were not yet invented and OpenGL was not available to you. You still want to produce the same Brainy Baby videos as in the first 2 assignments, but now you have to limit your imagination to what was available 50 years ago: (1) You don't have color display and can only do line drawing, (2) you don't have OpenGL and have to code all the 3D functions yourself. Now can you generate a "semi-decent" animation sequence with all the handicap?

Requirements for the homework:

(1) You must implement a hidden-line-hidden-surface removal algorithm. So occluded faces are not seen.
(2) You need also be able to perform 2D line drawing and scan conversion operations yourself.
(3) Lighting, shading, texture, and shadow are not required!
(4) You should execute the same animation as in program #2. I.e., all the cubes should be rotating and numbers should come out marching.
(5) In addition to animate the cubes and numbers, you may choose to demonstrate viewpoint change in the animation sequence too (this is optional, you get extra credits for doing this).
(6) You do all these *without* using OpenGL. That is, your program cannot link with the OpenGL libraries. You should not use any proprietary or public-domain graphic libraries. You need to implement all graphics functions by yourself, except for those to write and save images.

You should save each frame (in a popular format like JPEG or PPM) and then use a public-domain video composer (e.g., VirtualDub) or free-use website (e.g,, http://gifmaker.me/) to concatenate the image frames into a video sequence or an animated gif (on CSIL, you can use ffmpeg, the instruction is at the end of the page). You should turn in such a video or animated gif file together with your program sources. The important thing is that if one rapidly skims through the images produced by your program in order, one should see an animation sequence of rotating cubes and flying numbers. The sequence should be roughly the length of that of Brainy Baby and shows a similar animation (or your own 3D scene and animation) – in black/white.

How to concatenate individual image frames into an MPEG movie on CSIL:

You must have your images loaded on CSIL to do this:

ffmpeg -i movie/%4d.jpg -vcodec mpeg4 test.avi

where movie/ contains all individual frames, which are numbered as 0001.jpg, 0002.jpg ... 2000.jpg, etc. That is, the length of the file name must match the '%4d.jpg" specification on the command line.

The recommended image size is 400x400 or 500x500, which should be big enough for the complexity of our scenes.