CS 460
HW-4
Selin DINC

Problem Statement

- **Part 1:** Applying a deformation to the image by dragging the center of the image by using the mouse click. While deforming the image applying the texture mapping simultaneously.

- **Part 2:** Rotating the image 360 degrees around z -axis by using the up and down keys. Displaying the image in every 30 degrees.

- **Part 3:** Loading the 3D model from a file. Displaying the rotation and zoom in/out effect by selecting from the menu and using the up/down keys.

Algorithm Design

This program consist of only main file. Functions for the main file; **readBMP, loadOBJ, setup, reshape, BilinearInterpolation, textureInterpolation, draw, display, mouse, motion, RollUp, RollDown, ZoomIn, ZoomOut, YawDown, YawUp, MenuItemClicked, CreateMenu, specialKey.**

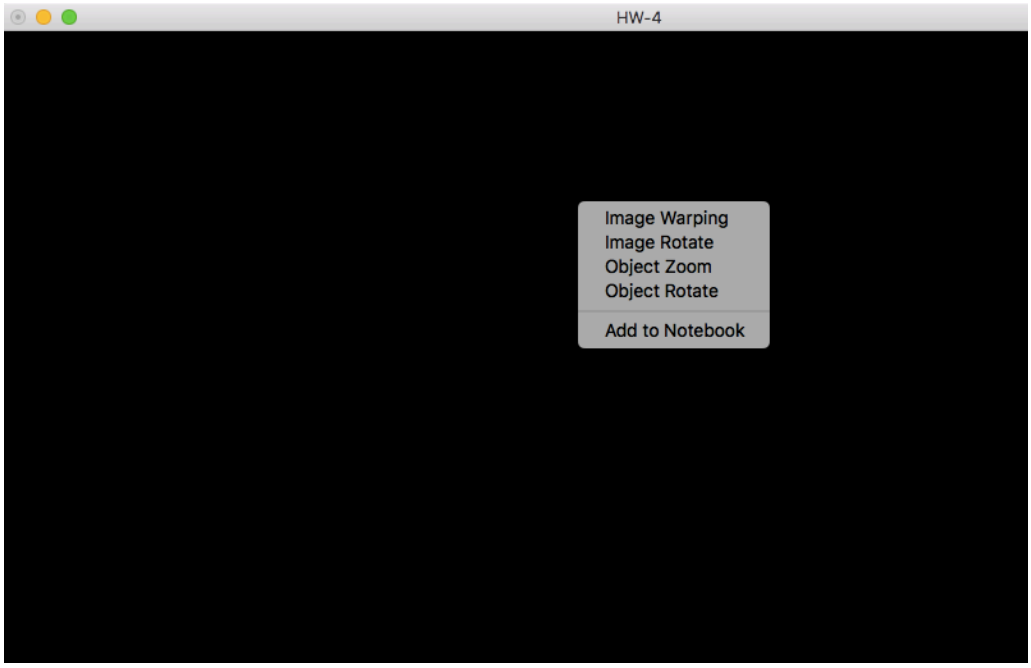

Figure 1: Menu

Program creates a window that shows a menu when clicked to right-click of mouse. Menu has the options; Image Warping, Image Rotate, Object Zoom and Object Rotate.

- **readBMP** function loads the BMP type image. Reads each pixel's color from the image and then converts each pixel BGR to RGB. Then fills four different vector with

the corresponding pixels that corresponds to four different regions of the image; topLeft, topRight, downLeft and downRight.

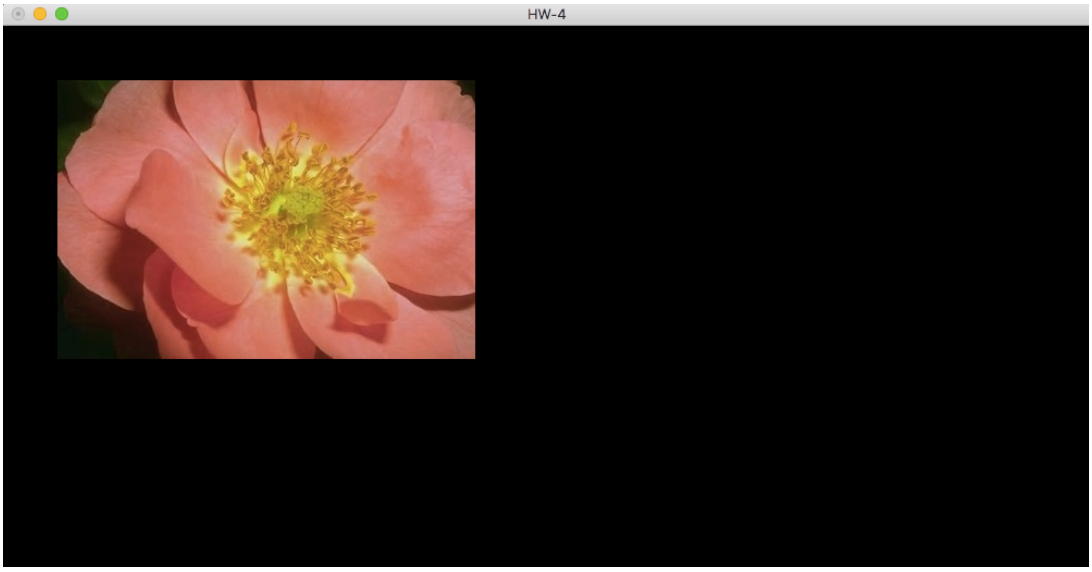

Figure 2: Image

- **loadObj** function reads the object file and floads the object.
- **setup** function sets up the environment for the program by calling readBMP and loadOBJ functions. Also calculates the center coordinates of the image and fills the texel vector.
- **BilinearInterpolation** function finds the new pixel color after the bilinear interpolation.
- **textureInterpolation** function creates a grid that divides the image into pieces.Traverses the image grid by grid ,then calculates the BilinearInterpolation.

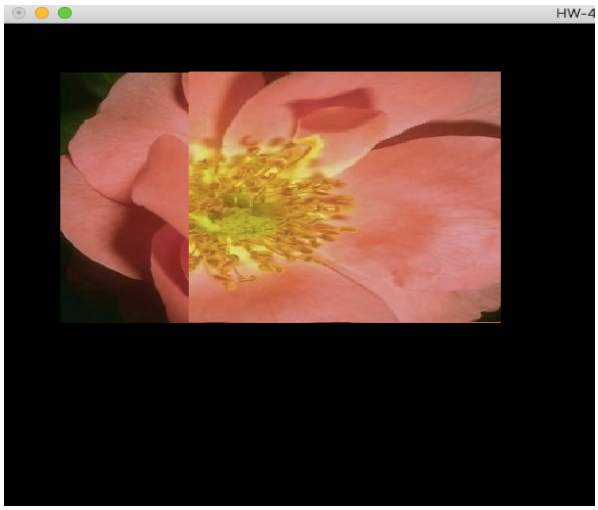

Figure 3: Warped Image

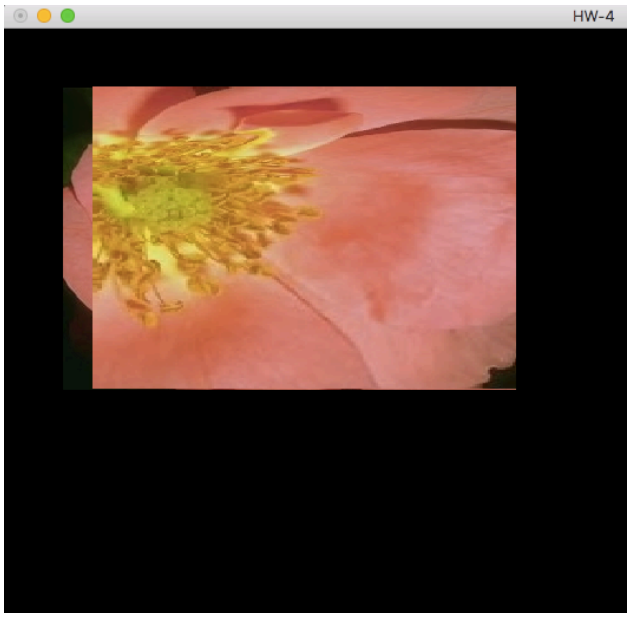

Figure 4: Warped Image

- **draw** function calls **textureInterpolation** function for every region of the image.
- **display** function shows the image and the object.
- **RollUp** and **RollDown** functions rotates the image + or - n degrees in z-axis.

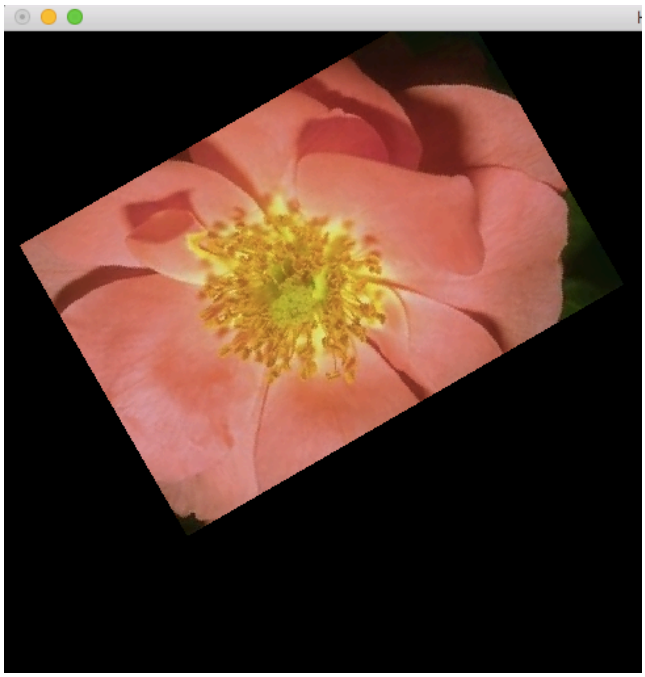

Figure 5: Rotated Image (z-axis)

- **ZoomIn** and **ZoomOut** functions zooms to the object + and - n degrees.

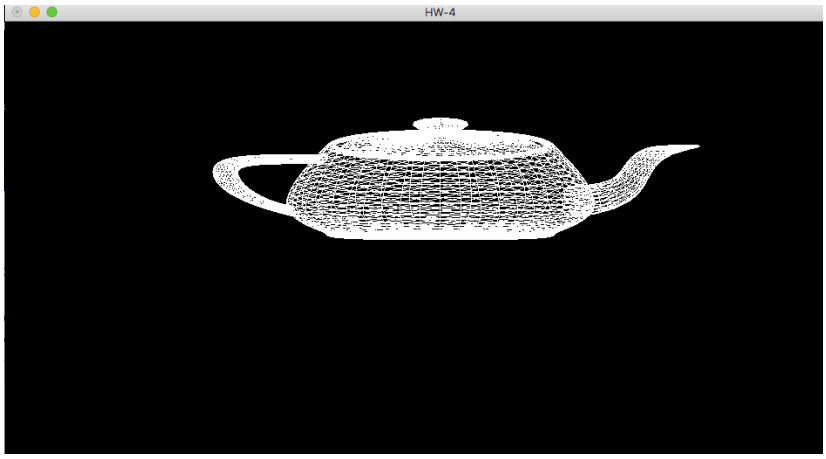

Figure 6: Loaded Object

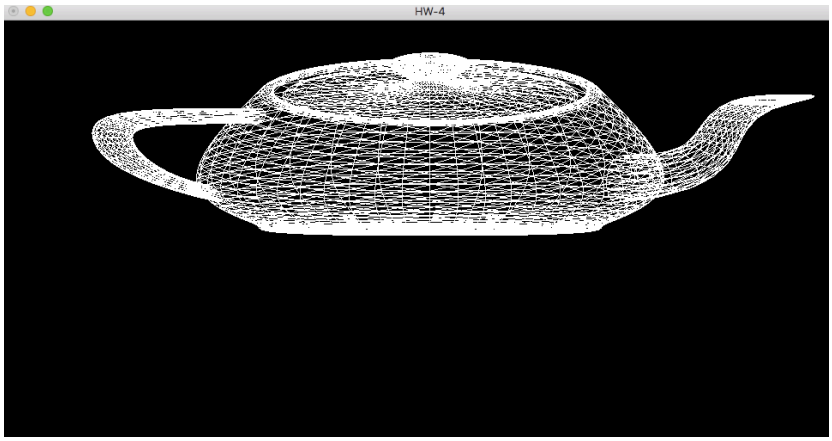

Figure 7: Zoom-In to Object

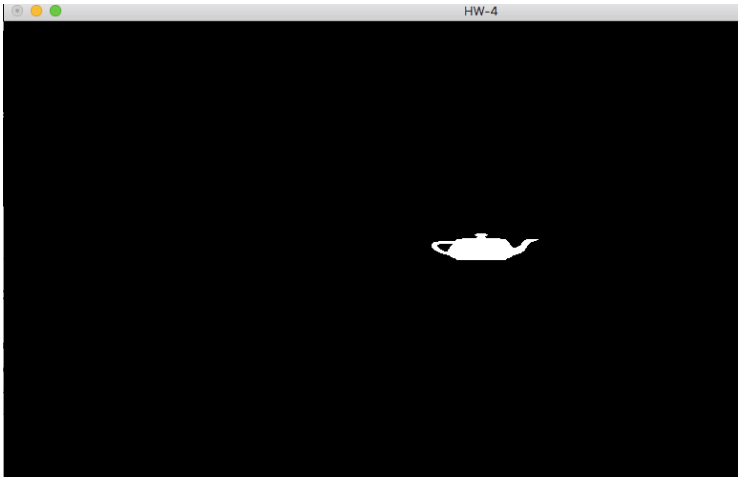

Figure 8: Zoom-Out from Object

- **YawUp** and **YawDown** rotates the object n degrees around y axis.

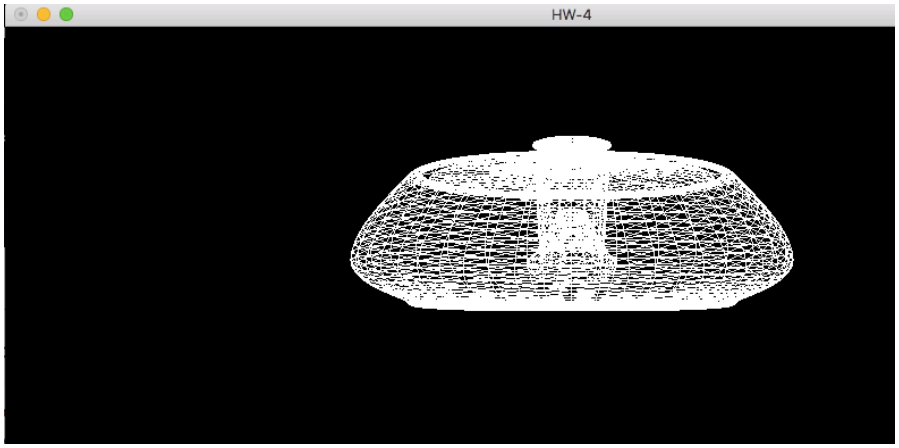

Figure 9: Rotated Object (y-axis)

Parts That Doesn't Work Properly

In the image warping part I couldn't manage to display the warping properly. It's almost correct but there is a problem while displaying the process that unfortunately I couldn't find.

How To Run

Compile with : g++ main.cpp -o a.out -framework OpenGL -framework GLUT

Run with: ./a.out