

Clever Support for 3D Printing

CMPT464/764
Geometric Modeling in Computer Graphics
Course Project

Program User Manual

April 15, 2016

1 File location

- folder models contains the obj files for 3D models without support
- folder modelsup contains the obj files for 3D models with support provided by the author
- folder result contains the results of the program which are the obj files for 3D models with support
- folder clever_support contains the program after making file

2 User Interface

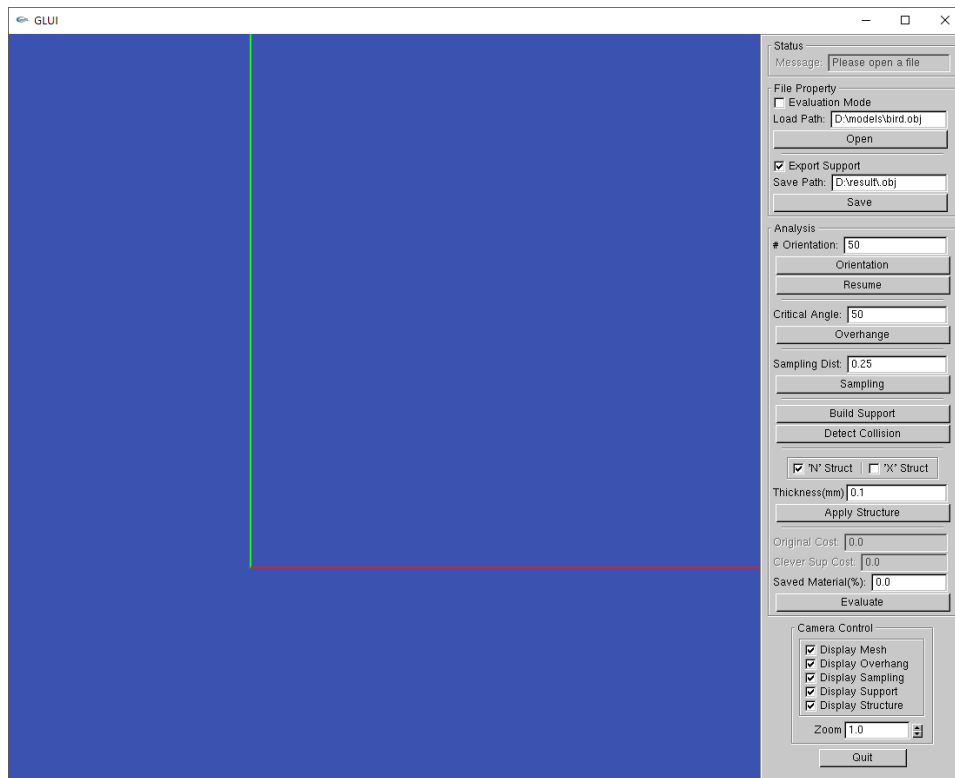


Figure 1: *The user interface is a glut window with glui controls.*

3 Open/Save File(normal mode)

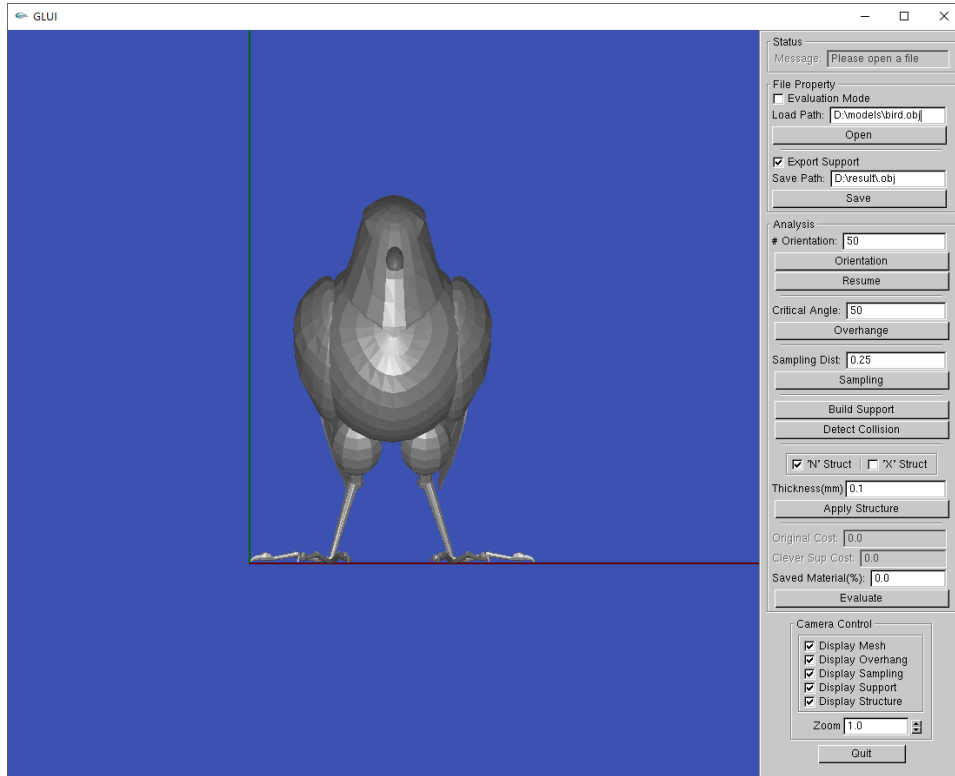


Figure 2: After inputting the correct file path, a 3D model file be opened and shown. If "Evaluation Mode" is selected, the program will enter evaluation mode. If "Export Support" is selected, the support structure will be saved along with the file.

4 Open/Save File(evaluation mode)

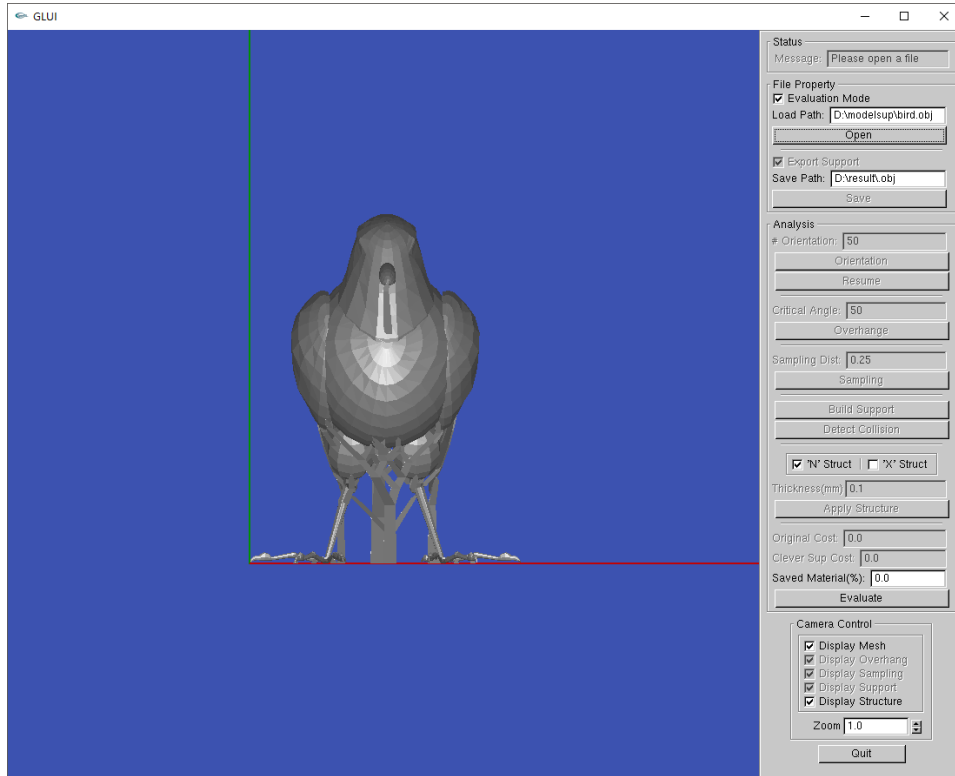


Figure 3: *The input model will be separated into the model and its support. IN this mode, no support will be generated. Save file function will save the same file to a different place. Evaluate function will show the total area of the support structure faces.*

5 Orientation

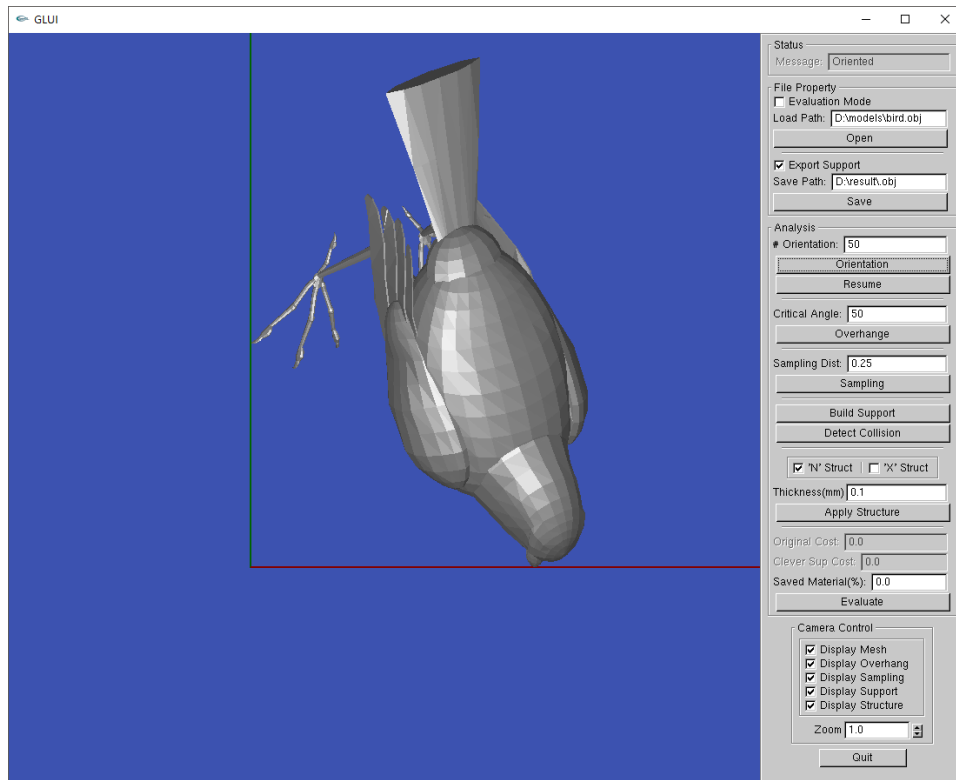


Figure 4: *Input the number of random rotations, the model will be rotated into the best orientation with least overhanging points. User can resume the model by clicking the "resume" button.*

6 Overhang

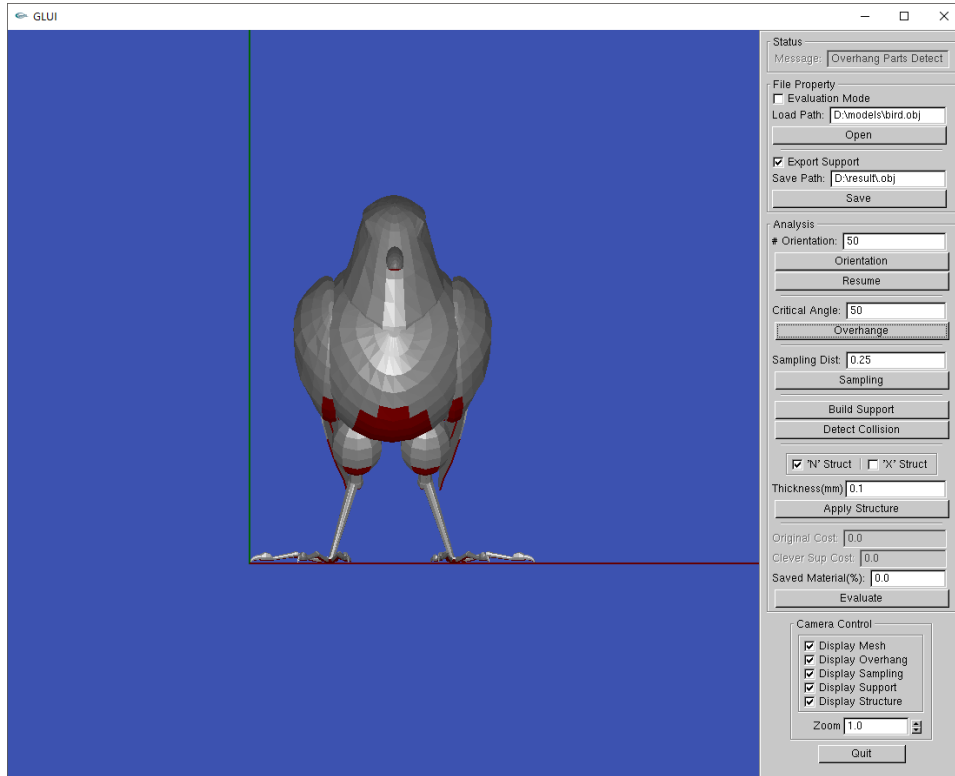


Figure 5: *Input the critical angle of the 3D printer, the overhang parts will be colored red.*

7 Sampling

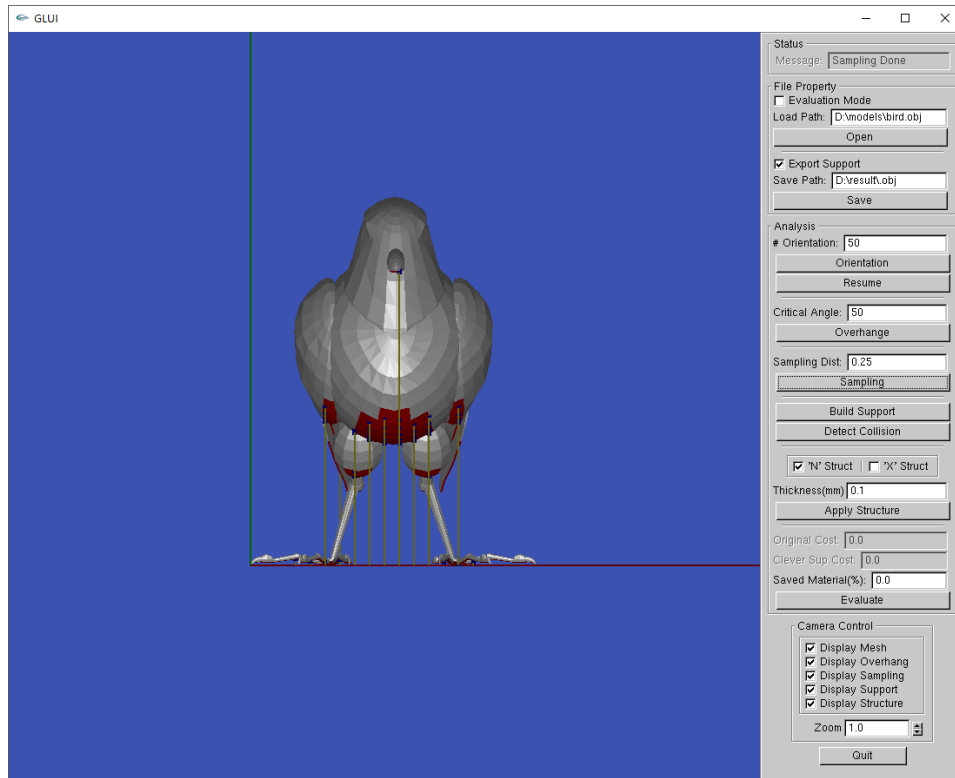


Figure 6: *Input the sampling distance in mm. Please note that if the sampling distance is set too small, the program may crash for big models. Please set the value appropriately. Usually 0.1 for small models and 0.15 for big models for the minimum value supported.*

8 Build Tree

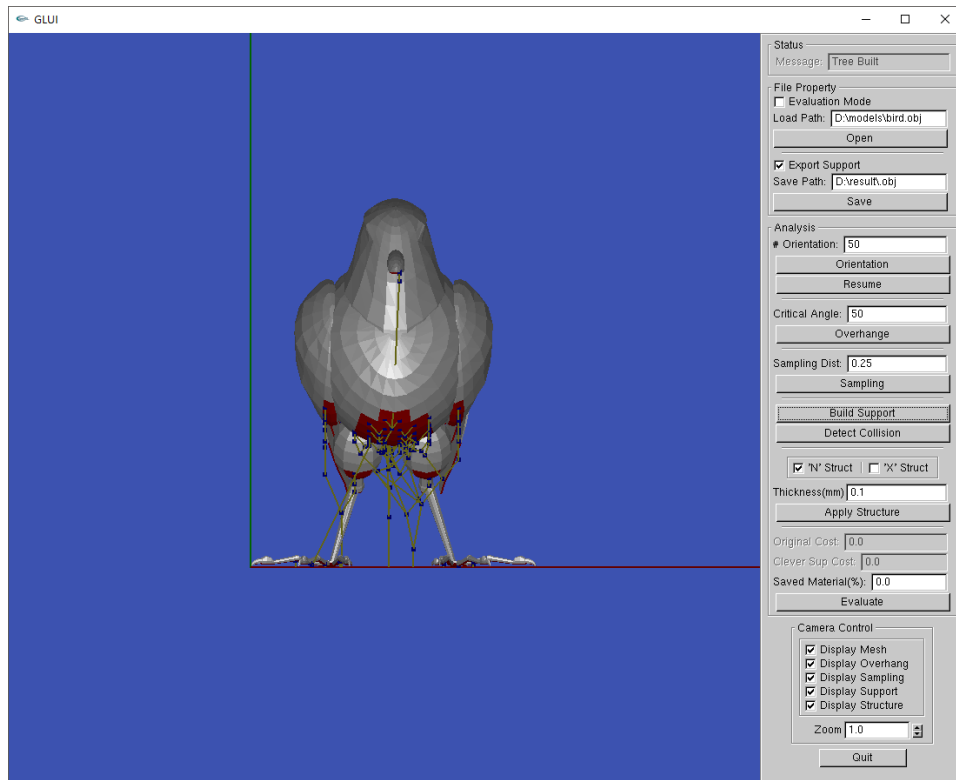


Figure 7: Click the "Build Support" button, and the support tree will be shown. The blue points are the overhanging points.

9 Detection

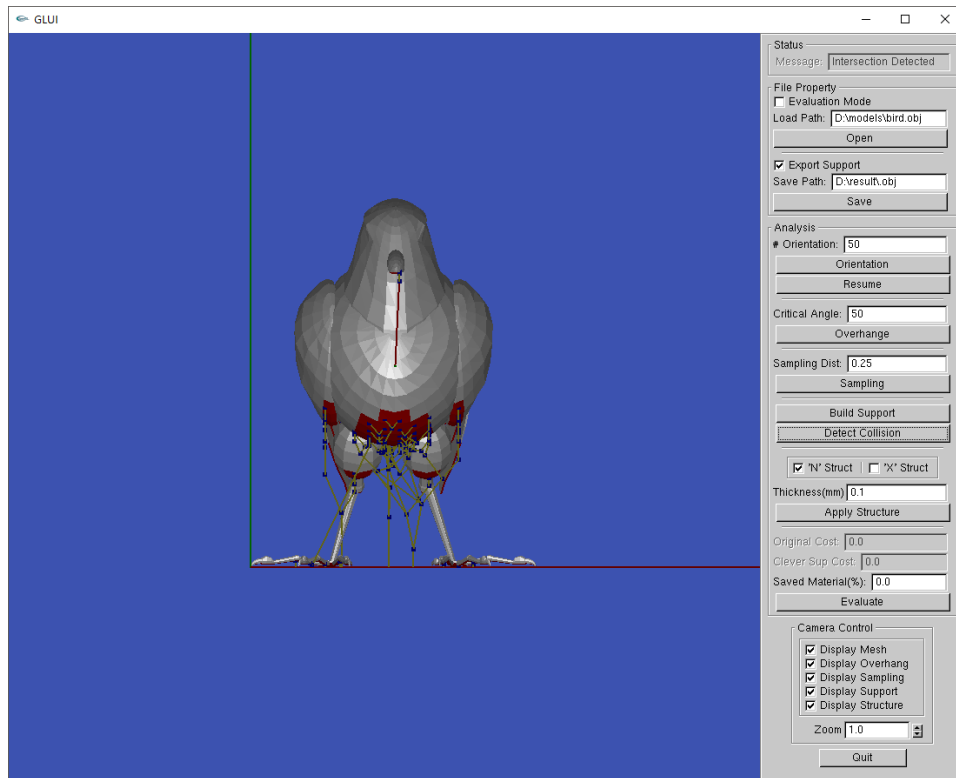


Figure 8: Click the "Detec Collision" button, the tree branches which have intersection with the mesh will be modified. The new branches will be shown in red.

10 Structure

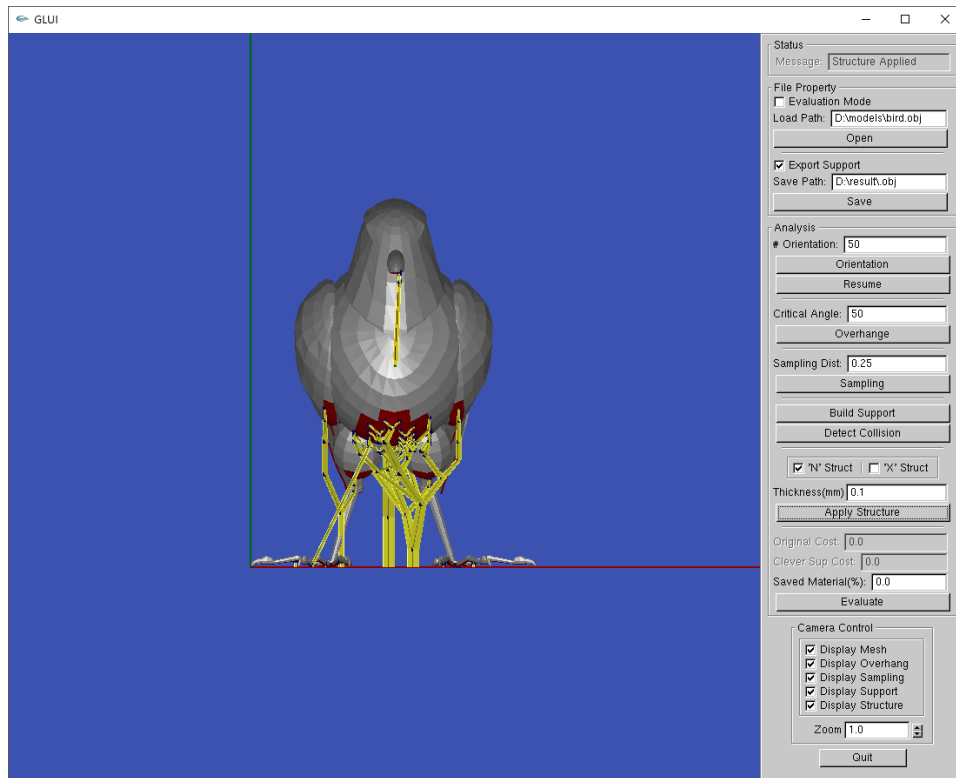


Figure 9: Select the type of the structure first, and then input the thickness of the support. Please make sure the value ranges from 0.05 to 0.6mm, otherwise there will be display error.

11 Evaluation

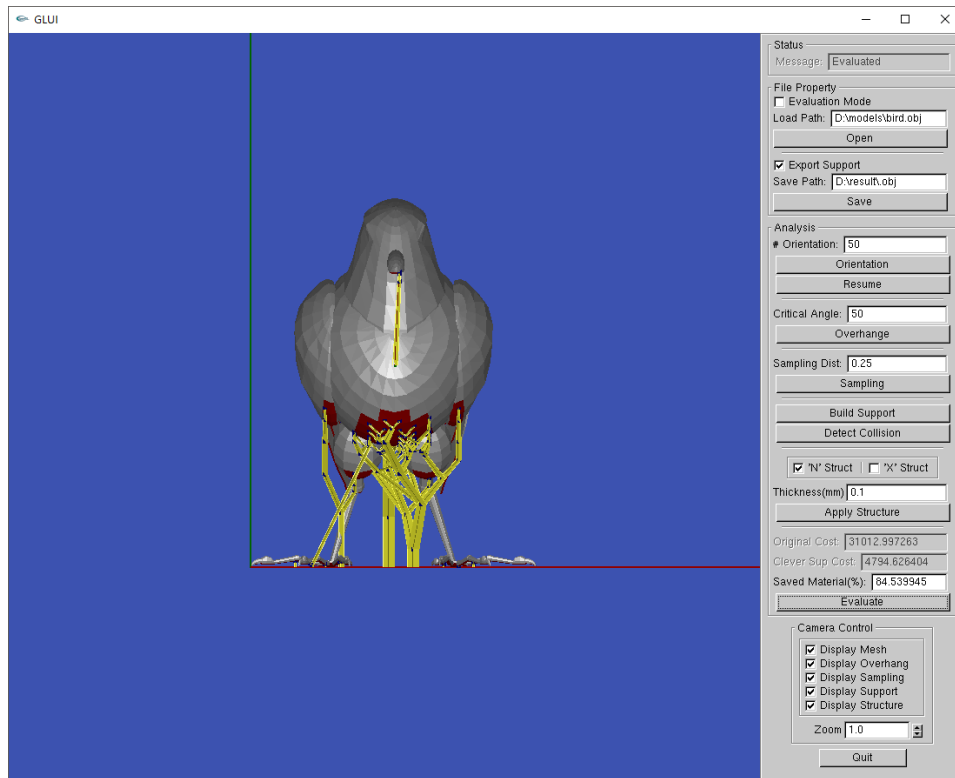


Figure 10: Click "Evaluate" button, and the total amount of the supporting face area will be shown.

12 Display Control

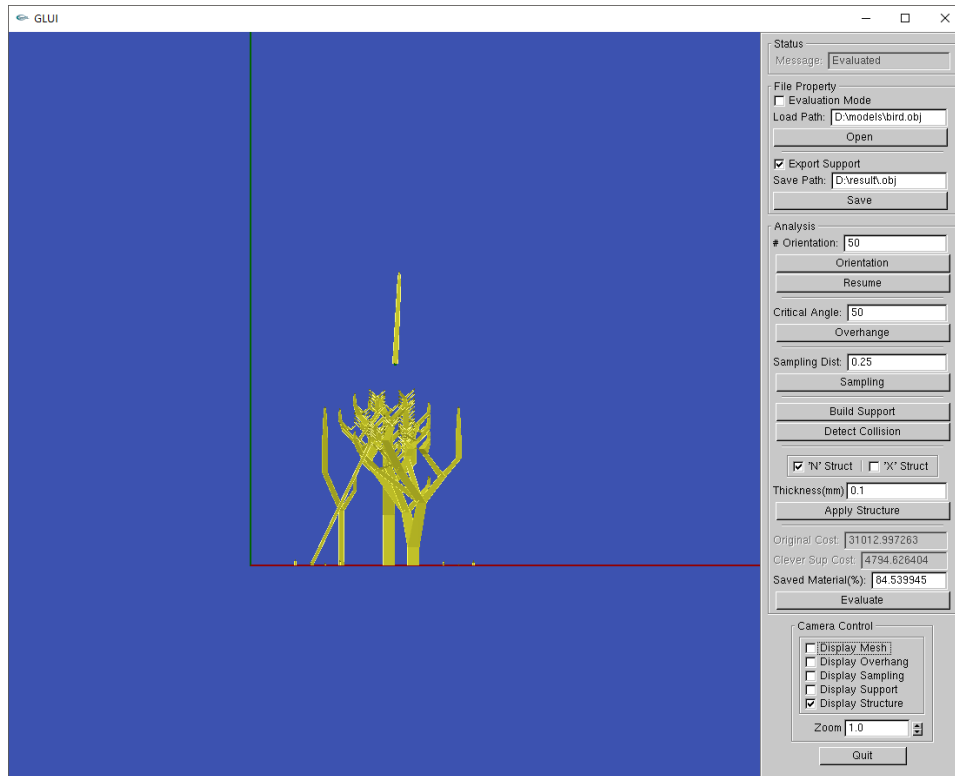


Figure 11: *Select different parts of the model to be displayed. Here only the support structure is display.*