

Computer Vision  
and Geometry Lab



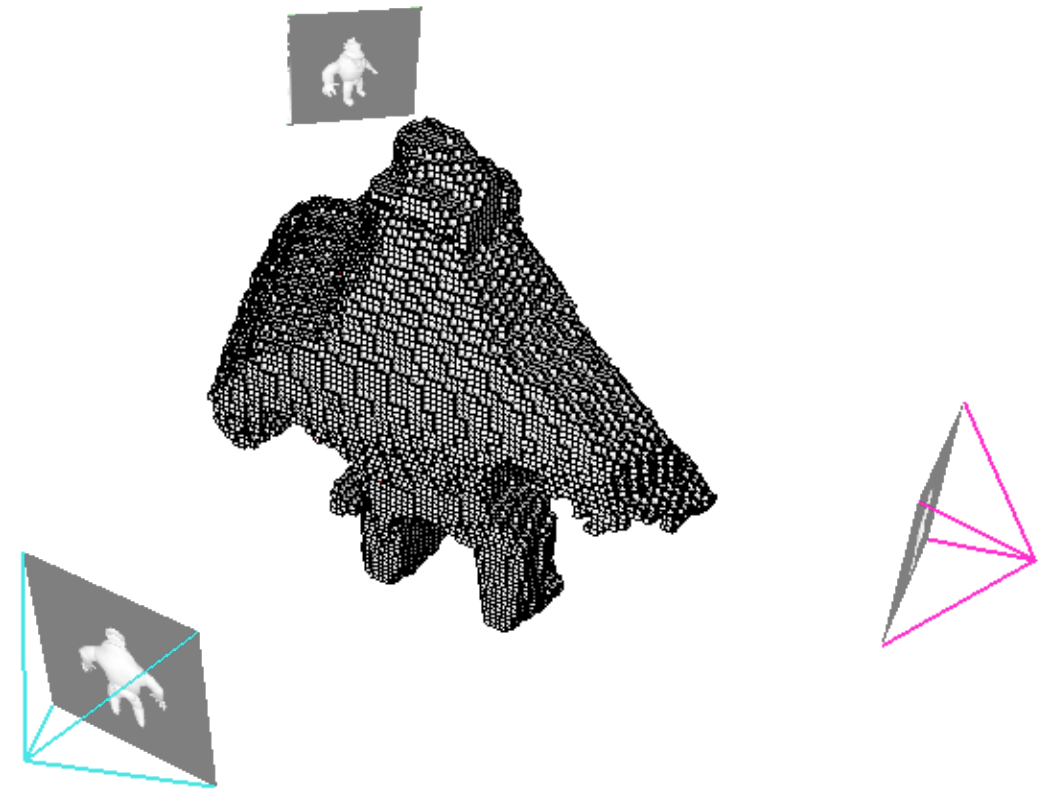
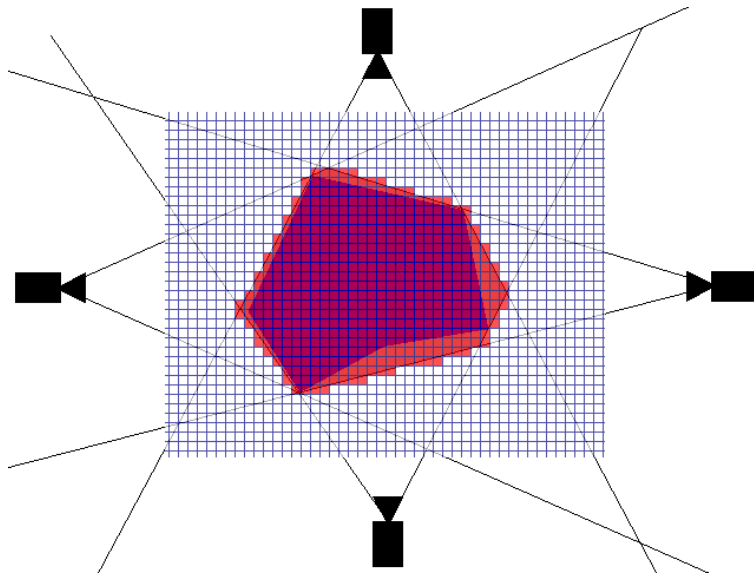
# Computer Vision

## Exercise 05 - Shape from Silhouettes

# Organization

- This week: shape from silhouettes
  - Hand in next week
  - Grades in two weeks' time

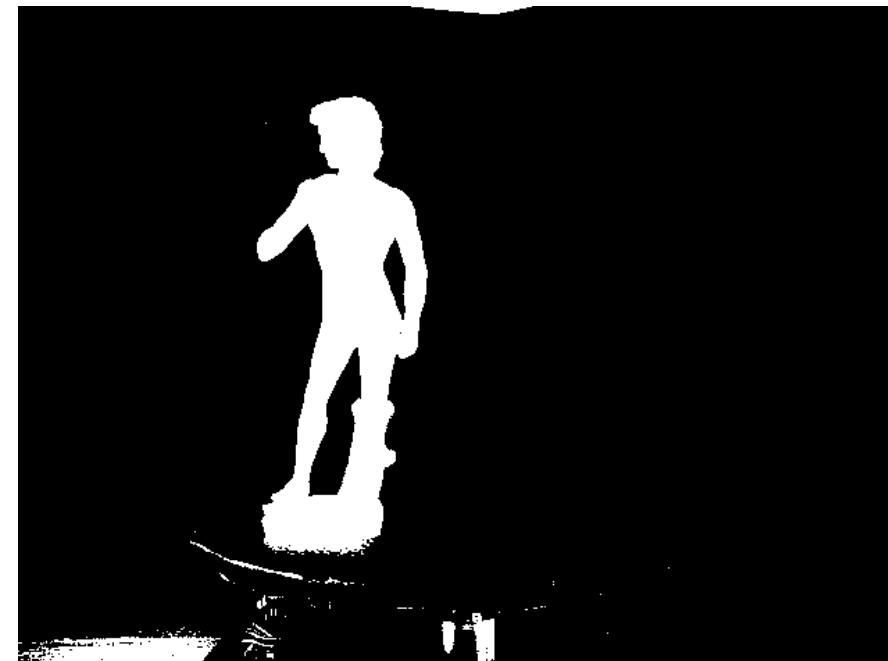
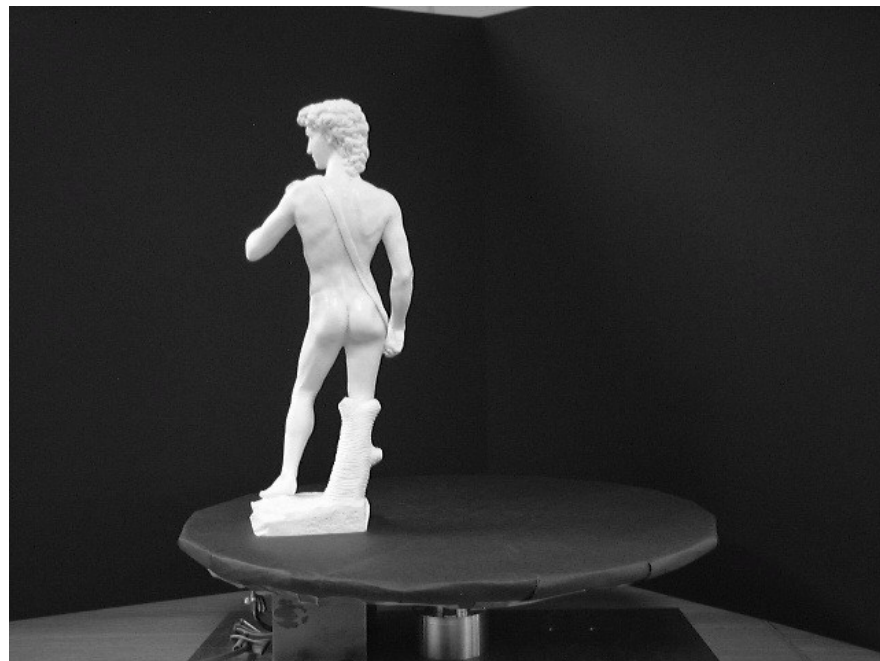
# Exercise 8 - Shape from Silhouettes



# Exercise 8

- Three main tasks:
  - Silhouette extraction
    - Find good threshold
  - Define volume of interest
    - Guess and check
  - Compute occupancy score for each voxel
    - Write code for this
- Modify provided code

# Silhouette Extraction

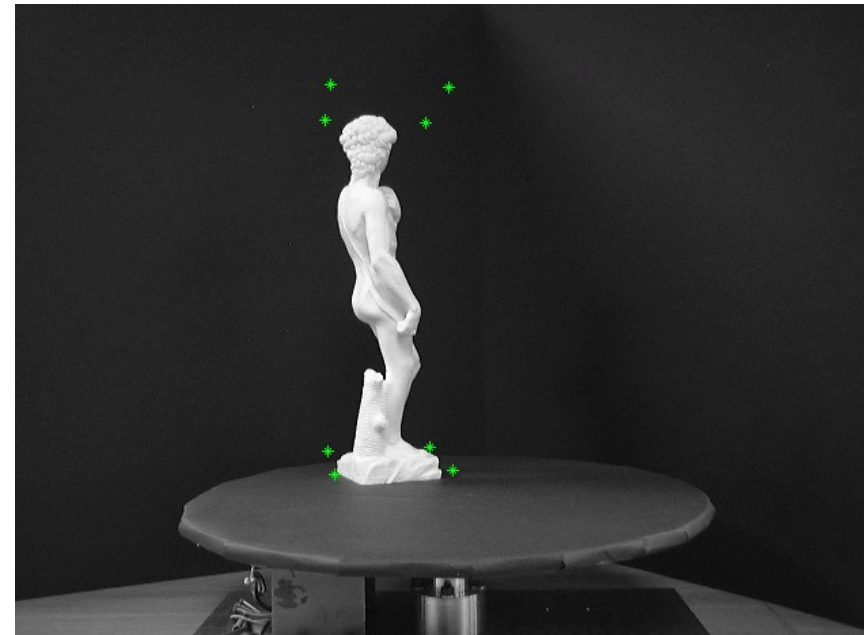
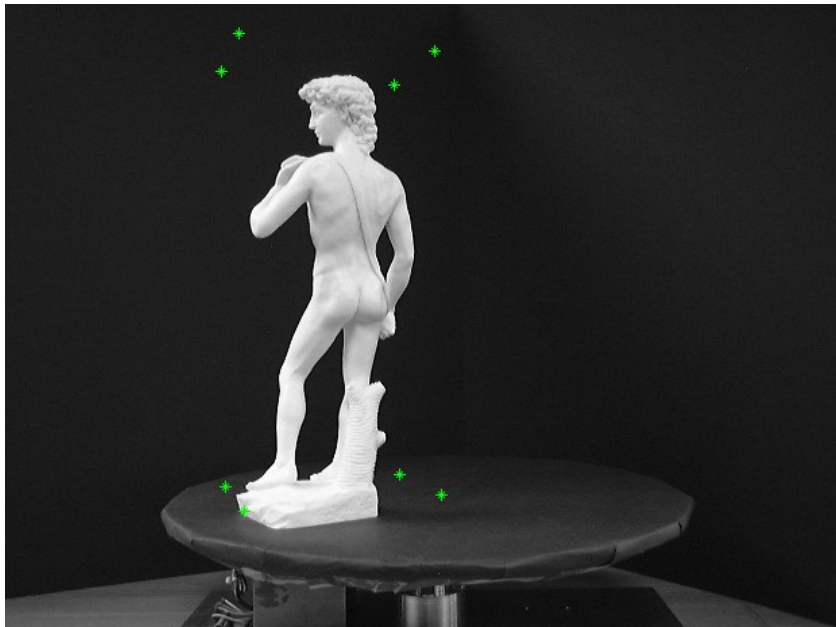
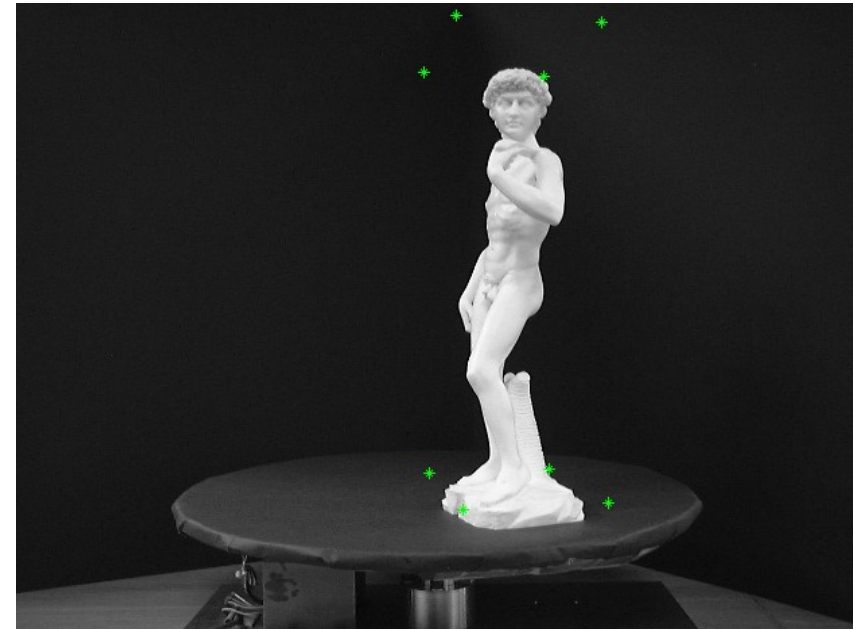
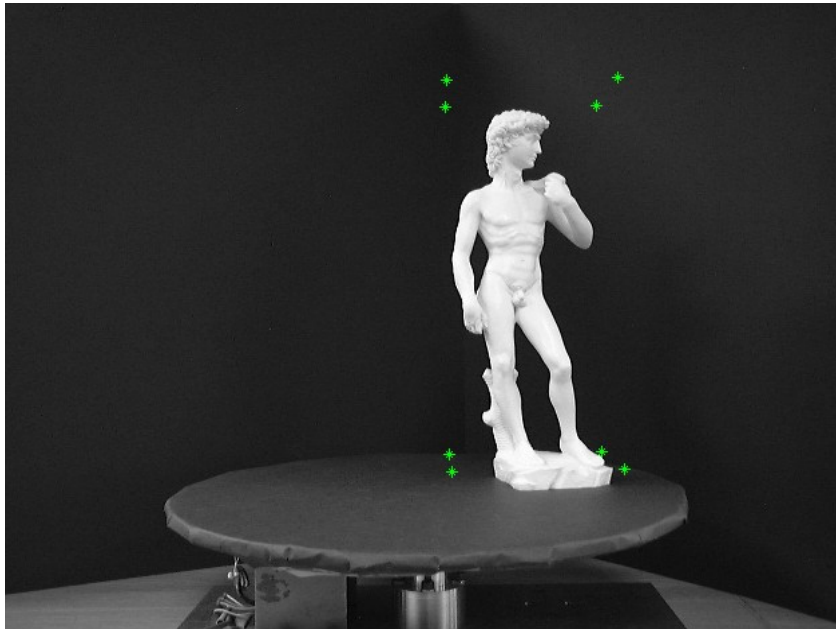


# Volume of Interest

- Find bounding box
- First get a rough bounding box
  - Refine later once everything is working
- Make sure your bounding box includes the whole statue
  - Provided code projects volume corners into images

# Bounding Box

- Projected volume corners



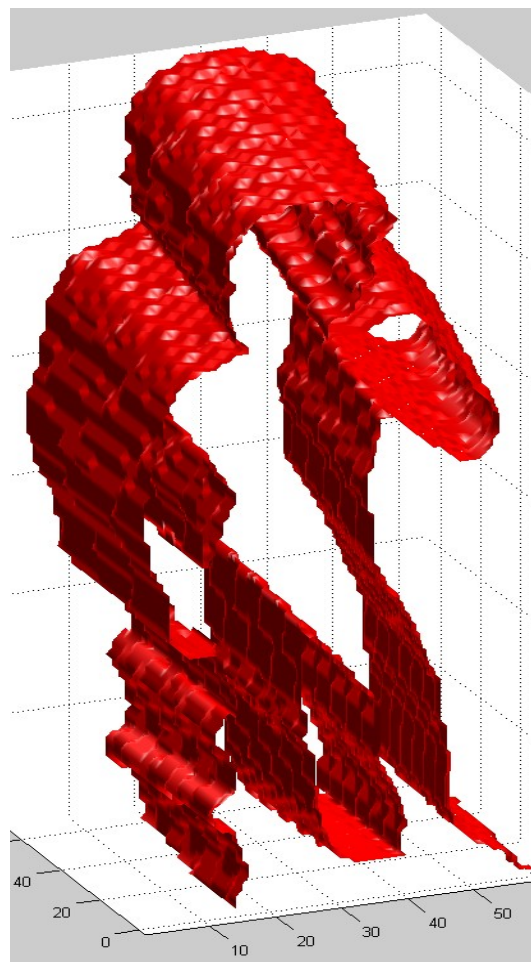
# Compute Occupancy Score

- For each voxel
  - Project the voxel center into each image
    - Use provided volume-to-world transformation
  - Add 1 if projection is within silhouette region
  - Note that  $z$  is up,  $x$ ,  $y$  are parallel to the turn table surface
- Start with a  $10 \times 10 \times 20$  voxel grid
- Once everything is working increase resolution, at least  $64 \times 64 \times 128$

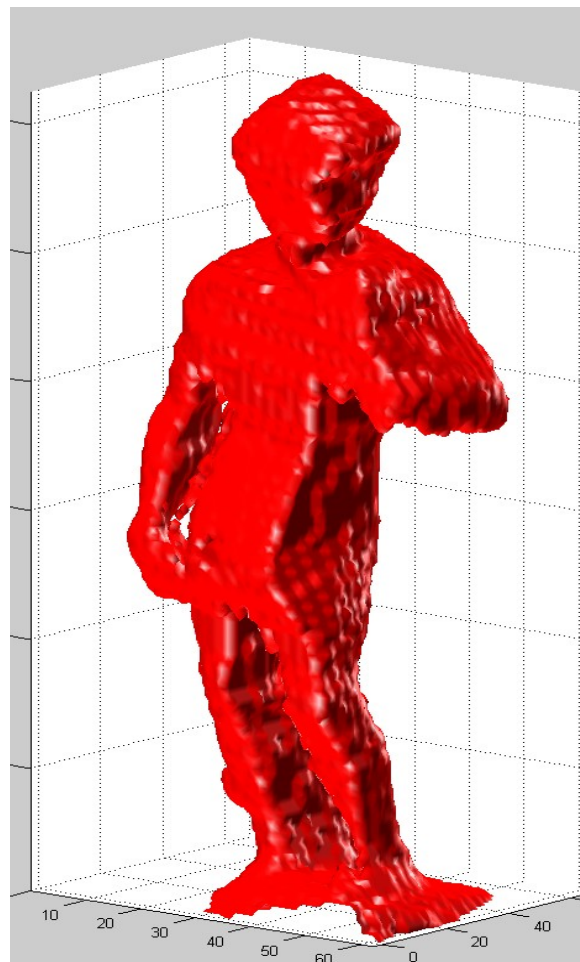


# 3D iso-surface

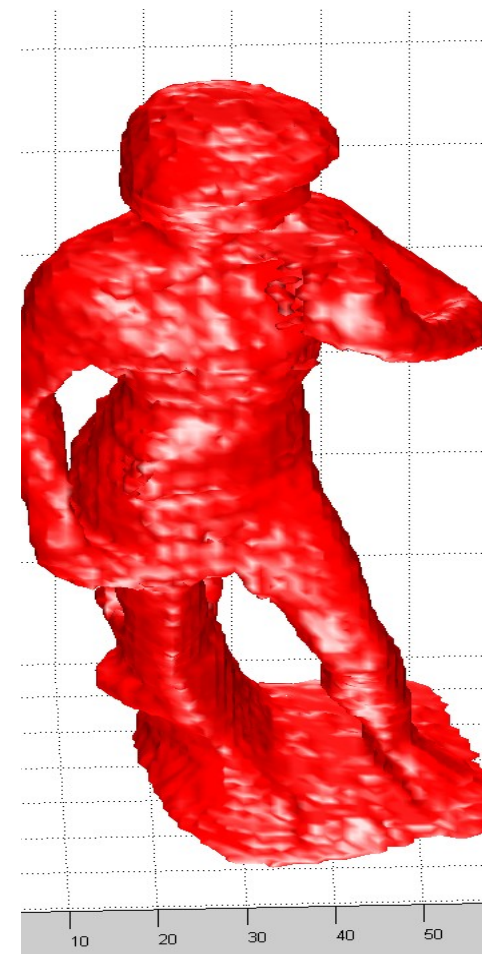
- Provided code generates a 3D iso-surface from the volume



1 image

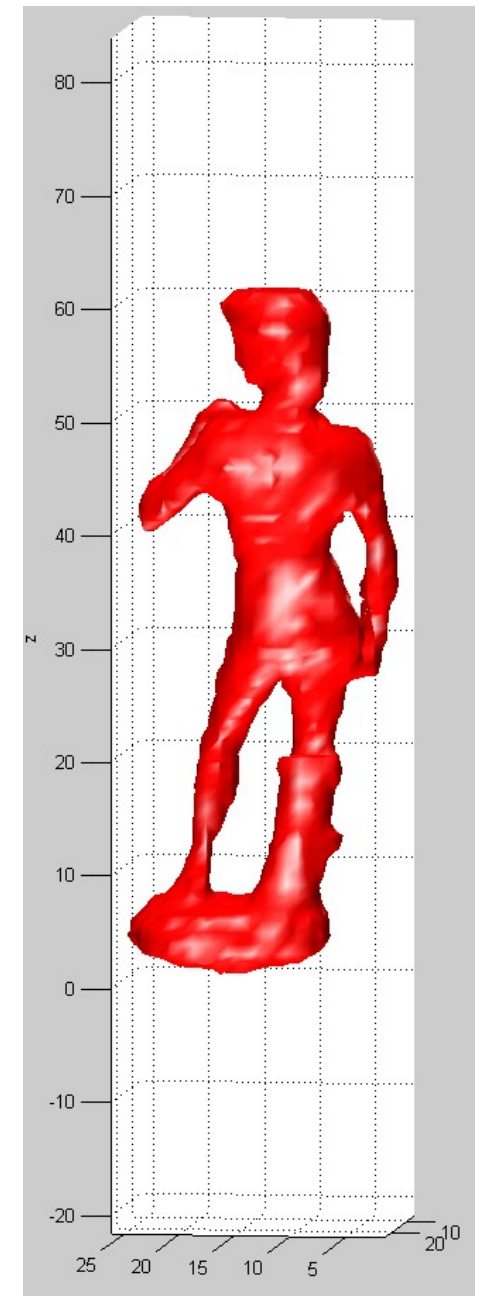
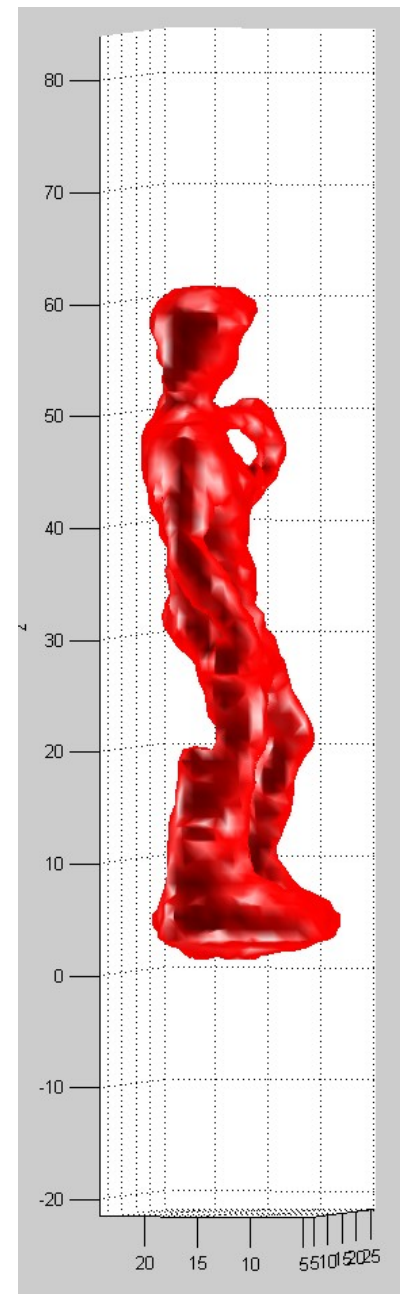
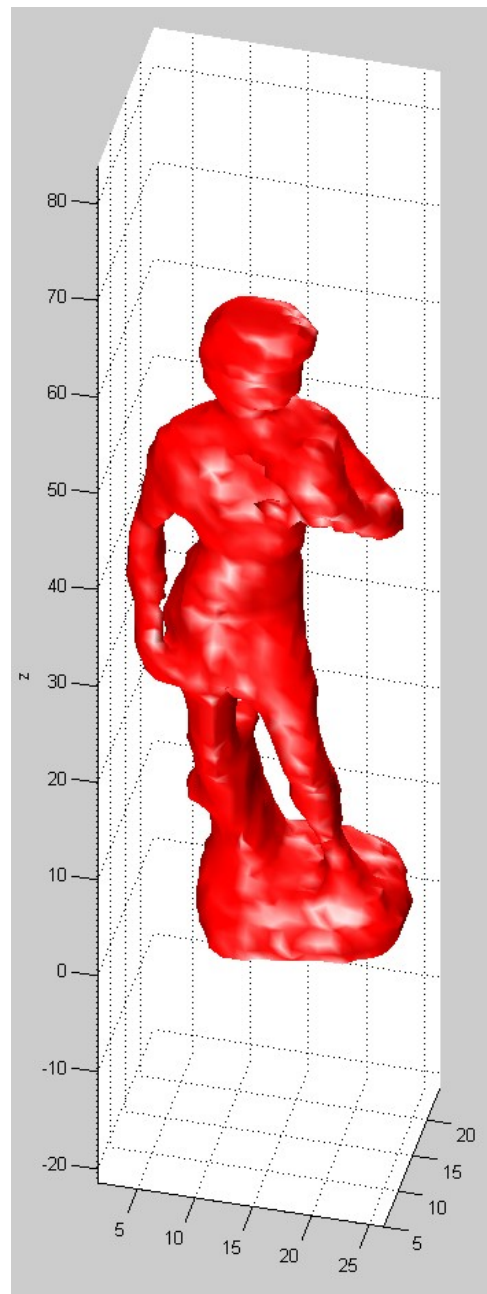
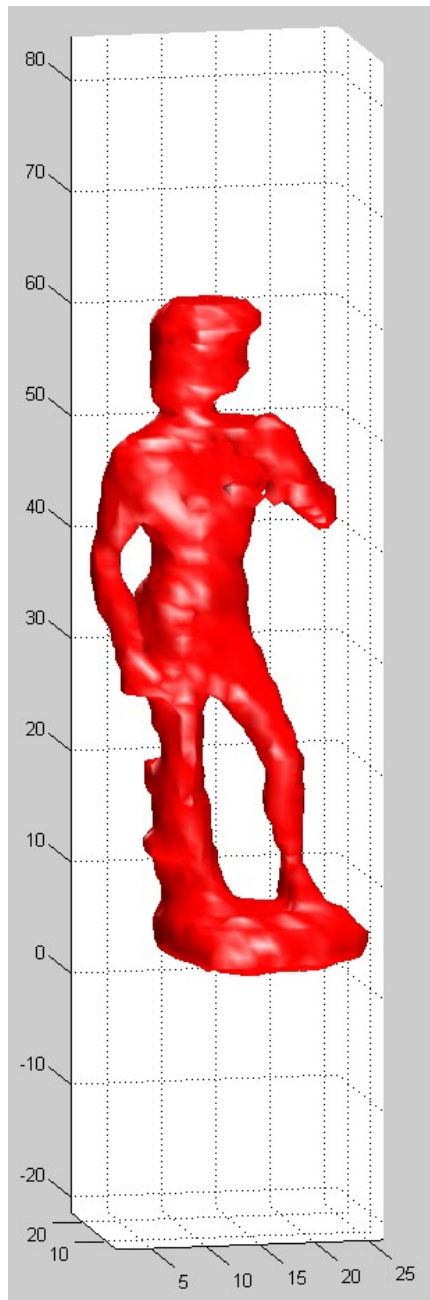


4 images



18 images

# 3D iso-surface



# Hand-in

- Report should include:
  - All parameters used i.e., silhouette threshold, bounding box and volume resolution
  - One or two silhouette images
  - Screenshot of the 3D model
  - Your description of the method and ideas of how to improve it
- Source code
- 3D model saved as \*.fig file