Computer Vision
and Geometry Lab

Computer Vision

Exercise Session 7 – Shape from Silhouettes

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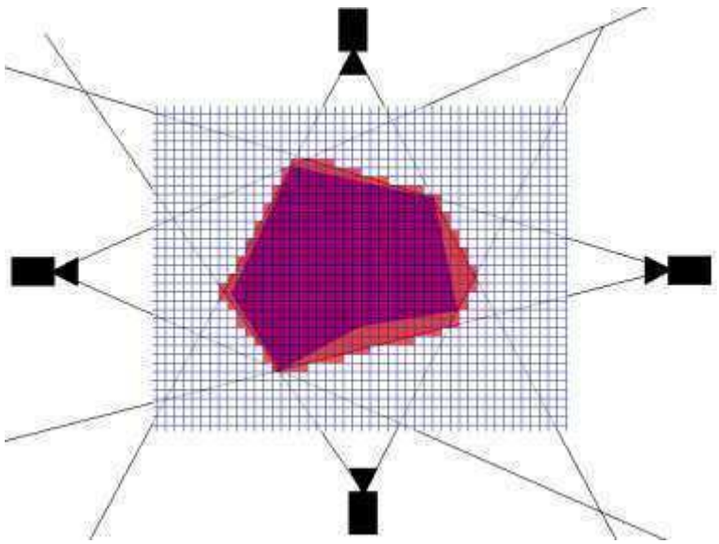
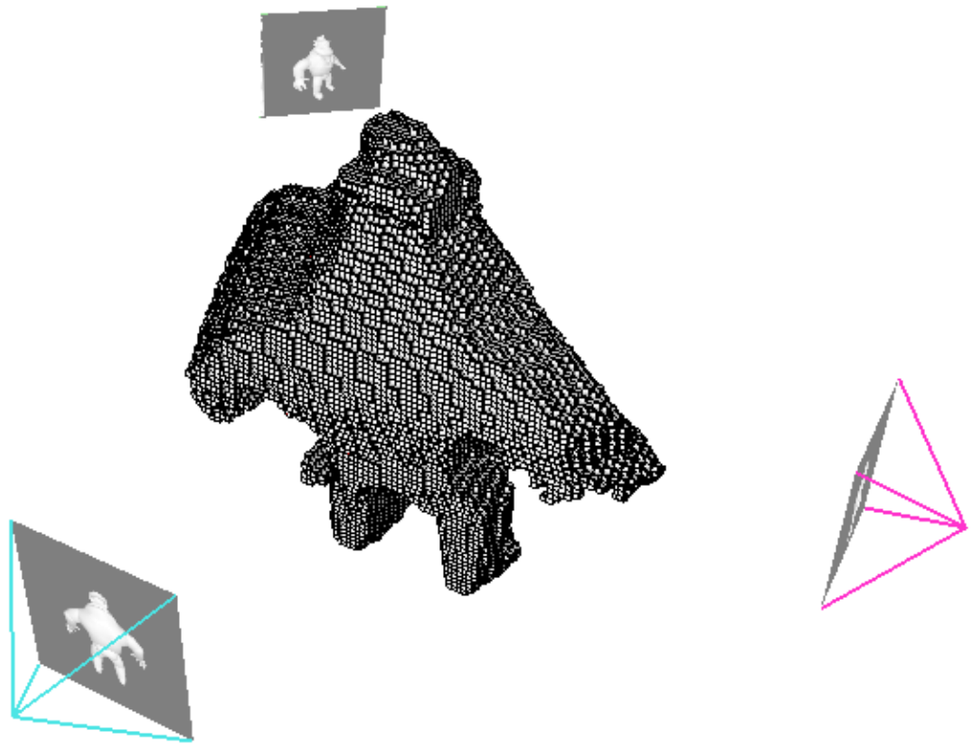
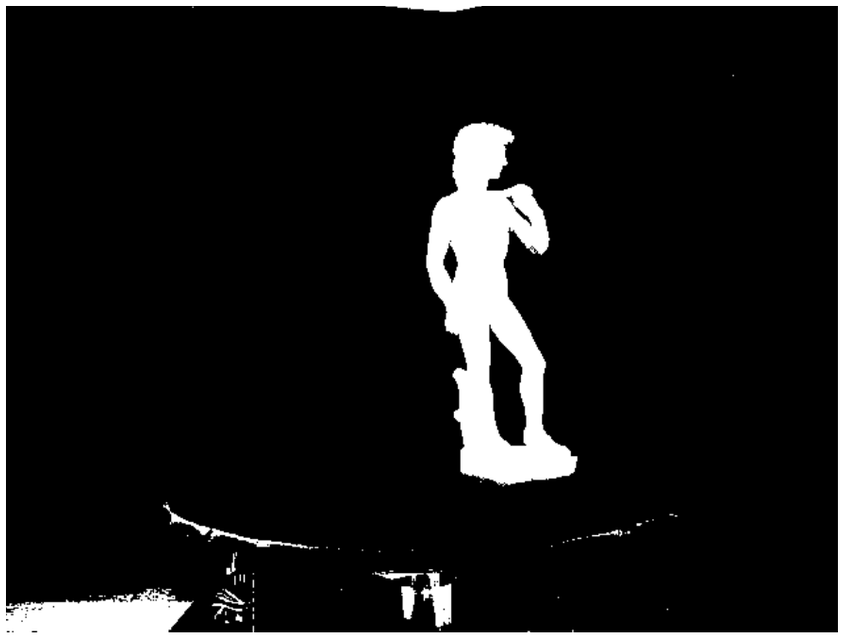


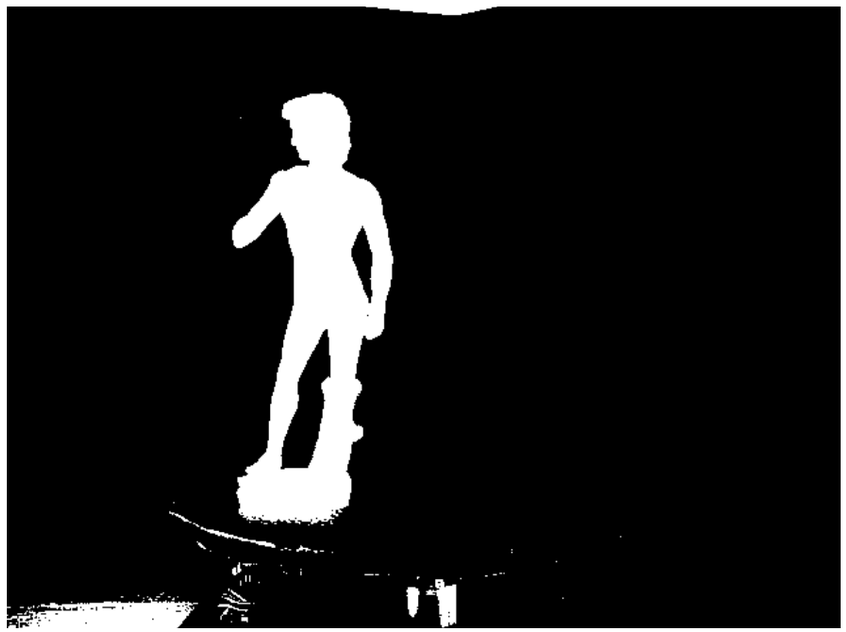


Exercise 7

- 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



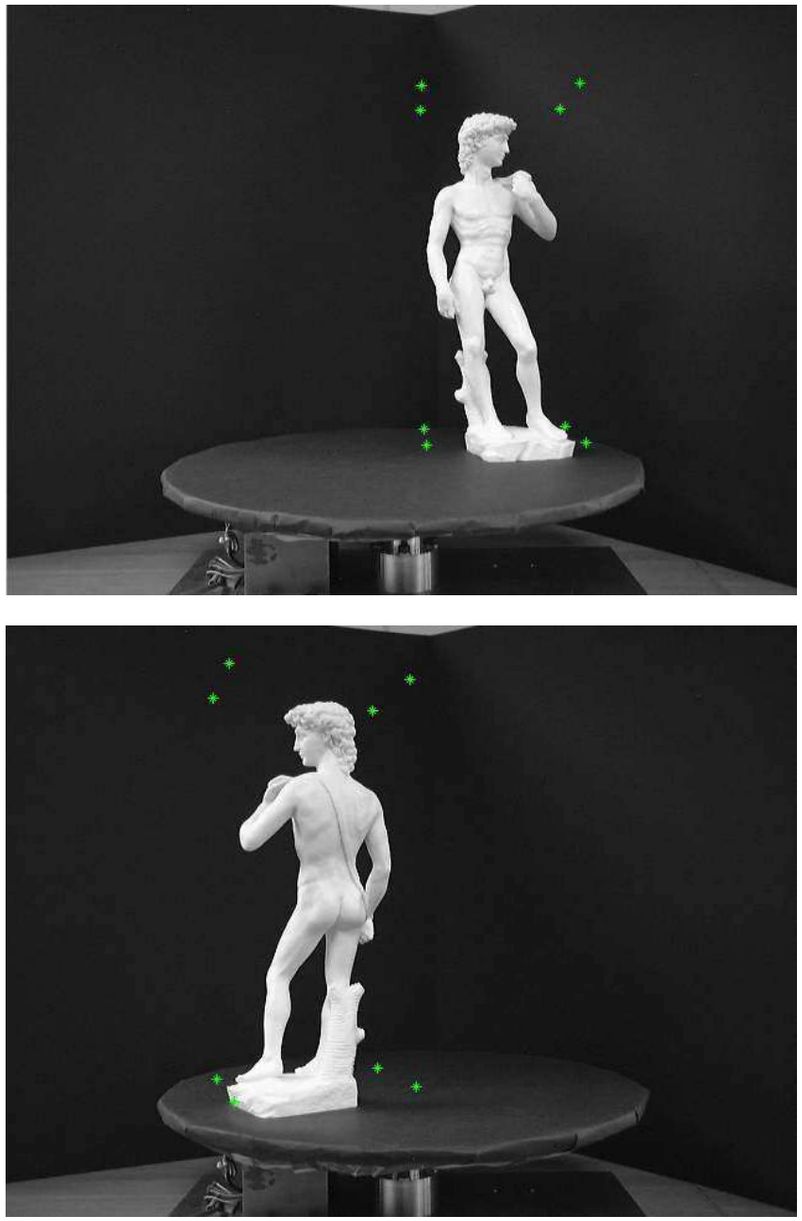


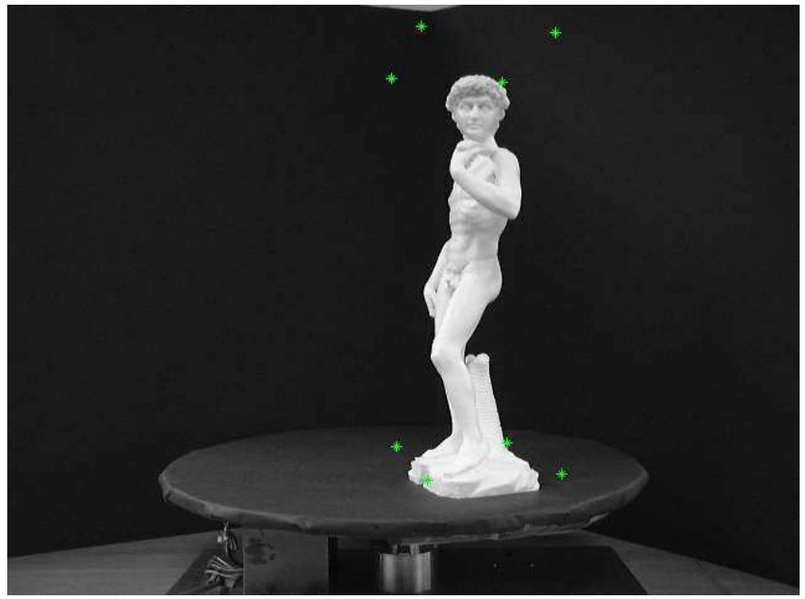
Volume of Interest

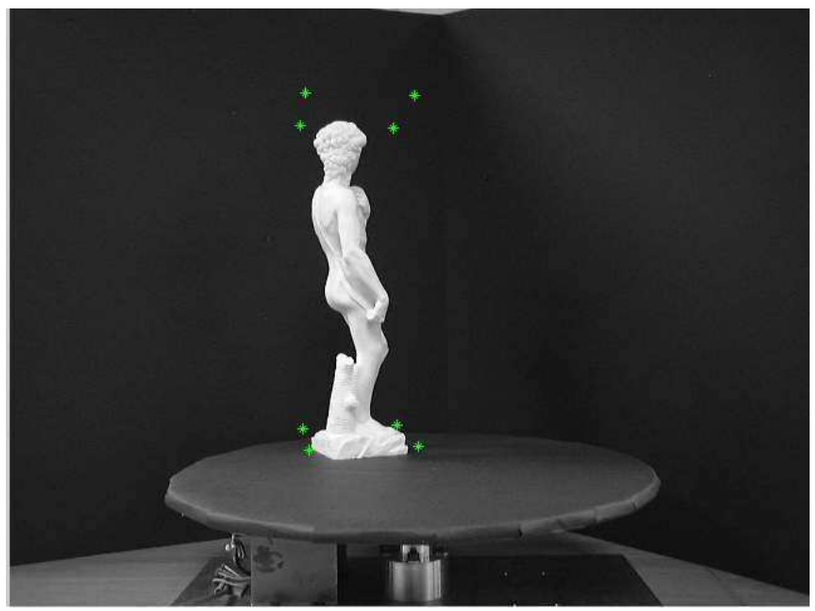
- Find bounding box
- First get a rough bounding box
  - Refine later once everything is working
- Make sure your bounding box includes the whole statue
  - Provided code projects volume corners into images

Bounding Box

- Projected volume corners





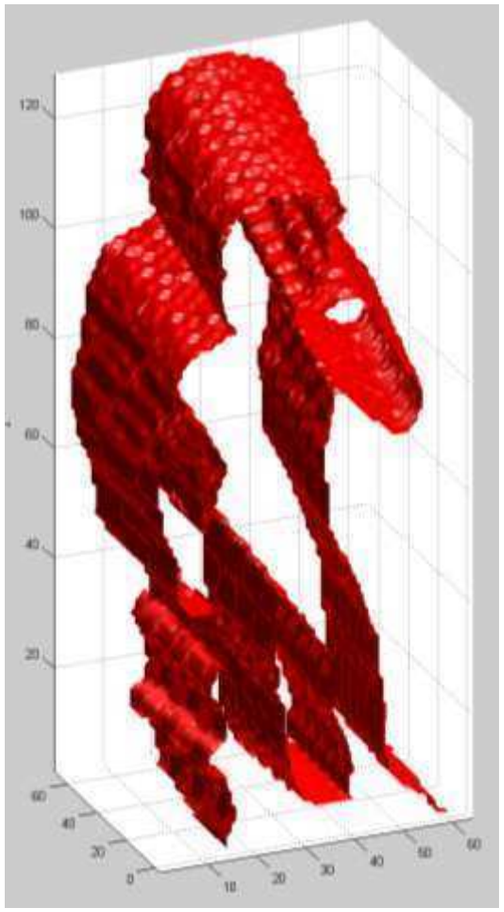


Compute Occupancy Score

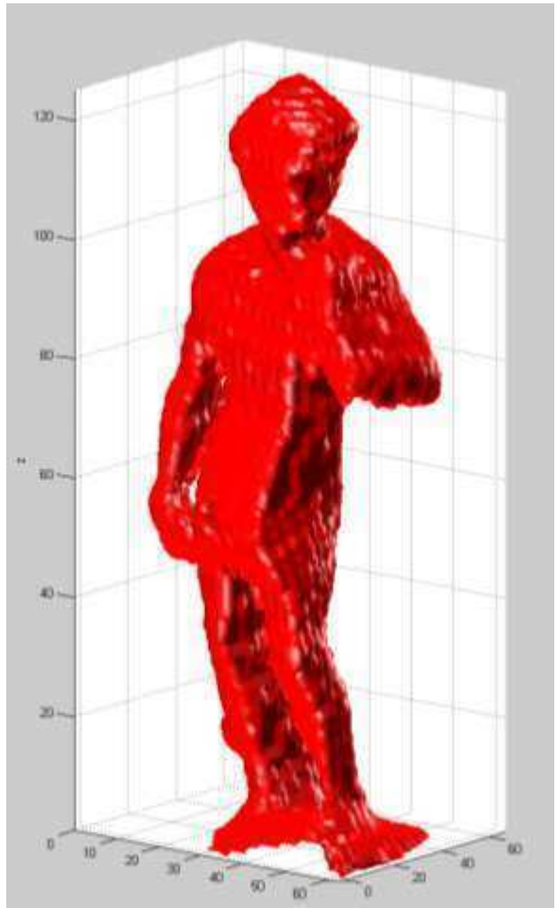
- For each voxel
  - Project the voxel center into each image
    - Use provided volume-to-world transformation
  - Add 1 if projection is within silhouette region
    - Note that z is up, x, y are parallel to the turn table surface
- Start with a 10x10x20 voxel grid
- Once everything is working increase resolution, at least 64x64x128

3D iso-surface

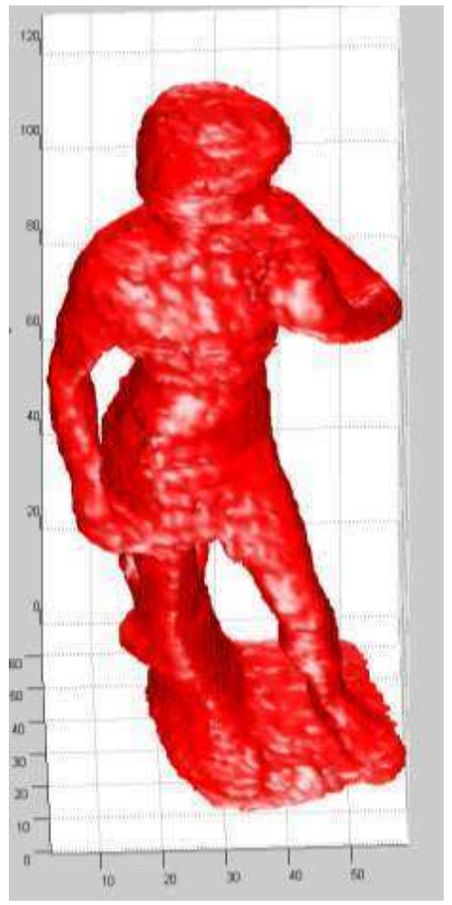
- Provided code generates a 3D iso-surface from the volume



1 image

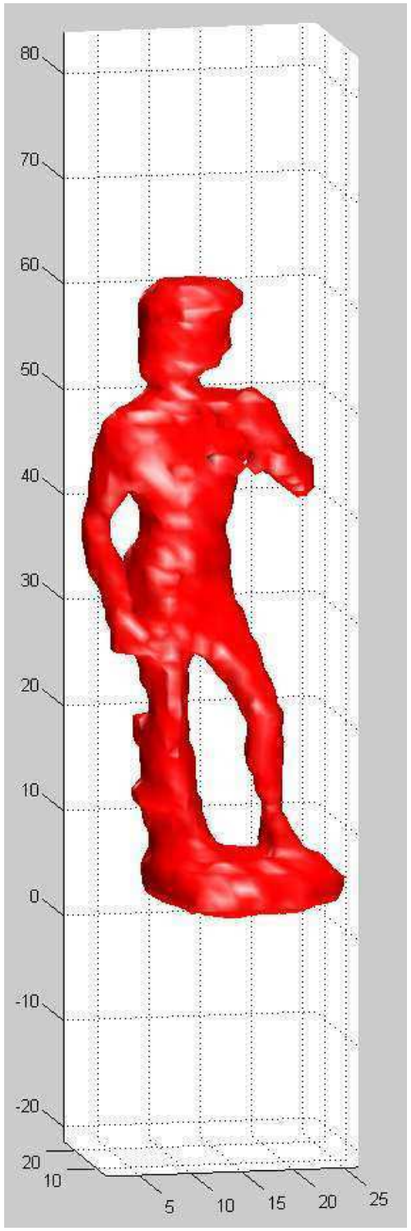


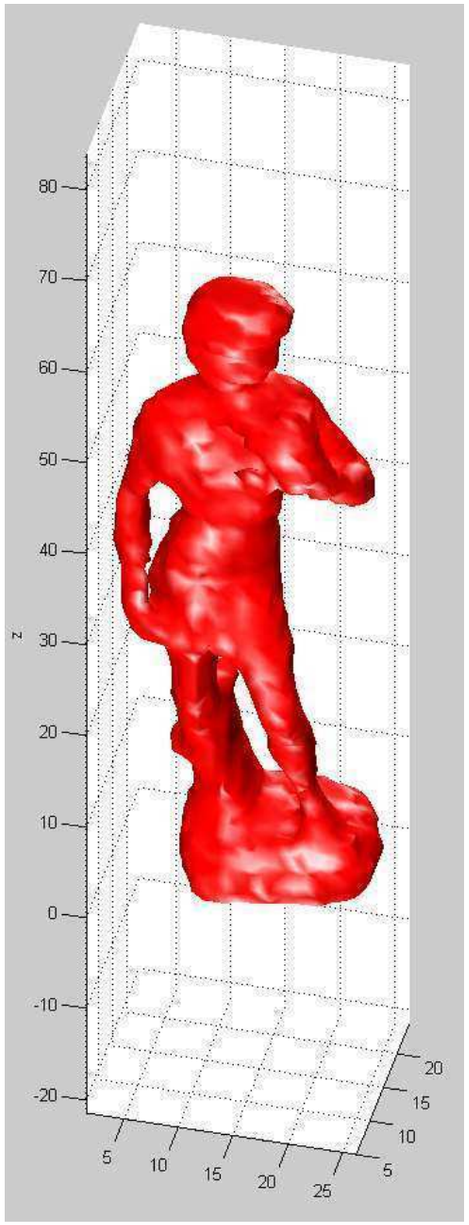
4 images

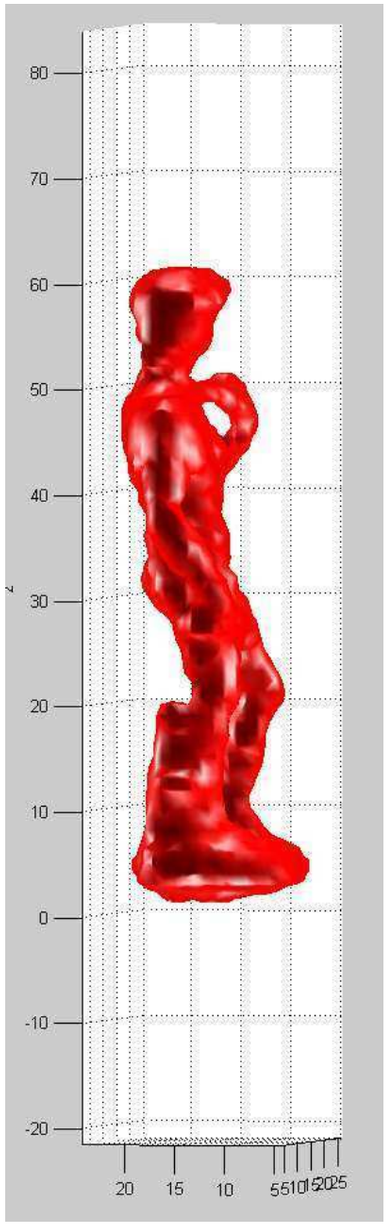


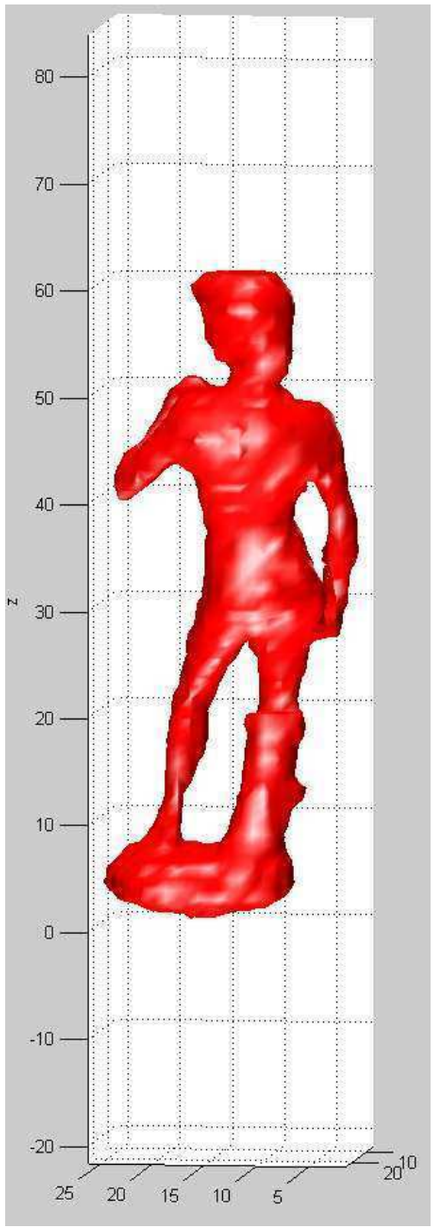
18 images

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