CS4058D
Computational Geometry


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Disney
Tangled

How to create “Rapunzel” ?

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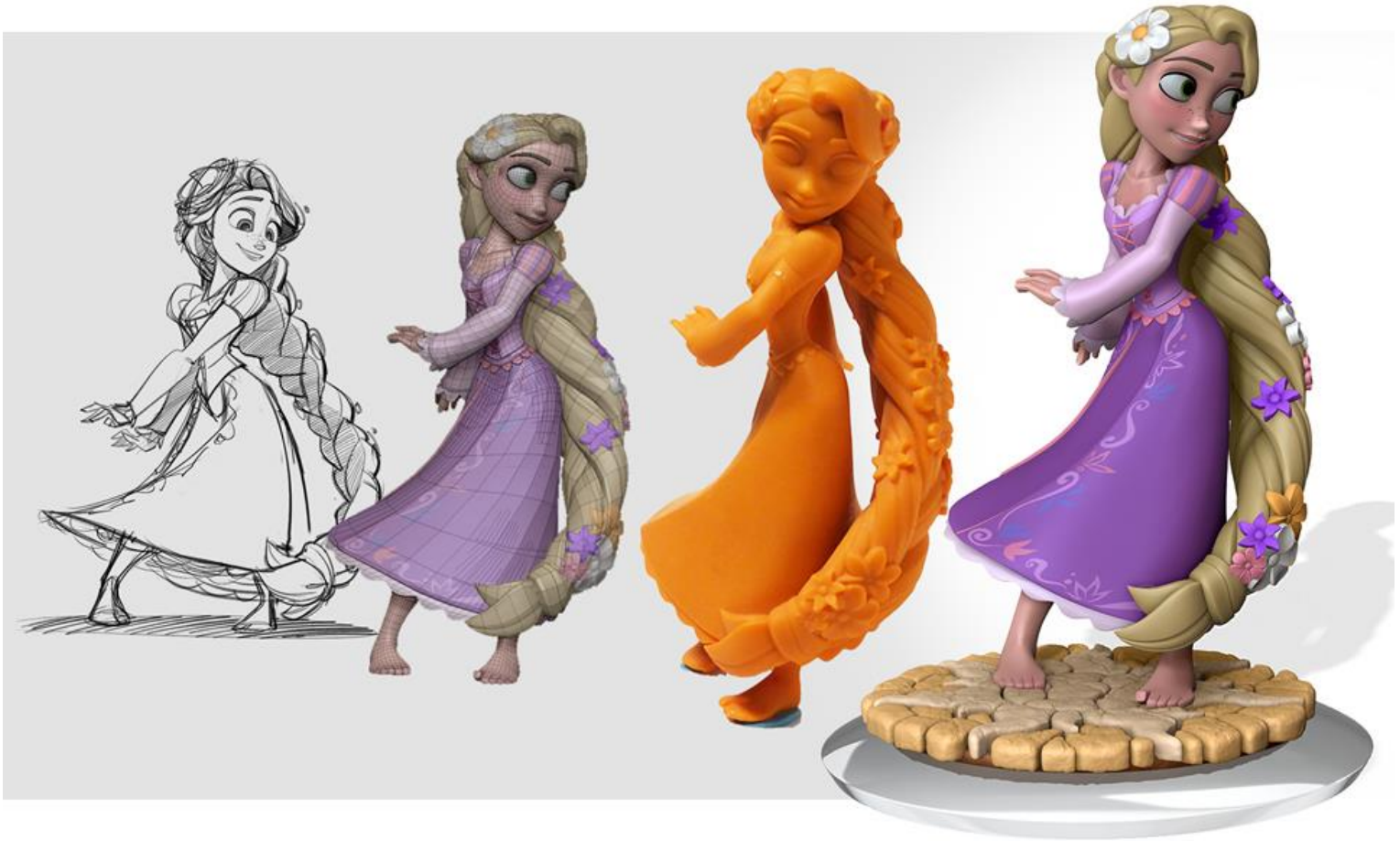
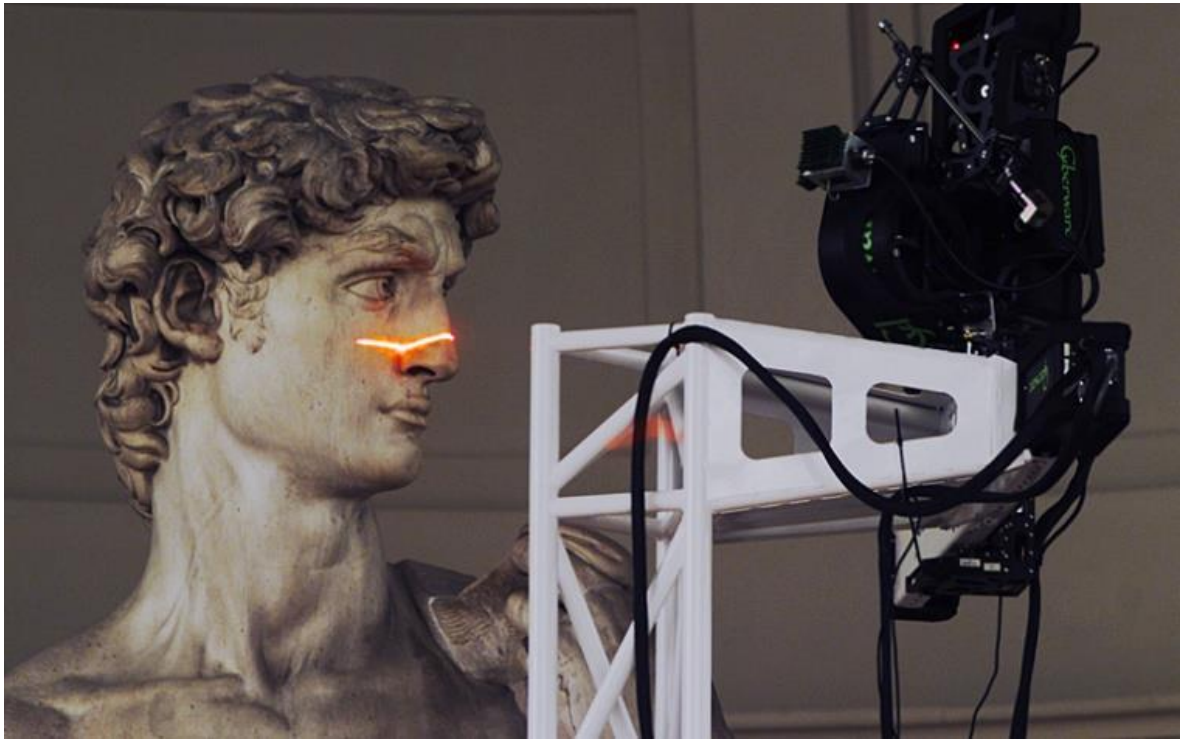
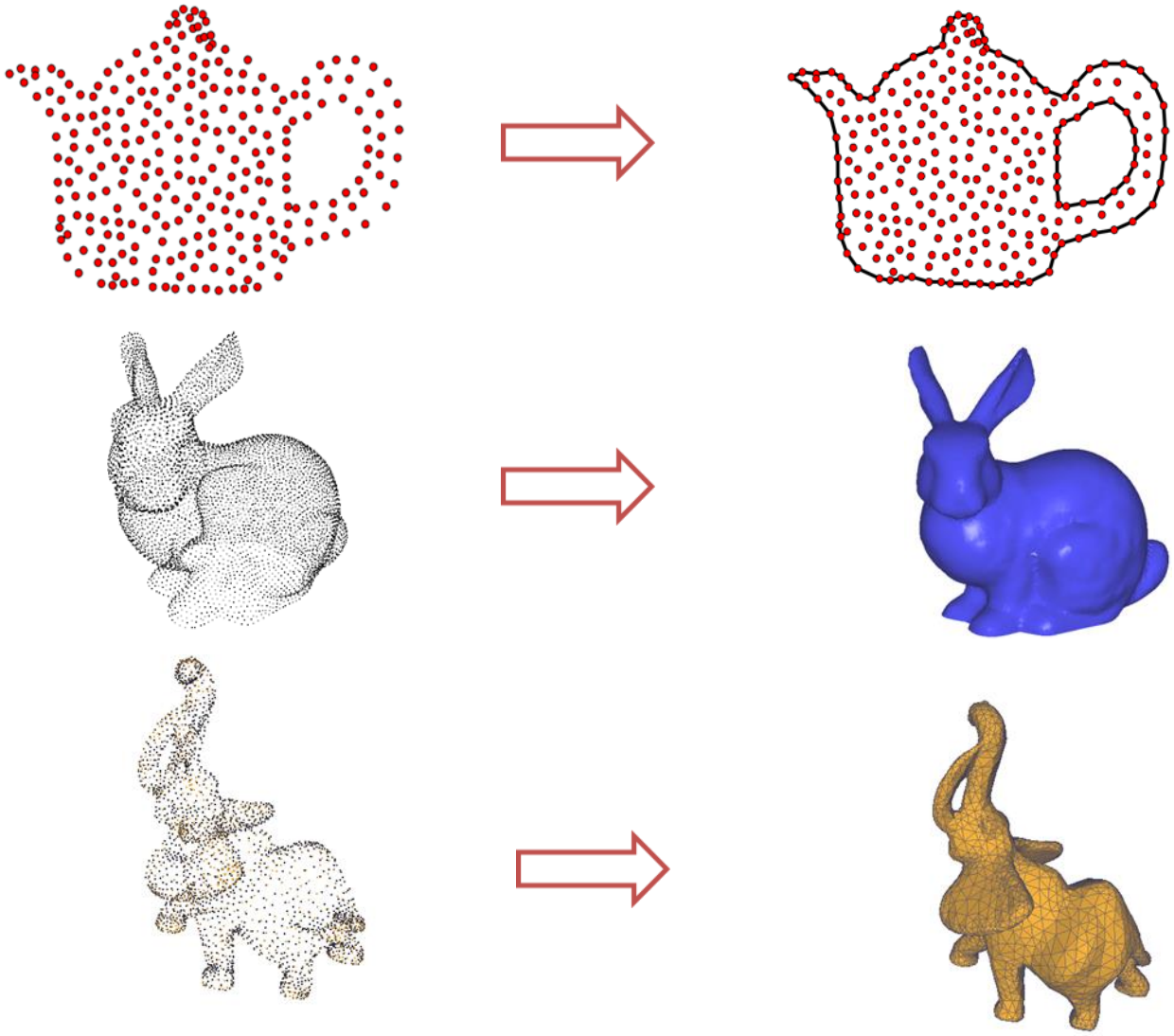


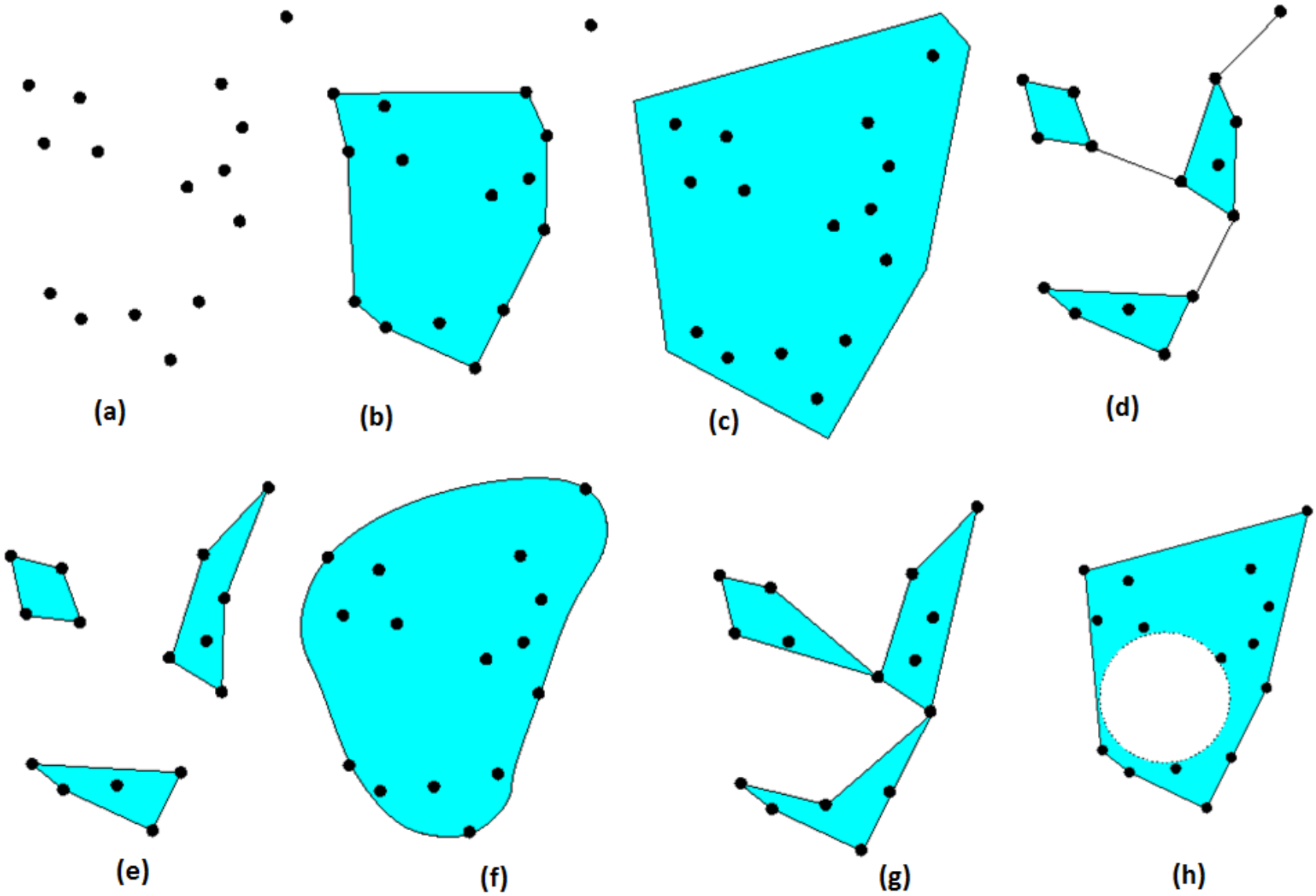
- 2D sketching to 3D models



- Digital archiving / Data compression of statue of David (Constructed by Italian sculptor Michelangelo)
- **The Digital Michelangelo Project by Stanford**
- **The Digital Michelangelo Project: 3D Scanning of Large Statues ,** Marc Levoy , Kari Pulli, Brian Curless, Szymon Rusinkiewicz, David Koller, Lucas Pereira, Matt Ginzton, Sean Anderson, James Davis, Jeremy Ginsberg, Jonathan Shade, Duane Fulk, Computer Science Department, Stanford University, Department of Computer Science and Engineering, University of Washington **,** Cyberware Inc., Proc. SIGGRAPH , 2000
- Global Non-Rigid Alignment of 3-D Scans, Benedict Brown, Szymon Rusinkiewicz , Princeton University, ACM Transactions on Graphics (Proc. SIGGRAPH), August 2007

Reconstruction

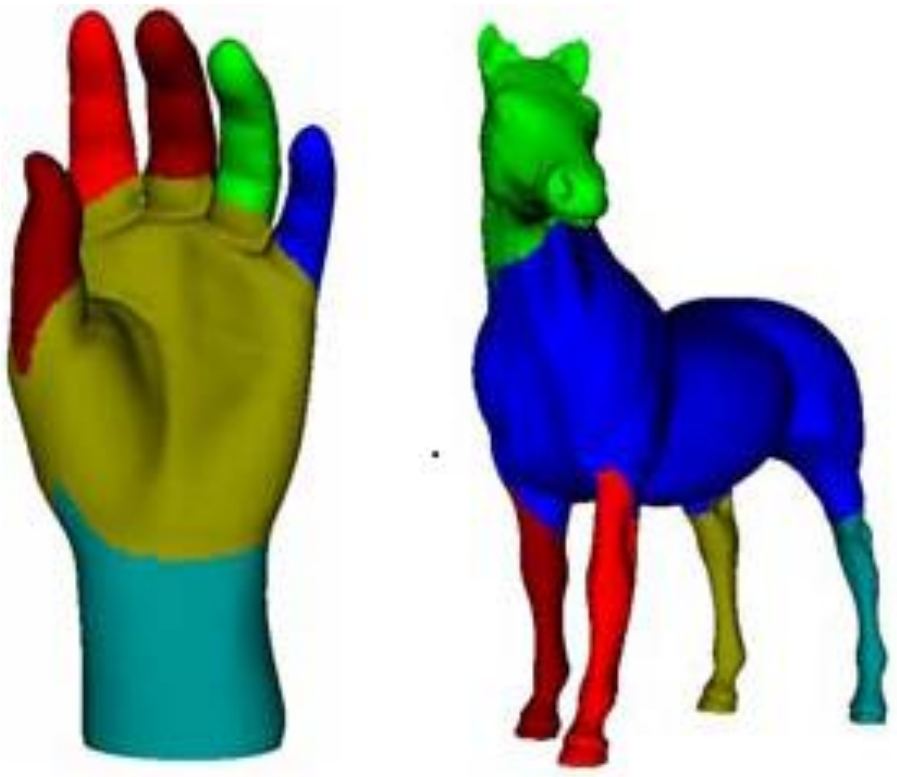



(a)
(b)
(c)
(d)
(e)
(f)
(g)
(h)

Urban modeling

3D model of Rome-courtesy: Nokia here

Segmentation

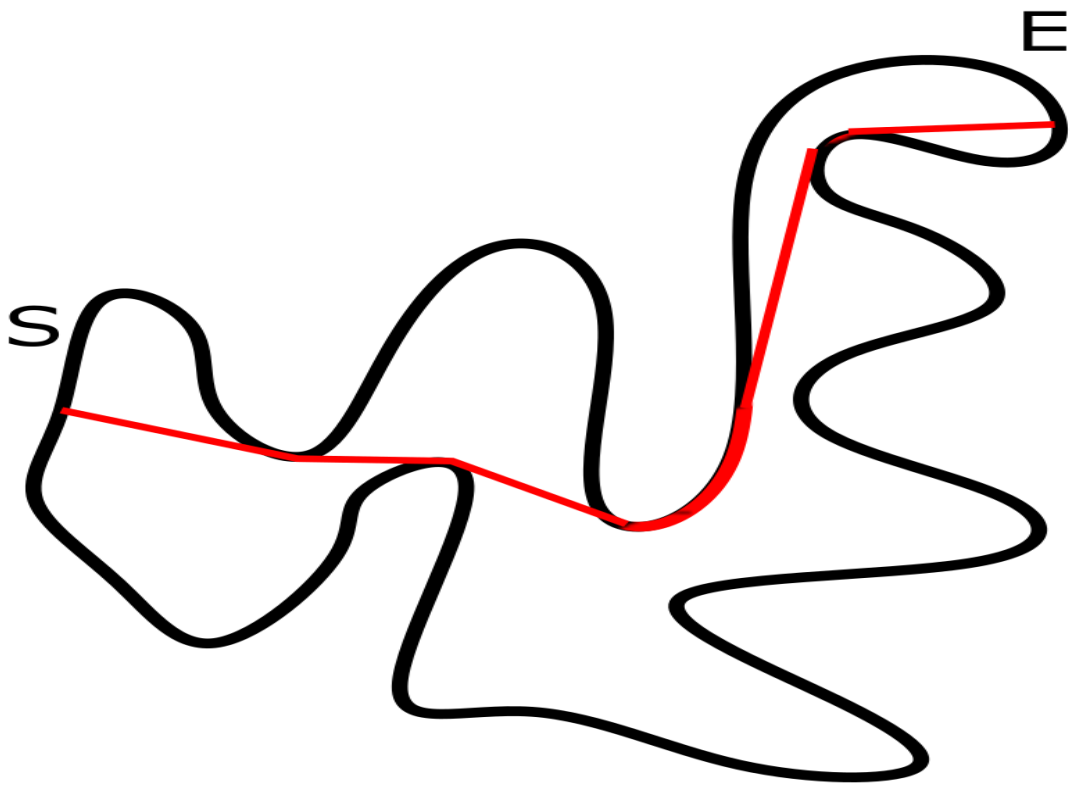


(a) (b)

Image courtesy: http://www.googlemaps/

- Facility Location

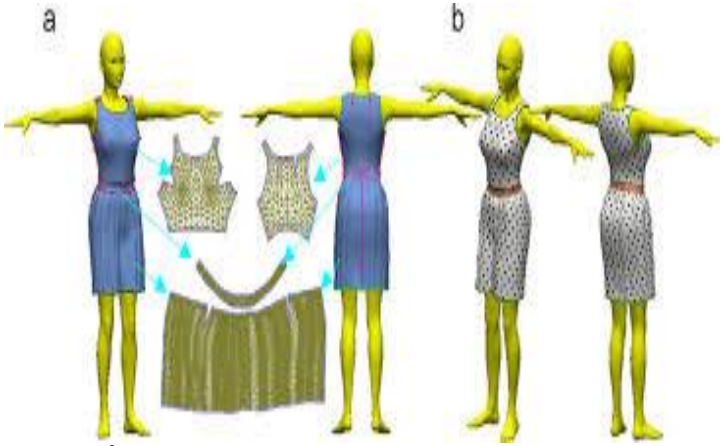
Shortest path problem



Cloth Fitting

Cloth Fitting

- Input:3D garment model and 3D virtual human model of different shapes and poses.



a)input b)output

- Output: 3D virtual human model perfectly adjusted with the given 3D garment model.

Project for MVR

Figure 5: Input image converted to jpeg

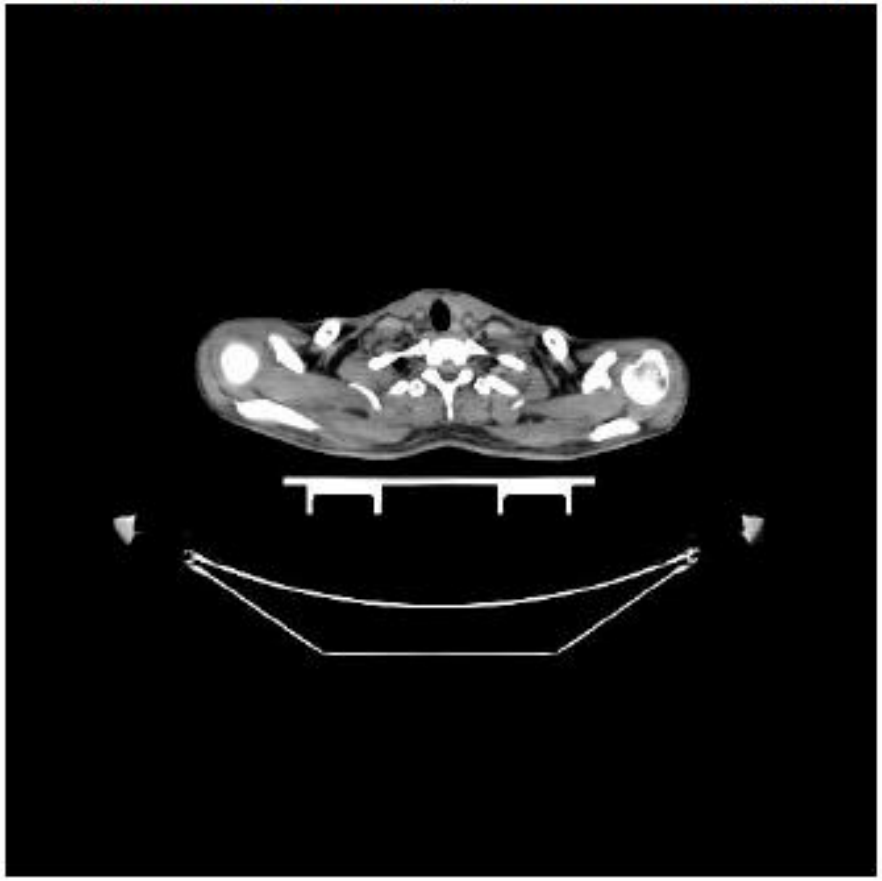


Figure 6: Selecting tumour area

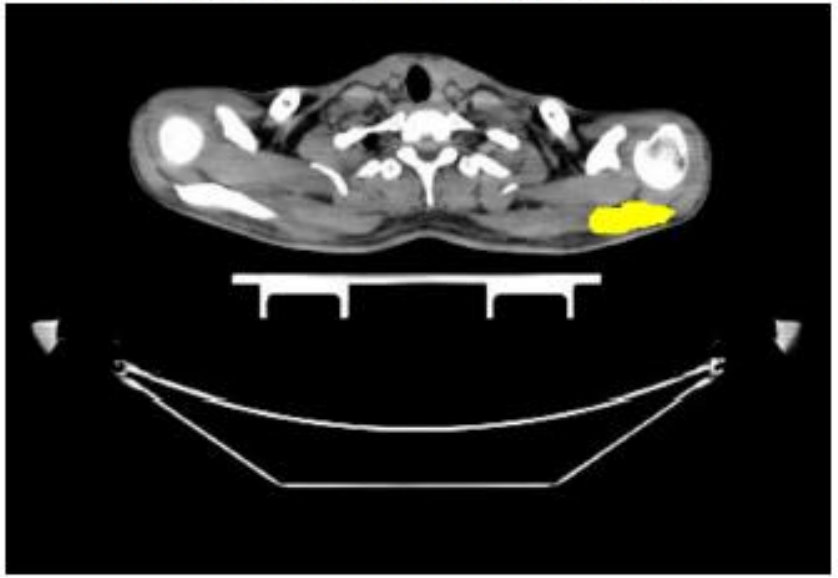
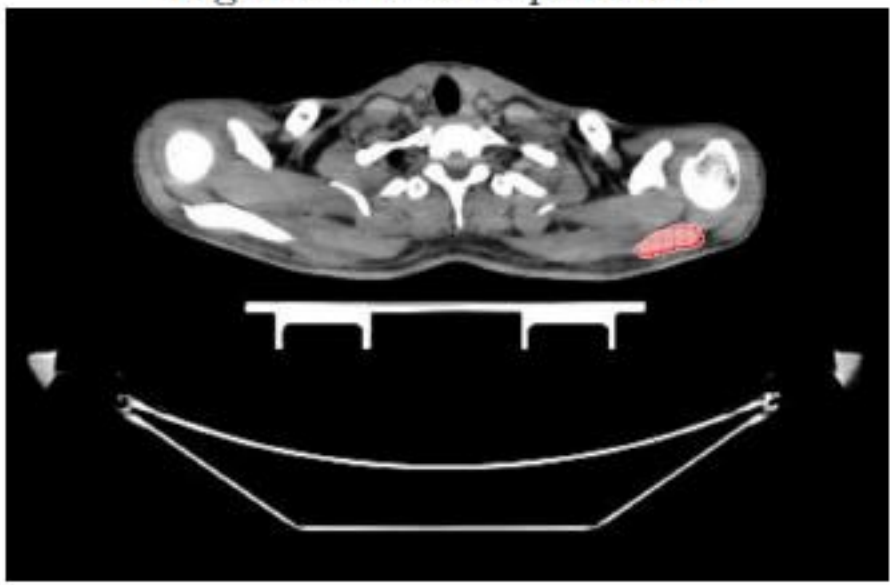
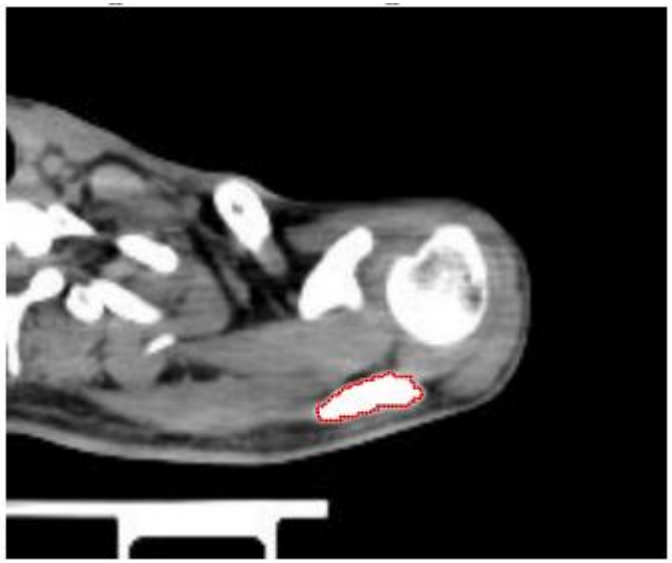


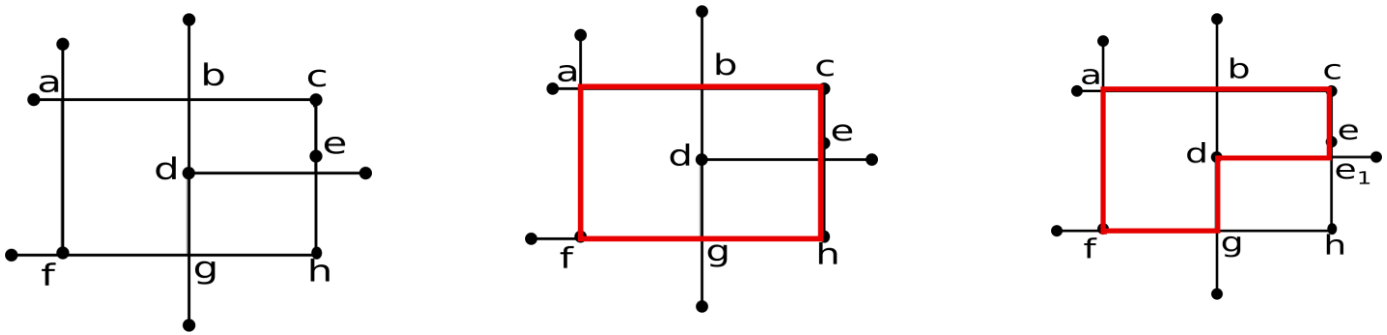
Figure 7: Create point set





Minimum Link Segment Tour

- Given an orthogonal connected arrangement *L* of line-segments, find a minimum link-distance closed walk visiting all the line-segments.
- Link-distance is the number of links or turns in a path/walk.



(a) (b) (c)

FIGURE –Input and Output Instances of MLST.
(a) The input arrangement of line-segments.
(b) closed walk in (a) with link-distance four(*ac, ch, hf* , and *fa* are the links)
(c)closed walk in (a) with six link-distance (*ac,* ce_1 *,* $e_1 d$ *, dg, gf* and *fa* are the links)respectively.

Motivation

- Applications in VLSI
  - Minimize the length of the wire used
  - Reduce the number of links(bends)I n a path connecting two points in the board
- Most of the covering problems are NP-hard even in rectilinear domains (lines/line-segments parallel to x-axis or y-axis)

Computational Geometry

Computational Geometry

Branch of Computer Science for the study of algorithms which can be stated in terms of geometry.

- Slot: F and F+
  - Mon: 8 to 8.50 am
  - Tue: 5 to 5.50 pm
  - Thur : 8 to 8.50am
  - Fri: 5 to 5.50 pm

Thank You