

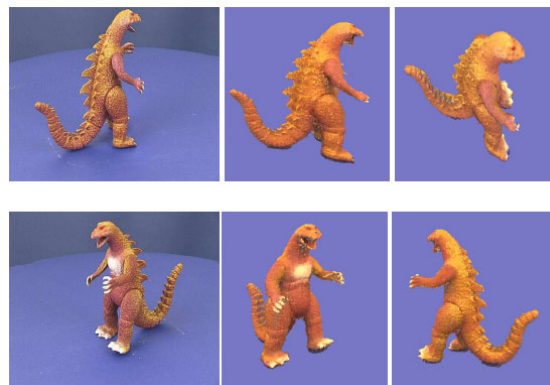
ELEC4630 Image Processing and Computer Vision

Assignment 3

(Due date: Friday 15/5/2019 at 11pm)

Assignment report should include **coding**, **results**, **images**, and a **verbal description** of how you approached the problem. Some similar solutions can be found on the internet, but you won't learn anything by copying these, and you may be flagged for integrity issues — none of us want this. The tutors will help you with the coding. Most importantly, have fun — especially with the dinosaur.

1. Stereo reconstruction is only useful for reconstructing a simple scene from two nearby views. It can be difficult to extend to complicated scenes with occlusion and to a large number of cameras or views. Volumetric reconstruction is one way to handle a large number of cameras with arbitrary viewpoints. In this assignment you will be required to fuse the data from 36 viewpoints of an object into a detailed volumetric model of that object. An example result is given below.



The inputs:

- 36 viewpoints of a toy dinosaur spinning on a turntable (10° per image).
- 36 projection matrices which determine how each spatial point maps onto the image plane.

The output:

- A volumetric model of the dinosaur
- (To be submitted) 4 new viewpoints of the reconstructed dinosaur which do not coincide with any of the original 36 viewpoints. Try to texture map the images.

The method you are required to implement is known as “shape from silhouette”. This has been covered in lectures. Images and some hints are available from Blackboard as dino.zip.

PS – This is easier than it looks as it is just nested FOR loops.

(10 Marks)

2. Build a simple face recognition system based on the eigenface technique to recognize faces from the database on the website. You should be able to obtain about 96% correct recognition. Supply the code listing, explain your method, and performance analysis. Higher marks can be obtained by building a nice GUI interface in Matlab. Face images are available from Blackboard. Details of the Eigenface method are in the book chapter “Face Recognition for Data Mining” on Blackboard. In the next assignment you will use deep learning to build a modern state-of-the art face recognition system.

(10 Marks)

(Total 20 Marks)

Assignment 3 Marking Scheme and Criteria

Q1

- Coding of a solution to backproject the dinosaur frustrum and create shape from silhouette. Appropriate images, description and explanation of method, issues of implementation, related images and graphs
 - (7 marks)
- Coding of a solution to texture map the dinosaur, description and explanation of method, issues of implementation, related images and graphs
 - (3 marks)

Q2

- Coding of a solution to perform face recognition using eigenfaces. Description and explanation of method, performance metrics. Issues with eigenface techniques (citations from the literature, experiments with other faces)
 - (7 marks)
- Development of GUI and user interface. Description and explanation of method. Layout of screen elements.
 - (3 marks)