Computer Vision & Imaging/ Robot Vision - Formative task 2

March 24, 2021

Part 1

This task is formative. Please submit your code as username_formativetask2.m and all graphs and figures produced as username_formativetask2.pdf see below the expected results of each question. To complete these tasks first load the data used by executing the following command which will create an image directory, the images loaded are shown below:

imageDir = fullfile(toolboxdir('vision'), 'visiondata', 'structureFromMotion');

The aim of this task is the calculate the relative positions of a camera to an object as it moves around said object given the images taken. You can assume that there is no in-plane rotation of the camera.Please remember to add comments to your code to explain your steps, this is good practice for coding beyond this course where it is standard practice.
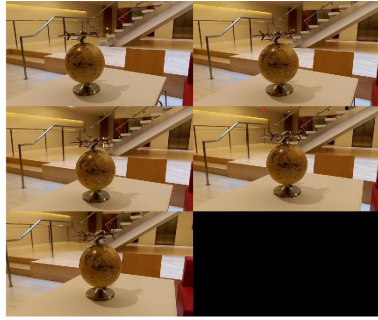
Question 1.1 *Read the imageDir and create an appropriate datastore of all the images in the directory, justify your choice of datastore type. Convert all the images to grayscale and display the resulting images.*

Question 1.2 *Load the camera parameters (cameraParams.mat) from imagedir. Open cameraParams.mat, you should now be able to see a number of parameters which you will need for the rest of the task*
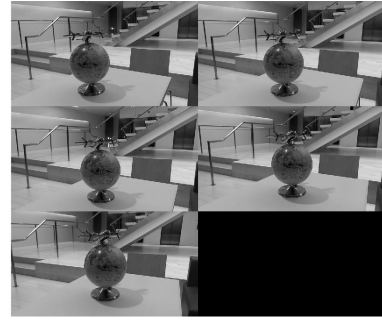
Question 1.3 *Extract key common features from the images and estimate the camera position relative to the previous image. These changes in position should then be related in a global coordinate system, use bundle adjustment to refine all points. If you get stuck the script helperEstimateRelativePose can be used to relate the relative positions.*

Question 1.4 *Plot the relative camera positions and 3-D features you have calculated, ensuring your graph is fully labelled and titled.*
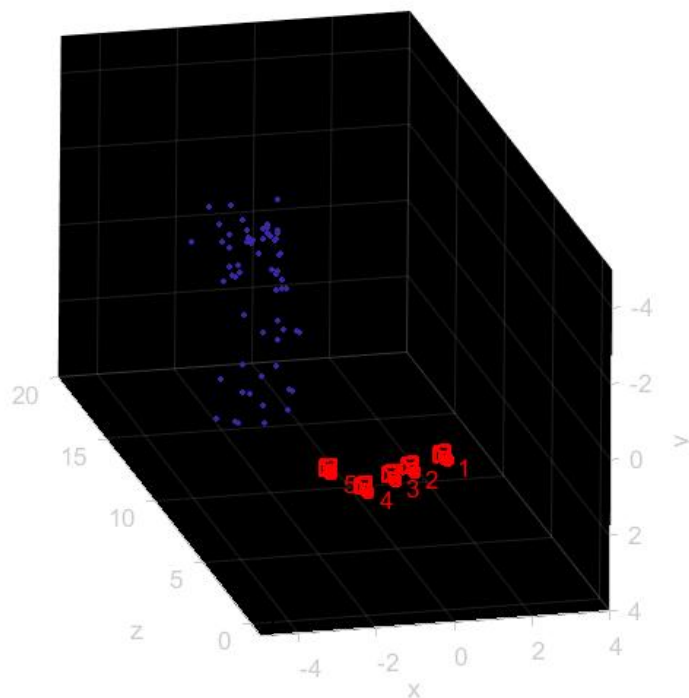
Data courtesy of The Mathworks inc

(a) Original image of part 1.

(b) Grayscale images from 1.1

(c) Camera parameters loaded in 1.2

(d) Final plot of camera positions from 1.4