

# Software Technical Assessment v1.1

## Overview

You have been provided with two point clouds consisting of the same object viewed from two different perspectives.

Your task is to develop a python3 script to transform the second point cloud into the co-ordinate frame of the first and display them both in the same scene.

You will be assessed on the format and legibility of your code as well as the function, so ensure to follow good development practices.

## Details

You should have been provided two files: bun000.txt and bun315.txt. These are text representations of 3D point clouds, with each row representing the cartesian co-ordinates of a single point (X Y Z) in metres. Your script should use the relative path to these files in the same directory as the script is run.

You are required to read in all points from both files and transform the points from bun315.txt into the reference frame of bun000.txt. The transformation between frames is defined as:

$$p' = R * p + t$$

With the rotation being expressed in XYZ Euler angles (in degrees): [-0.0642381, -45.1938717, 1.1853354], and translation in XYZ (in metres): [-0.00646017, -1.36122e-05, -0.0129064].

The rotation matrix R is composed  $R = R_z * R_y * R_x$ .

For this exercise, you are not to use any non-builtin packages or modules other than numpy for transforming the point cloud.

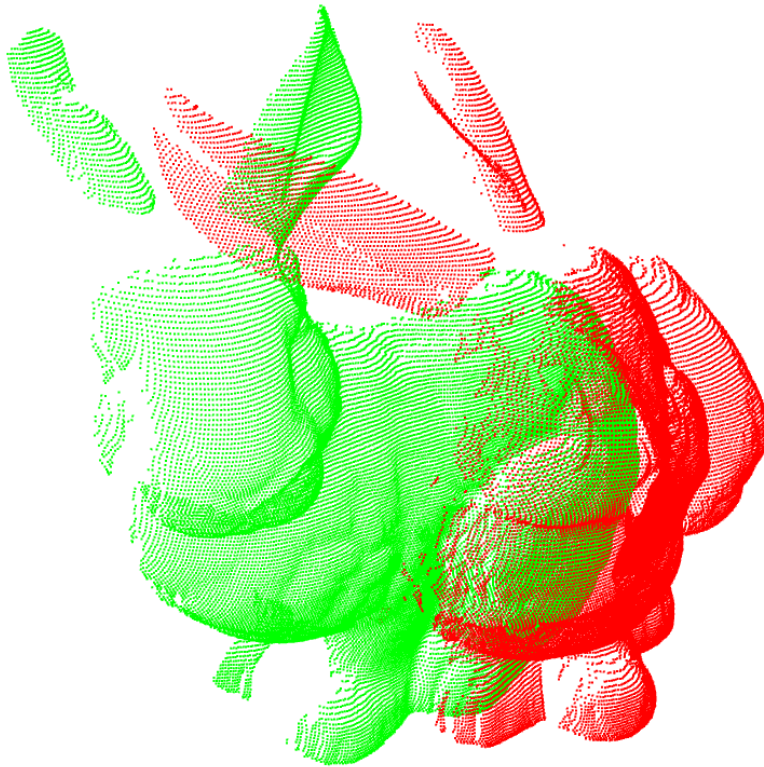
For visualisation, you can use the open3d library, which provides a quick way to visualise point clouds quite efficiently through `o3d.visualization.draw_geometries`.

The expected output visualisation is shown on the following page. The first image is before transformation, and second is after. The bun000 point cloud is displayed in green and bun315 in red.

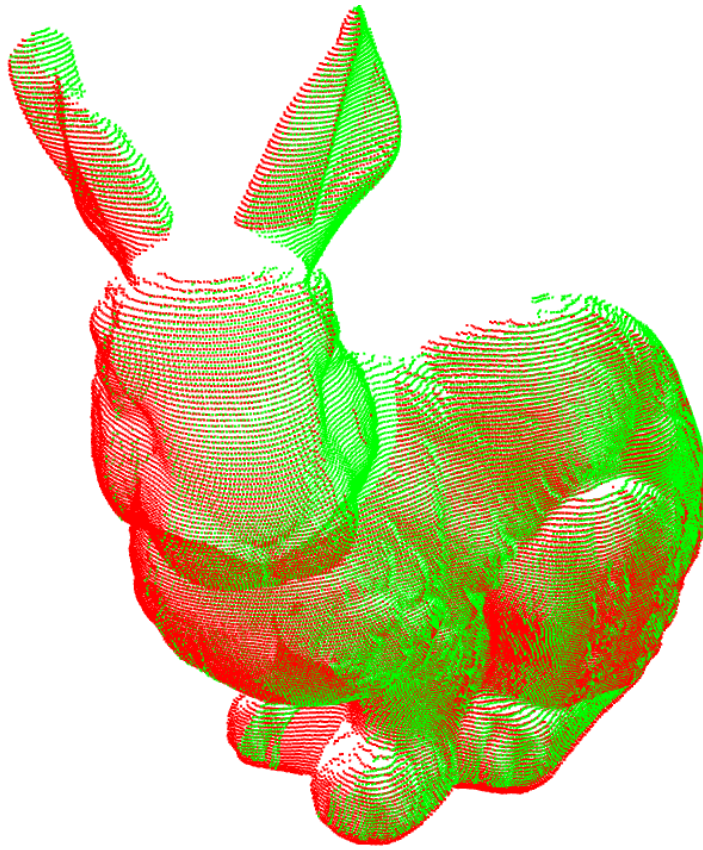
## Delivery

Your solution should be a single python3 script which can run with no additional dependencies except numpy and open3d. When run the script should display both the bun000 and the transformed bun315 point clouds in the same visualization window.

When complete, please email the solution python file to the hiring manager.



*Figure 1- Example Output - Before Transformation*



*Figure 2 - Example Output - After Transformation*