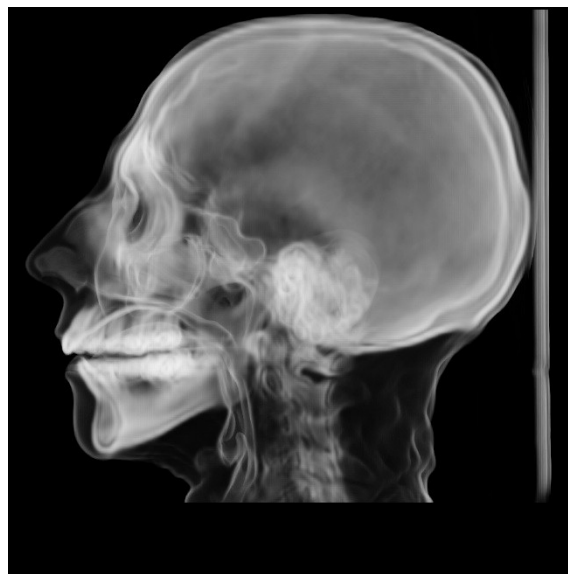


CSC337 CW #2

Description

For this assignment, you may reuse work done in the lab and extend it with specific new features. A template file is provided for you. You are not permitted to use additional libraries beyond those already introduced, except for standard mathematical operations where necessary. If you are unsure about any aspect, please reach out for clarification.

The goal is to visualize the UNC head dataset to closely resemble the reference image provided below. Since the exact rendering model used in the reference is not disclosed, you must apply your understanding of volume rendering to implement a model that approximates it.



To enhance image quality, you must implement trilinear interpolation and support image generation at arbitrary resolutions or zoom levels. The image should be rendered using an orthographic projection onto a single face—arbitrary viewpoints are not required. Starter code will be provided, and the marking criteria are given on the next page.

This is a strictly individual assignment. By submitting to Canvas you acknowledge that you have read and understood the following:

By submitting this coursework, electronically and/or hardcopy, you state that you fully understand and are complying with the university's policy on Academic Integrity and Academic Misconduct. The policy can be found at <https://myuni.swansea.ac.uk/academic-life/academic-misconduct>.

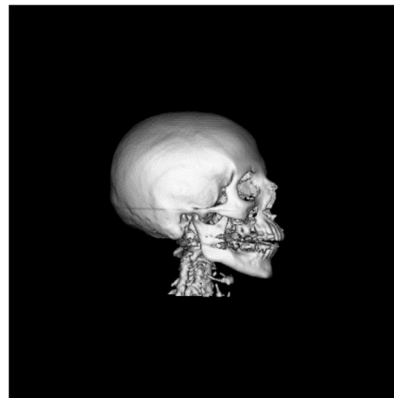
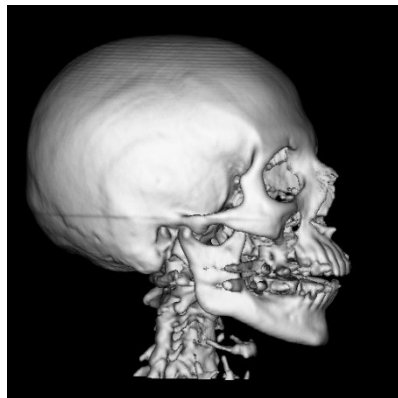
Marking Criteria

15 Marks

The final image must be generated at an arbitrary resolution (e.g., 512×512 pixels). The resolution is controlled by the resolution variable in the code. The program should allow setting this variable via the command line while also providing a default value.

15 Marks

Zooming in and out of the image must be possible (see images below). The zoom factor is controlled by the zoom variable in the code. The program should allow setting this variable via the command line while also providing a default value. Note: The images below use an isosurface rendering model, which is not the desired rendering model for this assignment.



30 Marks

The code must implement trilinear interpolation to reconstruct samples along the rays (or sampling points), improving the appearance of the isosurface. A sampling distance of 0.5 or less should be used.

30 Marks

A contour visualization technique must be implemented to match the provided reference image as closely as possible. Marks will be awarded based on the degree of similarity to the reference image.

10 Marks

Submission requirements must be fully met. Specifically:

- Submit a single Java file (CW.java) containing your code.
- Do not modify the core structure of the provided code (e.g., function names and parameters). In general, only additions are allowed.
- Ensure your code compiles and runs without issues. Marks may be deducted if additional effort is required to make it work.