

3D Modelling For Preoperative Planning In Orthopaedic Surgery: Step By Step Guide: How To Print 3D Model

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INTRODUCTION:

3D modelling, or 3D printing technology has been gaining popularity across various fields, including orthopaedic surgery. A physical replica of computed tomography scan provides an extra dimension for understanding the precise patho-anatomy, thereby enhancing accurate preoperative planning and implant placement. This presentation will show step by step guide on how to convert DICOM images into 3D printed model.

MATERIALS & METHODS:

To provide a step by step guide on how to convert DICOM images, which is the widely available format of CT scans, into a printed 3D model. Softwares required are InVesalius, Meshmixer, and Cura Ultimaker, all of which can be easily downloaded at no cost.

RESULTS:

The steps involved can be summarized into: Segmentation, Meshmixing, Slicing, Printing. First, DICOM images are loaded into Invesalius software for segmentation; to select areas of interest. Next, Meshmixer software is used to go through a touching up process called meshmixing to crop the model, to “close up” the model and to smoothen the edges. Finally, Cura Ultimaker is used to convert the 3D model into 2D slices (slicing) to be read the printer. The final process is to load the file into the printer to obtain the final 3D model.

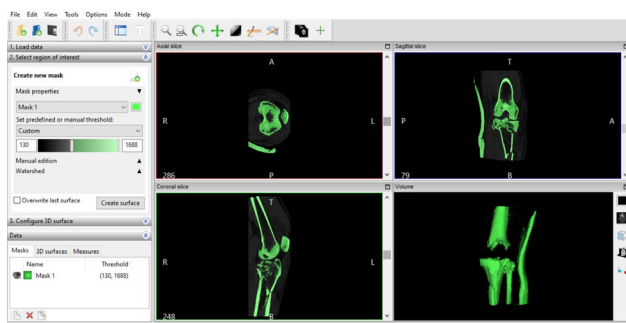


Figure 1: Segmentation process using InVesalius software

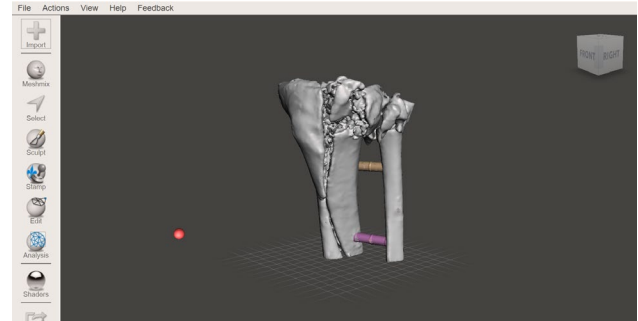


Figure 2: Meshmixing process using Meshmixer software

DISCUSSIONS:

3D printing technology has in recent years become simple and affordable to be adopted for use in preoperative planning in the field of orthopaedic surgery. The process of converting DICOM images to 3D model is a fairly simple process that can be learned with basic computer literacy. The softwares required are easily available at no cost and requires little learning curve to learn.

CONCLUSION:

The process of converting DICOM images into 3D model involves 4 steps; Segmentation, Meshmixing, Slicing, Printing. The softwares required are InVesalius, Meshmixer, and Cura Ultimaker. These steps are fairly easy to learn and does not require extensive computer literacy.

REFERENCES:

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