

IEEE Recommended Practice for Three-Dimensional (3D) Medical Modeling

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IEEE-SA Standards Board

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Abstract: The generation and practical use of medical three-dimensional (3D) modeling for diagnostics and therapeutic applications is described in this standard. Volume rendering and surface rendering techniques for 3D reconstruction from two-dimensional (2D) medical images and a texturing method of 3D medical data for realistic visualization are included.

Keywords: IEEE 3333.2.1™, material properties, medical 3D decimation, medical 3D format, medical 3D reconstruction, medical 3D segmentation, standard for medical 3D, texture mapping.

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Introduction

This introduction is not part of IEEE Std 3333.2.1™-2015, IEEE Recommended Practice for Three-Dimensional (3D) Medical Modeling.

Medical images from hospitals consist of a 2D dataset and provide human body information as a slice. The human body has morphological structures in 3D space. To recognize real human organs, the body should be reconstructed using 2D slices to obtain its precise position and shape. In real clinical situations, doctors expend a great deal of time and effort to learn this reconstruction process. With medical 3D data, we will obtain more information about the human body, as well as more objective data from the simulation, which may contribute to more successful treatment and surgery plans.

Contents

1. Overview	1
1.1 Background.....	1
1.2 Scope	2
1.3 Purpose	3
2. Definitions, abbreviations, and acronyms	3
2.1 Definitions	3
2.2 Abbreviations and acronyms	3
3. Medical 3D modeling information	4
3.1 Overview of 3D modeling	4
3.2 Modeling architecture.....	6
4. Segmentation	8
4.1 Overview of segmentation.....	8
4.2 Segmentation methods.....	8
5. Reconstruction.....	12
5.1 Overview of reconstruction	12
5.2 Surface rendering.....	13
5.3 Volume reconstruction.....	15
Annex A (informative) Bibliography	18

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1. Overview

1.1 Background

Medical images from hospitals consist of a two-dimensional (2D) dataset and provide human body information as a slice, but the human body has three-dimensional (3D) morphology. If we should simulate this 3D morphology, we might be able to obtain more information about the body as well as contribute in the clinical environment to both treatment and surgical outcomes. Our objective is to generate 3D medical data from 2D images. Although doctors expend a great deal of time and effort in this process, the resultant 3D data is different in each institute. This protocol, therefore, provides standard, easy, and accurate 3D data for clinical fields and even for industrial markets.

A standardized file with 3D medical data, considering each data character from a different place, will yield steady quality visualization. Therefore, this standard suggests standardized data including 3D processing techniques. A more realistic 3D model and a basic model are shown in Figure 1.