

Geometric Medical Data

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Introduction

Traditional Medical Data

- CT, MRI
- A Sliced Image
- A Set of Sliced Images
- DICOM

DICOM(1/2)

DICOM

- Digital Imaging and Communications in Medicine (DICOM) is a standard for handling, storing, printing, and transmitting information in medical imaging
- DICOM includes a file format definition and a network communications protocol.

DICOM(2/2)



X3D nodes for DICOM files

X3D Volume Rendering Nodes

Geometric Medical Data (1/5)

Medical Data Type

- Various Medical Devices (not CT, MRI)
- Not Images, But Geometric Data Obtained by Microwave tomogram application devices
- Current, DICOM does not support geometric data

Geometric Medical Data (2/5)

Geometric Data Type

- Point(0D)
- Line Segment(1D)
- Face(2D)
- Tetrahedron (3D)

- --- OK in X3D
- --- OK in X3D
- --- OK in X3D
- --- Not in X3D
- A set of sliced planes
- A specific sliced data
 - A set of points, each point has (x,y)coordinates, permittivity, conductivity
 - A set of triangles, each triangle is represented into indexes of its points

Geometric Medical Data (3/5)

- Geometric Medical Data Type
 - A set of sliced planes
 - A set of points, each point has (x,y)coordinates, permittivity, conductivity
 - A set of triangles, each triangle is represented into indexes of its points
 - A set of tetrahedra
 - A set of points, each point has (x,y,z)coordinates, permittivity, conductivity
 - A set of tetrahedra
 - Each tetrahedron is represented into indexes of four points

Geometric Medical Data (4/5)

Geometric Medical Data Example of a sliced plane

0.06896551724137931, 0.06791777607011494, 0.06480638764022988, 0.05972588991609196, 0.05283065124942529, 0.04433017997816092, 0.03448275862068966,	0, 0.0119757363908046, 0.02358759609195402, 0.03448275862068966, 0.04433017997816092, 0.05283065124942529, 0.05972588991609196,	17.46690331908038, 16.80870223766724, 16.59336590450841, 16.27567344220458, 16.86640707041372, 15.79206407630073, 16.88484697510959,	0.6876034249105845 0.6682301546951255 0.6437434401535009 0.6432477290176095 0.6667264458278848 0.6124039125207118 0.6754501065849764
X	Y	Permittivity	Conductivity
37	27	38	
38	27	28	
38.	28.	29	
37.	38.	39	
39.	38.	40	
40.	38.	29	
39.	40.	41	
41.	40.	42	
42.	40.	43	
43.	48.	29	
42.	43.	44.44	
4.44	43.	31	
42.	Ju Ju .	45	
45,	44,	46	
46.	44.4 .	32	
45.	46.	47	
47.	46.	48	
48.	46.	33	
47.	48,	49	
49.	48.	50	
50,	48,	34	
		1	
•	Triangle Ind	ex	

Geometric Medical Data (5/5)

Geometric Medical Data Example of a set of tetrahedra

- A Point: x y z
- A Tetrahedron: Node1 Noode2 Node3 Node4
- Intensity 1: for all points
- Intensity 2: for all points
- Intensity 3: for all points

Visualization of 2D Geometric Medical Data (1/2)



Give several colors for visualizing permittivity and conductivity into their corresponding colors

Visualization of 2D Geometric Medical Data (2/2)

Patient: 2133, Exam Date: 090904 Frequency: 900 MHz, Side: L, MeshID: 126 Interation number 10/10

Permittivity



Conductivity













Visualization of 3D Geometric Medical Data



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X3D Spec. [1/2]

Volume data for a set of 2D geometric data

- Description for 2D geometric medical data in a sliced plane
 - A set of 2D points
 - Intensities of each 2D point
 - A triangle (indexes of 3 points)
 - A set of triangles
- Description for a volume
 - A set of 2D geometric data

X3D Spec. [2/2]

A set of 3D geometric tetrahedra

- **Description of a volume**
 - A set of 3D points
 - Intensities for each 3D point
 - A tetrahedron (indexes of 4 points)
 - A set of tetrahedra
- Geometric 3D Components
 - Support Cone, Sphere, Cylinder in X3D
 - Tetrahedron or a set of tetrahedra is not specified into X3D

Conclusion

- Geometric medical data can be represented into 3D medical data with low overhead
- Colors can be visualized in geometric medical data

Thank You