InViVo ScanNT 3.4
Documentation

Vol 3 File Format

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1 Vol-3 Fileformat

The InViVo Vol-3 format is a tag based general-purpose fileformat designed for the storage of 3D Volumedata. The main focus of Vol-3 is a) easy to expand and b) easy to implement and c) machine independent. Therefore a tag-based format (like dicom) was choosen. This allows adding new features and/or requirements just by new tag definitions – older InViVo versions will ignore these additional Tags rather than complain about 'unknown fileformat'.

To make life easier Vol-3 contains a (short) unique header, which holds basic information's, like Resolution of the Volume, Identifier, etc. This header will remain the same for all future Vol-3 releases.

The current implementation writes Volume-Data as compressed blocks. The implementation of the compression procedure is not part of this documentation since Vol-3 compression is simply a unix compress command like procedure. To write a block-decoder refer to unix compress source code.

1.1 Description

First Part of a Vol-3 File is the unique header:

Contents	Description	Size (Bytes)	File Offset (Byte)
'VOL3'	Vol-Identifier	4	0x0
0x1234	Magic-Number	2 (unsigned short)	0x4
Dx	X-Resolution	2 (unsigned short)	0x6
Dy	Y-Resolution	2 (unsigned short)	0x8
Dz	Z-Resolution	2 (unsigned short)	0xA

The Magic number is used to identify the storage mode of the data (i.e. little endian, big endian).

After the Vol-3 header the file contains an arbitrary number of tags-length-data triples. Each triple is defined as:

Tag Identifier	Item Length	Item Data
2 Byte (unsigned short)	4 Byte (unsigned long)	N Byte Tag Data

By reading the length of the tag older Vol-3 implementations are able to ignore unknown data tags and proceed with reading (and hopefully find a known tag…).

1.2 Vol-3 Tags

The following table describes the currently defined Vol-3 Tags:

Tag Number	InViVo C-Constant	Description
0x0001	VOL3_VOXELXSIZE	Voxel Size in X-Dimension. The Value is stored as a string. The value represents a number in nano meters.
0x0002	VOL3_VOXELYSIZE	Voxel Size in Y-Dimension.
0x0003	VOL3_VOXELZSIZE	Voxel Size in Z-Dimension.
0x0006	VOL3_TYPE	Unsigned long Value: Dataset Type – This has been added to distinguish between ScanLite Dataset and any other sources. Defined Values: 0 → 3D Ultrasound (Tracker Version) 1 → 3D ScanLite Version 2 → Dicom 3 → Slices (Raw Data) 10 → Other Source
0x0010	VOL3_PNAME	String: Patient Name (Optional)
0x0011	VOL3_BIRTHDATE	String: Patient Birthdate (Optional)
0x0012	VOL3_STUDYDATE	String: Date of acquisition (optional)
0x0020	VOL3_4DNUM	Unsigned long: Number of volumes in this file. This value is added to simplify the loading procedure for 4D sequences. This tag must be stored before any volumedata-tags.
0x0021	VOL3_4DVOLSTART	Start Marker: Between this tag and VOL3_4DVOLEND tag the data for one time step (like volume, time-stamp) is located. Note: **ALL** volumes within a 4D sequence have the same resolution and voxelsize. This tag should not contains any data-value.
0x0022	VOL3_4DTIMESTEP	String: Float value of time-stamp for the current volumedata in fractions of heart cycle. That is, 0.0 at first R-Signal, 0.5 middle of heart cycle, 1.0 end of cycle, etc.. A value above 1.0 indicates the next heart cycle. Note: This tag might **not** be stored. In this case timing is undefined.
0x0025	VOL3_4DVOLEND	End Marker: This indicates the end of a 4D volume description.
0x0050	VOL3_DATA8BIT	Volume Data (8-Bit/Voxel)
0x0051	VOL3_DATA16BIT	Volume Data (16-Bit/Voxel)
0x0070	VOL3_CCVOL8BIT	8 Bit Color Data: A compressed data sequence will follow.
0x0071	VOL3_CC8BLOCK	Compressed Color Data Block
0x0072	VOL3_NCC8BLOCK	Color Data Block without compression.

0x0078	VOL3_LUTCOL	Color Look-Up table: 256 x 32 Bit entries. This converts color-indexes to 24 Bit RGB values. This tag is mandatory to display color-values.
0x1111	VOL3_EOF	End Marker: This is the last tag of all Vol-3 data files. This tag (and only this one) does **not** contain the length and data item.