Rady Children's Hospital-San Diego

Media2DICOM Quick Start Guide

A media conversion and encapsulation tool developed by the Helen and Will Webster Foundation 3D Innovation's Lab

The document is intended to cover version 0.9.1.0. 2022-10-10; please see DICOM Conformance Statement Section 2.1 for a version change log.

Introduction

Thank you for downloading Media2DICOM!

Media2DICOM was developed out of a need within Rady Children's Hospital-San Diego to archive 3D files into PACS/VNA and ultimately make the encapsulation process easier for our staff. As development progressed, we realized it could also be of value to those outside of our Rady family. To that end, we are excited to finally share the initial version of this tool with the community at no cost.

For any questions or support, we can be reached at 3DILab@rchsd.org. If you are interested in supporting this project and our lab, please consider donating through the Rady Children's Foundation.

We would like to thank The Helen and Will Webster Foundation for their support in the development of this software.

Quick Start Guide

Selecting media

Media files of the following formats can be imported for DICOM encapsulation:

Type	Format	Multi file support
Images	PNG, JPG, BMP	Yes, batched into a single "CINE." Images cannot be reordered in the current version of Media2DICOM.
Videos	MP4	No current support. Note: MP4s are not encapsulated. MP4s are discretized into frames and reconstructed as a single (concatenated) "CINE" DICOM file.
Models	STL	Yes, they are exported as individual DICOMs with a shared Model Group UID (0068, 7004).

Only one file type can be imported at a time. Media2DICOM supports the batch import of images and models. Depending on the file format, this will result in either a single DICOM or multiple DICOMs.

Editing media

Videos

The sliders define the start and end time of the selection to export as a CINE. The volume slider exists for video playback within Media2DICOM but does not affect the encapsulation settings.

Setting	Description
Sample Rate	Define how many frames should be pulled from the source video. This value will also be used for Frame Time (0018, 1063) in the final output.
Frame Rate	The original frame rate of the source video.
Est. Frames	The number of images expected to be grabbed from the video, based on the sample rate and duration of the clip.

When ready, click "Create Frames" for Media2DICOM to start creating images from the frames. For the remainder of the session, until the application is closed, DICOM is created, or import process is restarted, the images will be stored in the cache folder.

Models

The asset list will outline all the models to include in the encapsulation process. From here, models can be either removed, added, or edited. Each of these values can be changed either globally or per-model:

Setting	Description
Measurement Units (0040, 08EA)	Unit of measurement used for model(s).
Opacity (0066, 000C)	The opacity level of the model(s), from 0 (invisible) to 1 (solid).
Recommended Display Color (0062, 000D)	The color recommended for displaying the model.
Mirrored (0068, 7002)	Model has been created using mirroring of anatomy from the other side of the patient.
Modified (0068, 7001)	Model is modified from the original anatomy.
Burned In Annotation (0028, 0301)	Annotations have been burned into the model(s).
Content Description (0070,0081)	Toggling "Color to Content Description" can help troubleshoot color information compatibility in certain 3D applications. By default, this field is unchecked.

Using a reference DICOM

A reference DICOM is used to pull all the metadata needed for creating the new exported DICOM.

There are two ways to import a reference DICOM into Media2DICOM:

Local

Select a DICOM file (often with a "*.dcm" file extension) using the file explorer.

Remote

If at least one DICOM server has been successfully configured in Media2DICOM, you will have the option to pull in a reference DICOM using DICOM Query/Retrieve. It's currently possible to search for studies based on a patient's medical record number (MRN).

Upon selecting a study in the top view, all the related series will propagate in the bottom menu. Once a study is selected, you can import the information into Media2DICOM.

The imported DICOM is then previewed in DICOM Summary. All these values will be used in the exported DICOM. However, for DICOMs with encapsulated models, the modality will instead be set to "M3D". Currently, there is no way to individually select which tags to include or omit in the export process.

Exporting the new DICOM

This is the final stage of the encapsulation process, where you will have the opportunity to review your export settings and select the export destination. If you are exporting a CINE or individual image, you can also preview the images included as part of the exported DICOM.

Setting	Description
Series Description (0008, 103E)	Description for the series. By default, the series description will be the same as the source DICOM with "RM2D" appended to the beginning; however, this can be completely changed.
Series Number (0020, 0011)	The number for the series. The default value is 899.
Accession Number (0008,0050)	A RIS generated number which identifies the order for the Study. The default will be the same number as source DICOM; however, this can be modified manually at export.
Transfer Syntax [1]	The encoding method for the exported DICOM.
Output	Destination for exported DICOM.

[1] Depending on the source file type, different transfer syntaxes are available in the dropdown menu:

File Type	Transfer Syntaxes
Images and Videos	JPEG Baseline (Process 1) JPEG Lossless, Non-Hierarchical, First-Order Prediction JPEG Lossless, Non-Hierarchical (Process 14) JPEG Extended (Process 2 & 4)
Models	Explicit VR Little Endian

During the export, ASCII STL models are converted to Binary STL models to conform to the DICOM specification. The source file is not modified, and no data is lost in the conversion process.

Settings

Client

Setting	Description
AE Title	The client's Application Entity (AE) title.
Port	The client's outgoing port.

Servers

Servers may be added, edited, or removed to the list. When using Media2DICOM's DICOM Query / Retrieve, all the servers in this list will be searched. If there are no servers in this list, the remote DICOM import function will be disabled.

Setting	Description
IP Address	The server's IP address.
Port	The port from which the client will be interfacing with the server.
AE Title	The client's Application Entity (AE) title.
Description	Description for the DICOM server. This does not need to be completed and is strictly for your own note keeping.

Other

Setting	Description
Cache Directory	The directory where data is temporarily stored during the encapsulation process.[1]
Upload Warning	A warning will be given if the exported DICOM exceeds the size set here.
Upload Limit	The maximum file size permitted for the exported DICOM. This is a hard limit of the DICOM standard and cannot be modified.

[1] During the conversion process, Media2DICOM will temporarily store files in the cache folder. These files include:

- Reference DICOMs remotely queried from a PACS server
- Exported DICOMs that will be stored on a PACS server
- Frames created from the sample videos
- ASCII STLs that are converted into binary STLs

Security Considerations

Plaintext Information

As Media2DICOM pulls all the relevant information from the reference DICOM, the data will be handled in plaintext. It will be important for administrators to ensure proper role-based access to the referenced DICOMs.

Cached Content

Every instance of Media2DICOM has its own subfolder within the defined DICOM cache folder that may contain protected health information (PHI).

If an imported STL is determined to be ASCII, Media2DICOM will create a binary version based of the ASCII original for the encapsulation process. The binary copy will be stored in the cache folder. Likewise, when creating a "cine" based off a video, each frame will temporarily be stored in the cache folder.

If the user utilizes the DICOM Q/R tool for pulling in a reference DICOM, the DICOM will temporarily be stored in the cache folder. Likewise, if the user exports their encapsulated DICOM to a server,

Media2DICOM will first create the DICOM locally in the cache folder before sending it to the server. After the DICOM has been uploaded, the local version is deleted.

The folder's contents are completely cleared whenever the application is closed or unexpectedly crashes. Additionally, it will clear whenever the user returns to the "Import Media" tab at any stage of the conversion process