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Radiotherapy Support Functions (RSF)

Radiotherapy Support Functions are, as a basic description, general radiotherapy worker functions. RSF functions are used both various Dose Calculation Functions and Design Task Functions. The RSF function category encompass the remaining functions not classified as a DTF or DCF.

Image Processing

Below is a list of some common image processing functions and a brief explanation of their intended usage (Specific details of each function, argument parameters, and return values are provided at the Dosimetry App Manifest Guide).

• override_image_inside_structure:

 Returns a new 3D image where the value of each voxel that is more than cutoff % contained within the structure is set to the provided override value.

• override_image_outside_structure:

 Modifies an image where the value of each voxel that is more than cutoff % contained within the structure is set to the provided override value (values outside the structure are not modified).

override image variant outside structure:

• Returns a new 3D image where the value of each voxel that is more than cutoff % outside the structure is set to the provided override value.

• image_histogram:

Creates a histogram using the specified 1D image

• combine images <N>d:

- Where N is the size of the image
- Combine multiple images into single image

bounding box <N>d:

- Where N is the size of the image
- Returns the bounding box of a image

image_min_max_<N>d:

- Where N is the size of the image
- Get the minimum and maximum values in the given image.

• image list min max <N>d:

- Where N is the size of the image
- Get the overall minimum and maximum values for a vector of images.

• create_uniform_image_on_grid_<N>d:

- Where N is the size of the image
- Create an image of uniform pixel values (e.g. water phantom) over a grid of size N.

Contour and Structure Modification

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Below is a list of some common polygon, polyset, and structure manipulation functions and a brief explanation of their intended usage (Specific details of each function, argument parameters, and return values are provided at the Dosimetry App Manifest Guide).

polygon_centroid:

Computes the geometric center of a polygon

• scale_polygon:

Scales a polygon shape in XY (independently) based on a vector2D factor

scale polyset:

Scales a polyset shape in XY (independently) based on a vector2D factor

• polyset expansion:

 Expands a polyset uniformly around the edges by the given amount. This function can be used to either expand or contract a polyset.

• polyset combination:

• Compute a combination of two or more polysets. This function can operate as a union, intersection, difference, or exclusive or (xor).

• structure_combination:

 Compute a combination of two or more structures. This function can operate as a union, intersection, difference, or exclusive or (xor).

structure 2d expansion:

 Compute the 2D expansion of a structure. The 2D expansion of a structure is computed by independently expanding each slice of the structure within its 2D plane. This function can be used to either expand or contract a structure.

• structure 3d expansion:

 When computing the 3D expansion of a structure, the structure's slices are allowed to expand into other slices. This function can be used to either expand or contract a structure.

Geometric Primitives

Below is a list of some common creation functions for geometric primitives and a brief explanation of their intended usage (Specific details of each function, argument parameters, and return values are provided at the Dosimetry App Manifest Guide).

make cube:

Creates a triangle mesh representing a 3D box

• make cylinder:

Creates a triangle mesh representing an axis aligned, right 3D cylinder

make pyramid:

Creates a triangle mesh representing a rectangular based, right 3D pyramid

make sphere:

• Creates a triangle mesh representing a 3D sphere

• make sliced box:

Creates a structure geometry representing a 3D box (using a sliced mesh)

make sliced cylinder:

• Creates a structure representing an axis aligned, right 3D cylinder (using a sliced mesh)

make sliced parallelepiped:

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Creates a structure representing a generalized 3D parallelepiped (using a sliced mesh)

make sliced pyramid:

• Creates a structure representing a rectangular based, right 3D pyramid (using a sliced mesh)

make sliced sphere:

• Creates a structure representing a 3D sphere (using a sliced mesh)

Degrader Manipulation

Below is a list of some common degrader manipulation functions and a brief explanation of their intended usage (Specific details of each function, argument parameters, and return values are provided at the Dosimetry App Manifest Guide).

make block:

 Create a degrader representing a block. A block has a uniform thickness within its shape and 0 thickness outside. Note that the shape is specified at the downstream edge of the block.

make shifter:

 A block has a uniform thickness within its shape and 0 thickness outside. A range shifter is modelled as extending infinitely in the X and Y directions, so its thickness is uniform across the field.

• make rc:

 Create a degrader representing a range compensator. A range compensator is a degrader whose thickness is specified as an image. The image is specified in the plane of the downstream edge of the RC.

• make rc nurb:

 Create a degrader representing a nurbs range compensator. A nurbs range compensator is a degrader whose thickness is specified as a smooth surface. The surface is specified in the plane of the downstream edge of the RC.

• truncate rc:

 Shifts a range compensator surface such that the minimum thickness is set to the specified value.

• make uniform rc:

• Create a degrader representing a uniform thickness range compensator.

make linear rc:

Create a degrader representing a linearly varying thickness range compensator.

By changing the input (shape, image, etc) passed into the the degrader make functions, the resulting degrader can be manipulated as desired.

From:

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Last update: 2021/07/29 18:22

