

# Volumetric Image Visualization

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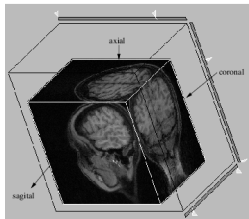
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# What is this all about?

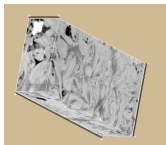
- **Volumetric (3D) Images** are used to study the interior of the human body, plants, animals, and minerals in a non-destructive way.
- Applications for 3D images cover many areas of the Sciences and Engineering.

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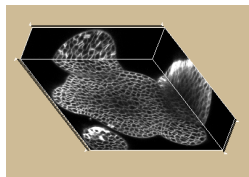
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(a)



(b)



(c)

(a) MR-T1 image of the brain, (b) CT image of a sedimentary rock, and (c) confocal microscopy image of a plant.

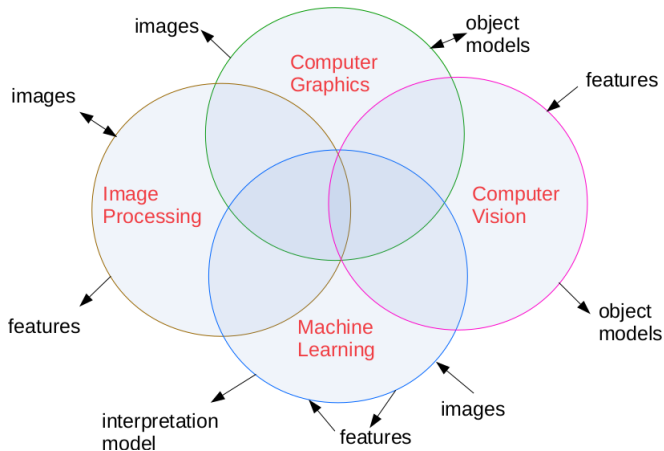
# What is this all about?

Those studies may involve visualization, processing, and analysis of **objects** inside those images, such as

- subcortical structures and tumors in the human brain,
- pores in rocks, and
- stem cells of the shoot apical meristem in plants.

# Objective

You will learn the basic techniques from Image Processing and Computer Graphics for volumetric visualization.



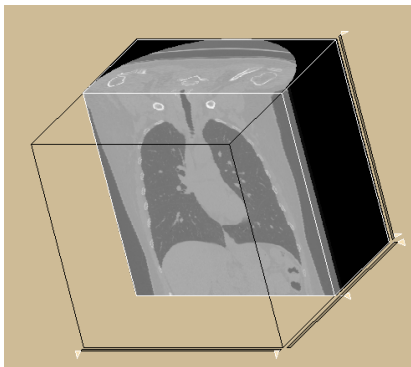
# Examples of tasks that require those techniques

- Extract the three images that represent the axial, coronal, and sagittal slices with a given common point  $(x, y, z)$ .
- Add user control for brightness and contrast of those slices.
- Reformat a 3D image along a given axis: axial, coronal, or sagittal.
- Reformat a 3D image along an arbitrary direction.

# Examples of tasks that require those techniques

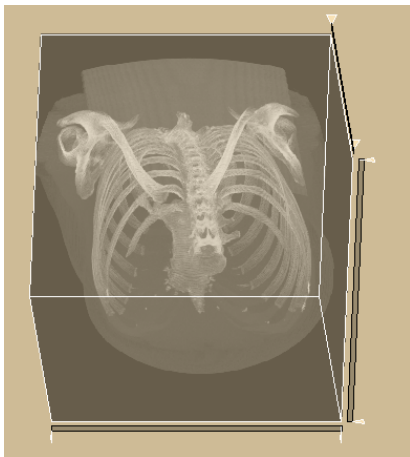
- Create a maximum intensity projection from a given point of view.
- Visualize from a given point of view the objects that result from image segmentation using color and transparency.
- Reformat a 3D image with iso-surfaces (curvilinear cuts) of a given object.
- Create the stereo display of an object's surface from a given point of view.

# Examples of the visualization techniques

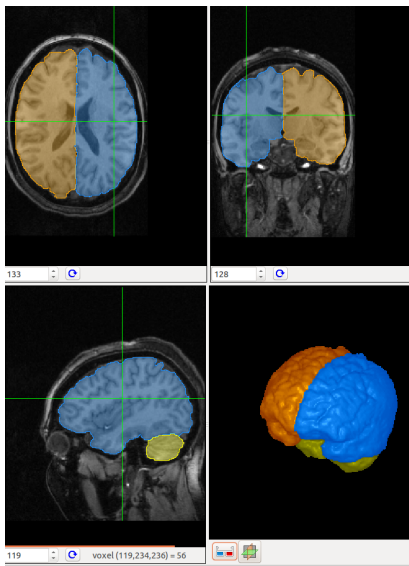




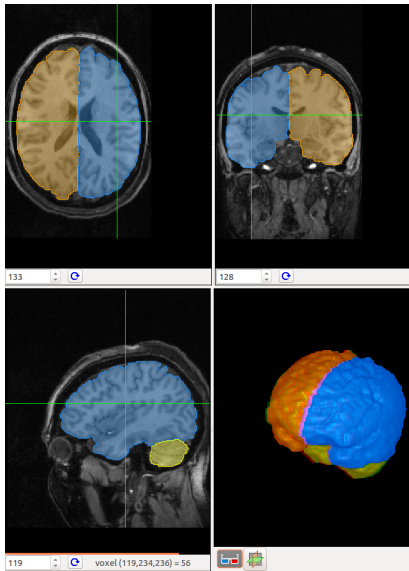
# Examples of the visualization techniques



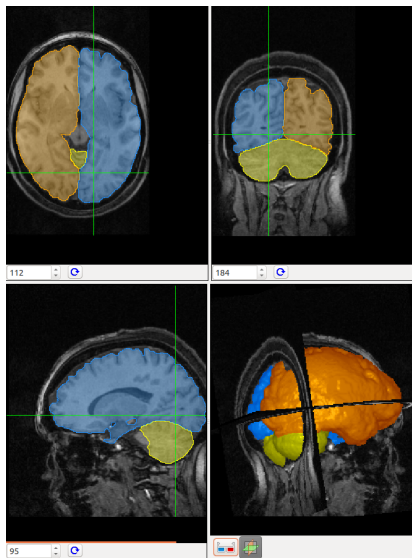
# Examples of the visualization techniques



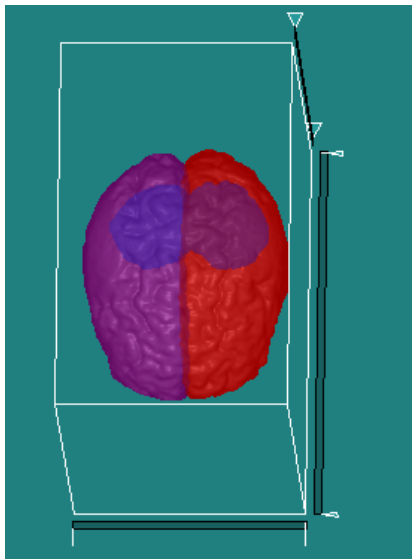
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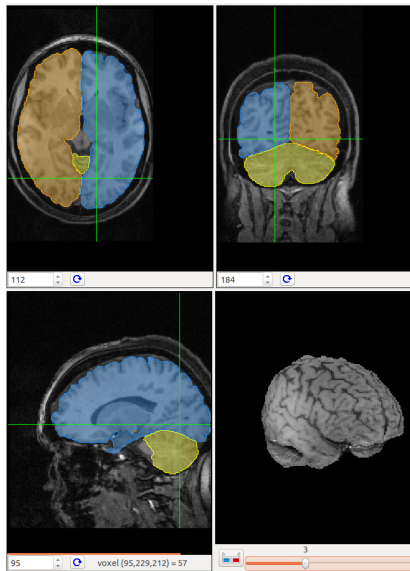
# Examples of the visualization techniques



# Examples of the visualization techniques



# Examples of the visualization techniques



# The plan of the course

`www.ic.unicamp.br/~afalcao/mo815-3dvis`