

Automatic Extra Axial CerebroSpinal Fluid (Auto EACSF)

Tutorial on how to use the tool

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How to get Auto EACSF

Download available on NITRC :

https://www.nitrc.org/projects/auto_eacsf/

Be sure to get the latest version.

After downloading the zip file, extract it in your working folder then follow the instructions in the README.txt file.

Image below : the Auto_EACSF NITRC page

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Automatic Extra-Axial Cerebrospinal Fluid (Auto EACSF) Visit Website

Automatic Extra-Axial Cerebrospinal Fluid (Auto EACSF) is an open-source, interactive tool for automatic computation of brain extra-axial cerebrospinal fluid (EA-CSF) in magnetic resonance image (MRI) scans of infants. Elevated extra-axial fluid volume is a possible biomarker for Autism Spectrum Disorder (ASD). Auto EACSF aims to automatically calculate the volume of EA-CSF and could therefore be used for early diagnosis of Autism. Auto EACSF is a user-friendly application that generates a Qt application to calculate the volume of EA-CSF. The application is run through a GUI, but also provides an advanced use mode that allows execution of different steps by themselves via Python and XML scripts.

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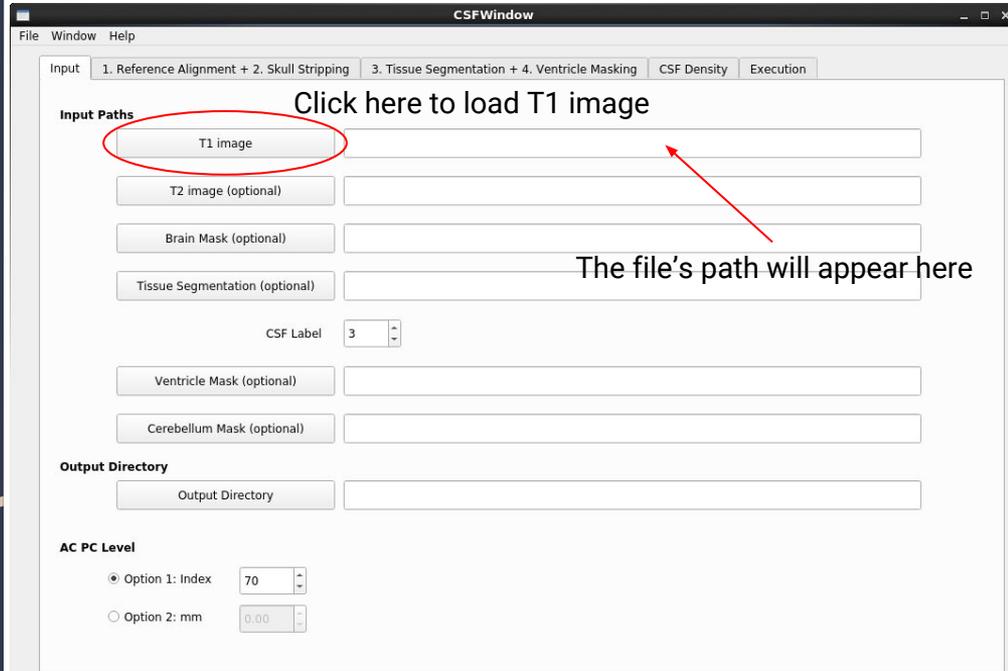
General overview

Purpose of the software :

From T1 only or T1 and T2 MRI images of the brain, the tool extracts the area that corresponds to the external cerebrospinal fluid.

For faster computation you can provide a brain segmentation, a brain mask and a ventricle mask, that will be automatically generated if not provided.

Image below : Auto EACSF window at execution

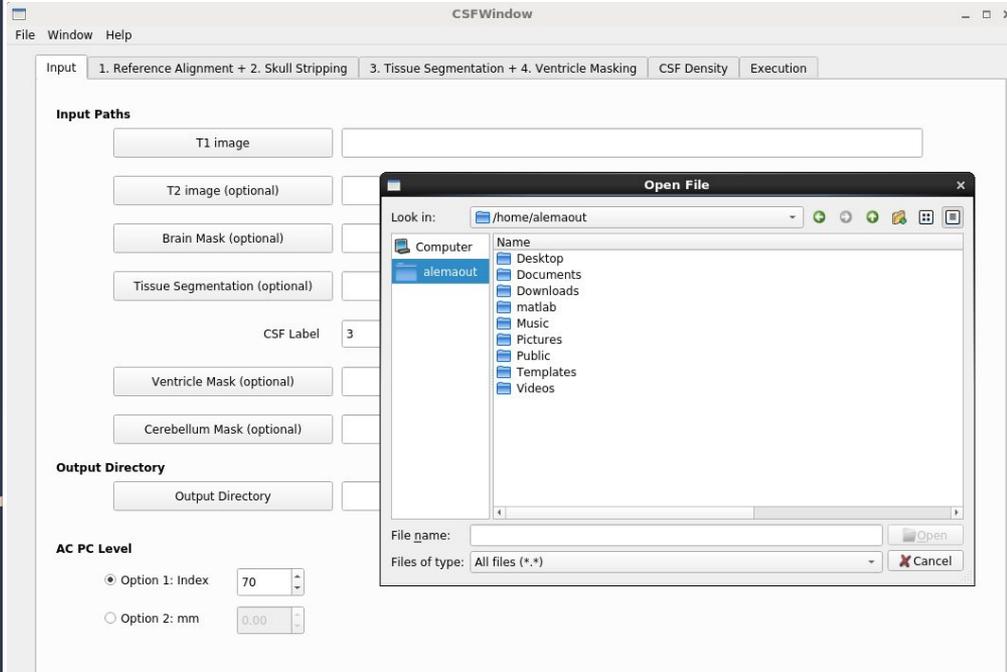


Step 1: Provide the input data

Each buttons from T1 image to Output Directory allows you to navigate through your computer's folder to select the corresponding files or folder. Only T1 image is strictly required.

If not Output Directory is given, the outputs will be produced in the execution folder.

Image below : the input tab after clicking on one of the inputs buttons



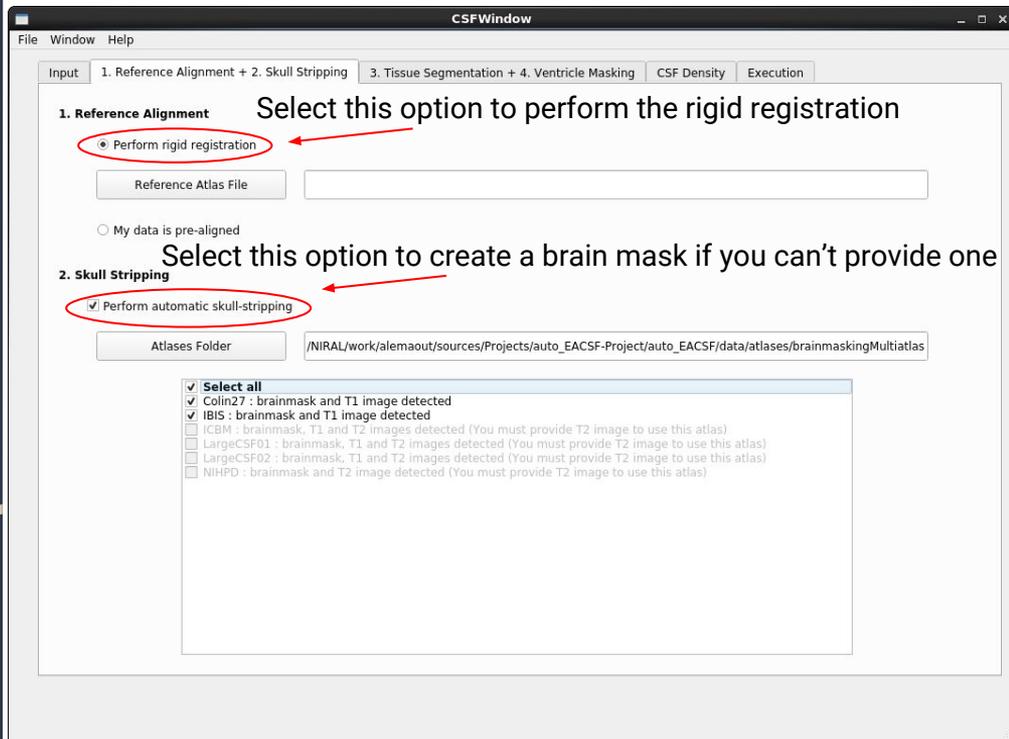
Step 2: Reference alignment and skull stripping parameters

If your data is not aligned, the tool can put it into a reference space if you provide a reference atlas file.

If you did not provide a brain mask, you can choose to perform automatic skull stripping by checking the checkbox and providing an atlas folder*. You can then select the atlases you want to use from your folder.

* You must respect the file name convention :
[atlas_name]_brainmask.nrrd ; [atlas_name]_T1.nrrd ;
[atlas_name]_T2.nrrd

Image below : reference alignment and skull stripping tab

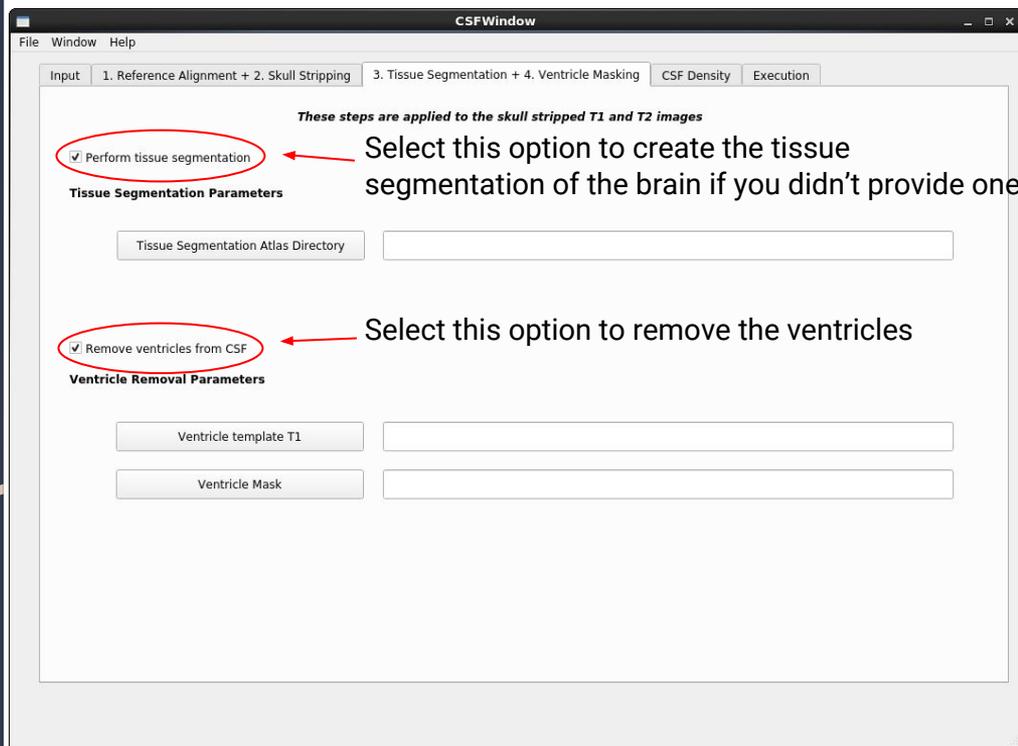


Step 3: Tissue segmentation and ventricle masking

If you did not provide a tissue segmentation it must be done with the tool providing an atlas directory.

If you wish to remove the ventricle from the CSF extraction, this will be done by checking the checkbox and providing a specific ventricle mask on the first tab and/or a template mask with the corresponding template T1.

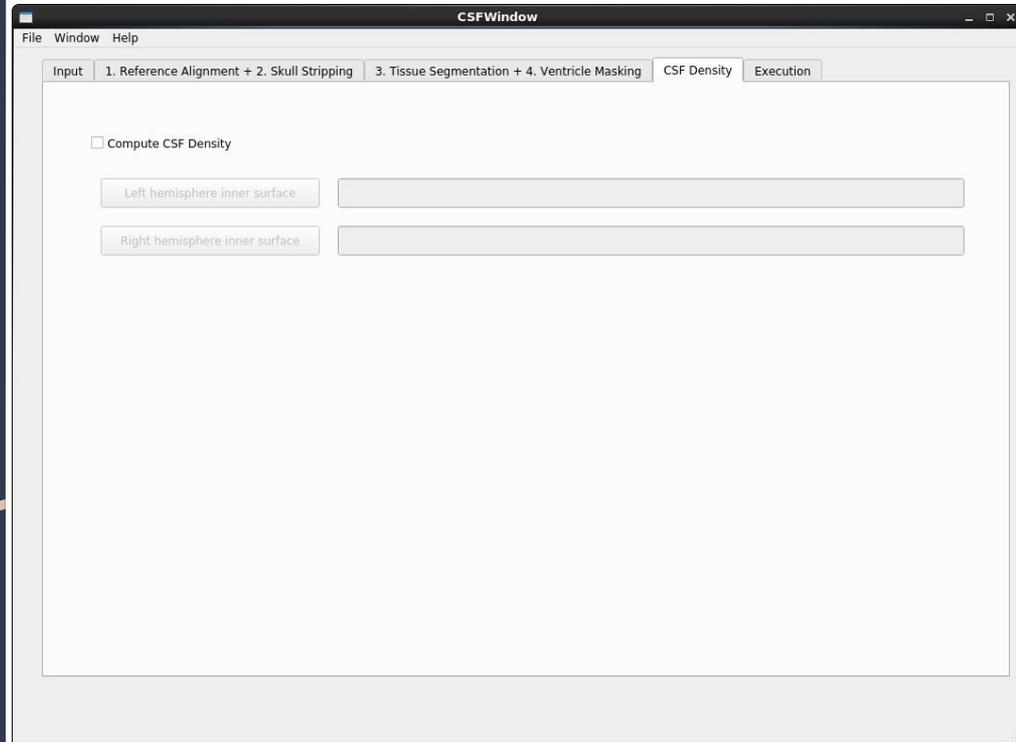
Image below : tissue segmentation and ventricle masking tab



Optional step: CSF Density

If you provide in this tab the inner surfaces for both hemisphere, the tool can calculate the local density of external CSF in the brain.

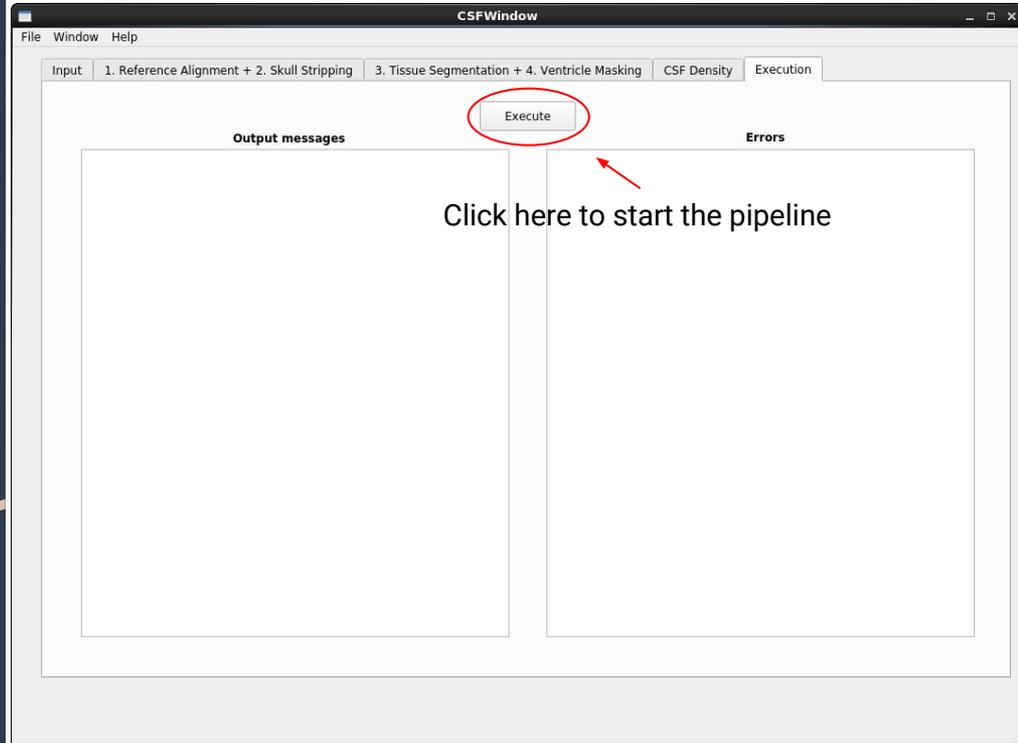
Image below : CSF density tab



Final step: execution

You can now click the execution button to start the process. You can read and identify the current state of the pipeline through the output messages panel and potential errors through the errors panel.

Image below : Execution tab



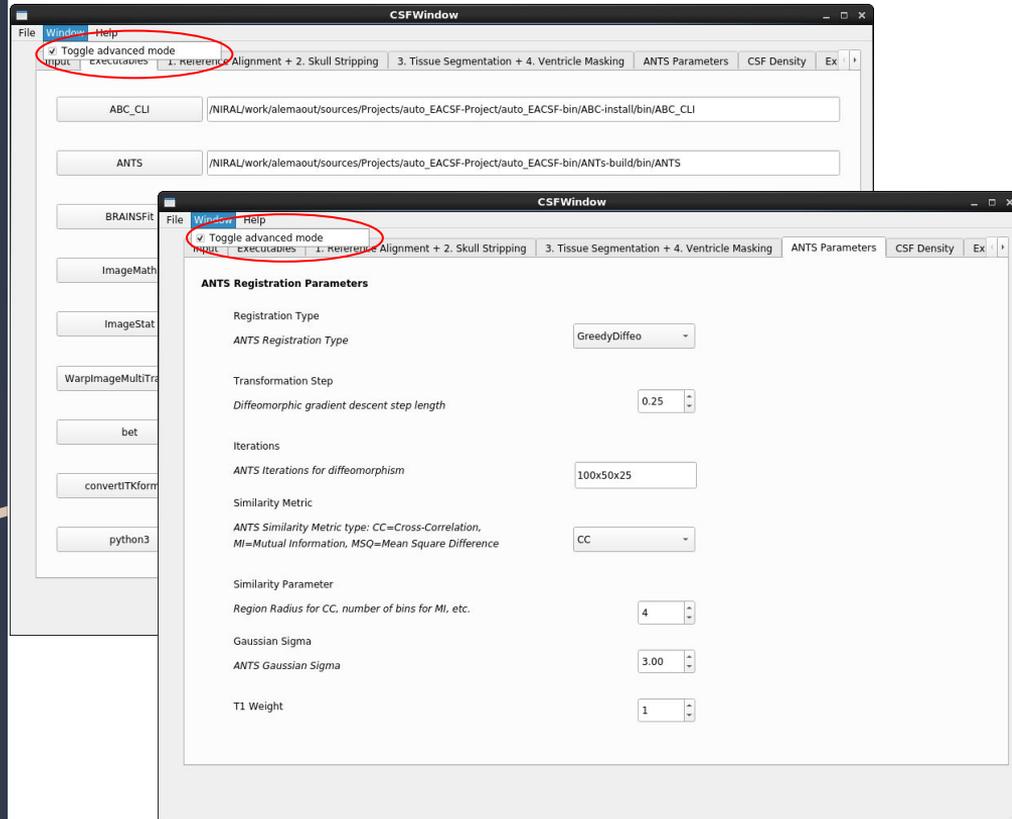
Advanced display mode

If you click window > Toggle advanced mode, two new tabs will appear.

The **Executables** tab allows you to set manually the paths to the external tools used by Auto EACSF.

The **ANTS Parameters** allows you to set the different parameters used each time Auto EACSF will use the ANTS tool.

Images below : the two new tabs of the advanced display



Saving and loading configurations

Auto EACSF allows you to save your configuration (paths to the files and different parameters that you set for one execution) in JSON files. You can then load them again to reproduce the execution.

To save your settings or load saved ones, use the File menu on the top left of the window.

Image below : the file menu

