

Analysis options in SamSrf

As of version 10.3, there are three ways to run analyses in *SamSrf*:

1. ***SamSrfX* GUI:** You can run this either as a standalone app or by launching it in Matlab. This is perhaps the most user-friendly option and it allows you to inspect a host of modelling options with detailed explanations. This makes it perhaps the best way for a beginner to learn the ropes, especially combined with the *SamSrfX*-Manual. However, some options are not available in the GUI and it lacks flexibility of accessing the code. While the GUI has been implemented in *NeuroDesk*, due to how Matlab GUI play with Linux, this can be annoyingly buggy. The GUI also contains menu options to run other tools, such as *ViewApertures*, *DisplayMaps*, and *DelineationTool*. All these tools are also provided as standalone apps.
2. **Matlab scripts:** For maximal flexibility, you can run *SamSrf* code directly in Matlab. This is the old-school way that most of our lab and collaborators have been using in the past. It involves setting up a model structure for the parameters of the analysis and then passing this to the algorithm function (e.g., *samsrf_fit_prf*, *samsrf_revcor_prf*, etc.). This has many advantages but it requires a fairly in-depth understanding of how to set up an analysis – and it requires Matlab, which is proprietary software.
3. ***SamSrfAnalysis* command:** This command line interface can be used as a standalone app. This means you don't require a Matlab license and it is an easy way to run the analysis in the *NeuroDesk* environment. However, this feature requires some in-depth knowledge of how *SamSrf* analyses work. It has been designed specifically for use with open datasets, such as those using the BIDS framework. All necessary data can be read in from NII and GII files, and the analysis outputs such files for further use.

SamSrfAnalysis command line

The basic logic of the *SamSrfAnalysis* command is that you provide a wildcard to find data files and a JSON parameter file to specify the model options, the same way you would use the Model structure when running the analysis in Matlab. You can then also provide some alternative options, such as how data are preprocessed or whether the analysis is restricted to a ROI.

Some basic example JSON files to specify analyses are included in *SamSrf/Models/Json*

On the next page we explain how to use the command line tool.

SamSrfAnalysis Algorithm ModelJson DataPath -outpath= -roi= -surf= -norm=1 -aver=1

Important Notes:

The tool must be run from the folder where the executable lives!

The first three arguments are mandatory & must be defined in this order!

All paths must be defined explicitly or relative to where the -data- files are!

Algorithm:

prf	forward-model pRF
rc	reverse-correlation pRF
cf	reverse-correlation CF

ModelJson:

JSON file with the model description but do not include extension.

DataPath:

Path & filename (allows wildcards) to the data files, which can be in NII or GII format

The remaining input arguments are optional & can be defined in any order.

They must include the equation symbol = to define the input:

-outpath:	Path where you want to save the results files, if not the data path.
-roi:	Name of ROI definition to restrict analysis without file extension. Must be FreeSurfer LABEL for surface analysis or NII binary mask for volumetric analysis (Can also be -roi= if you don't want to provide a ROI)
-surf:	Path to the FreeSurfer surface folder (can be -surf= for no surf)
-norm:	1 (default) to detrend & z-score time series in each run or 0 for no normalisation
-aver:	1 (default) to average time series across runs or 0 for concatenating runs

Examples

SamSrfAnalysis prf 2dGaussian /data/001/func/lh_*.gii -roi=lh_occ -surf=../surf

Runs a 2D Gaussian forward-model pRF analysis specified by *2dGaussian.json* of the data in */data/001/lh_*.gii*, restricted to ROI *lh_occ.label* & using the surface meshes in *../surf*

SamSrfAnalysis prf 2dGaussian /data/001/func/lh_*.gii

Runs the same analysis as above but simply using the data contained in the *lh_*.gii* files but without treating it as a surface & not restricted to any ROI.

SamSrfAnalysis rc RevCor /data/001/func/lh_*.gii -roi= -surf=../surf/lh.inflated.gii

Runs a reverse-correlation pRF analysis specified by *RevCor.json* on the same data but uses the inflated surface provided by the GII & not restricted to any ROI

Demo using Example Dataset

Download the example dataset called X001 from the SamSrf OSF repository.
For convenience, copy the *JSON* file from *SamSrf/Models/Json* into *X001/prf*.

To run the standard 2D Gaussian pRF analysis:

```
SamSrfAnalysis prf ../prf/Example_2D_Gaussian_pRF ../X001/func/bi_*.gii -roi=../prf/V123  
-outpath=../X001/prf -surf=../surf -outpath=../prf
```

To run a reverse correlation pRF analysis:

```
SamSrfAnalysis rc ../prf/Example_Reverse_Correlation_pRF ../X001/func/bi_*.gii -  
roi=../prf/V123 -outpath=../X001/prf -surf=../surf -outpath=../prf
```

To run a reverse correlation pRF analysis, you first need to generate the atlas maps. This can be done using the *SamSrfX* GUI but currently this is not yet automated in the command line app.