RESTplus Manual

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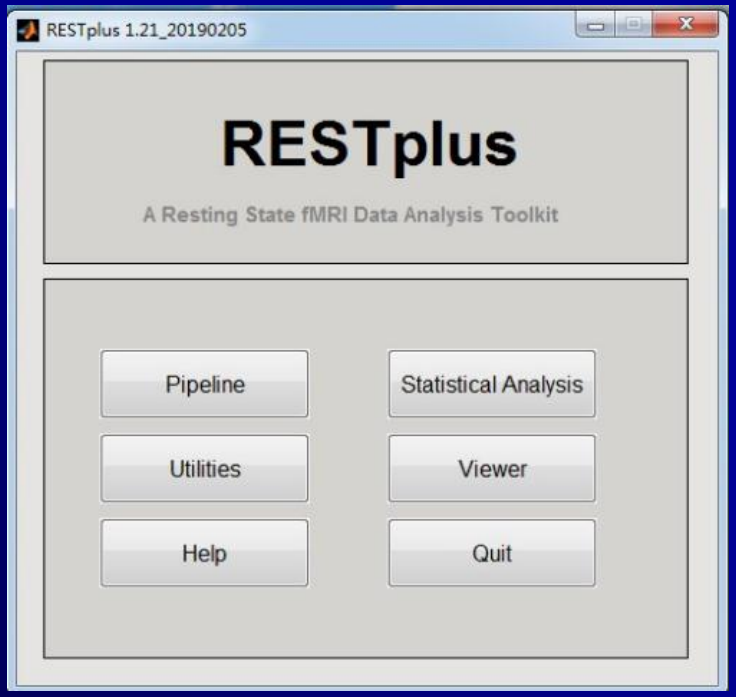
jiaxize@foxmail.com

RESTplus



1. Download RESTplus

http://www.restfmri.net/forum/RESTplusV1.2

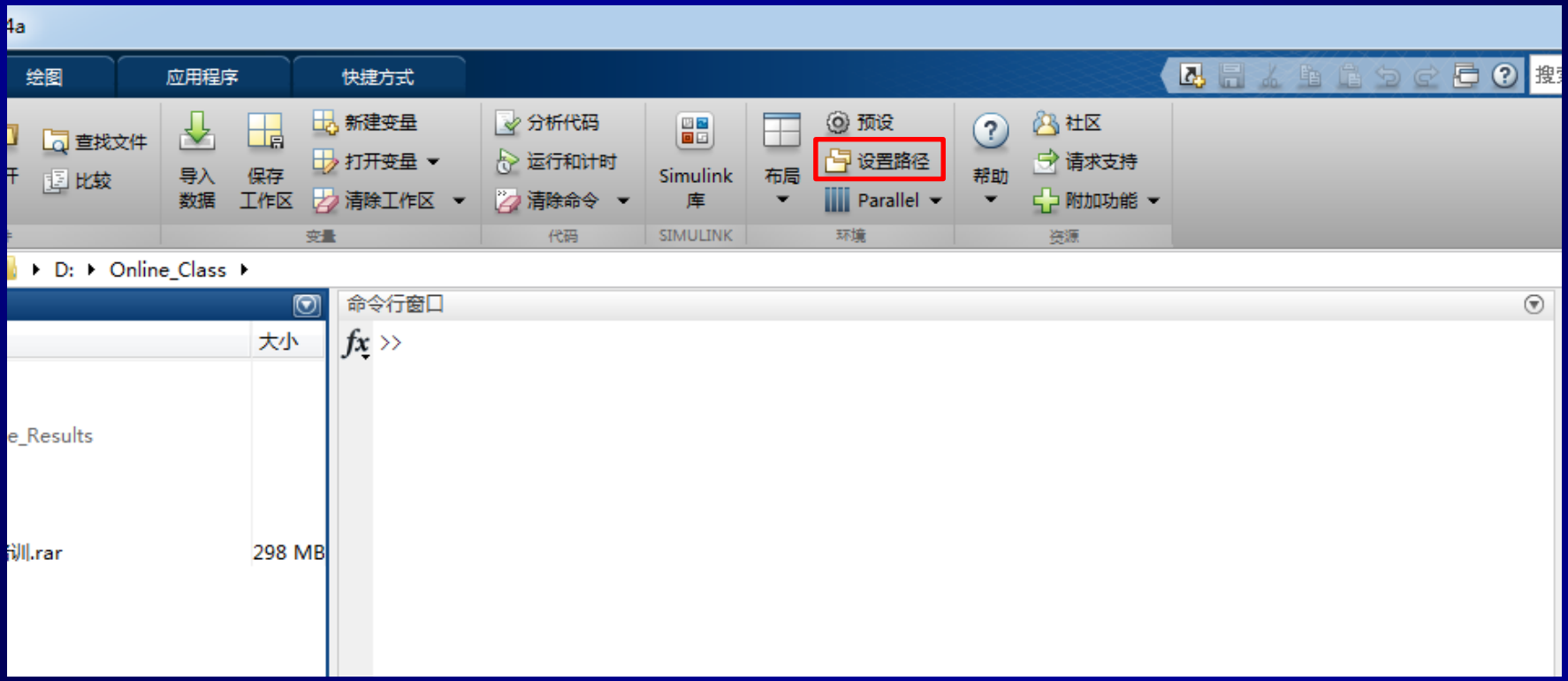
2. Install RESTplus

MATLAB 2014a
SPM12(https://www.fil.ion.ucl.ac.uk/spm/software/spm12/)

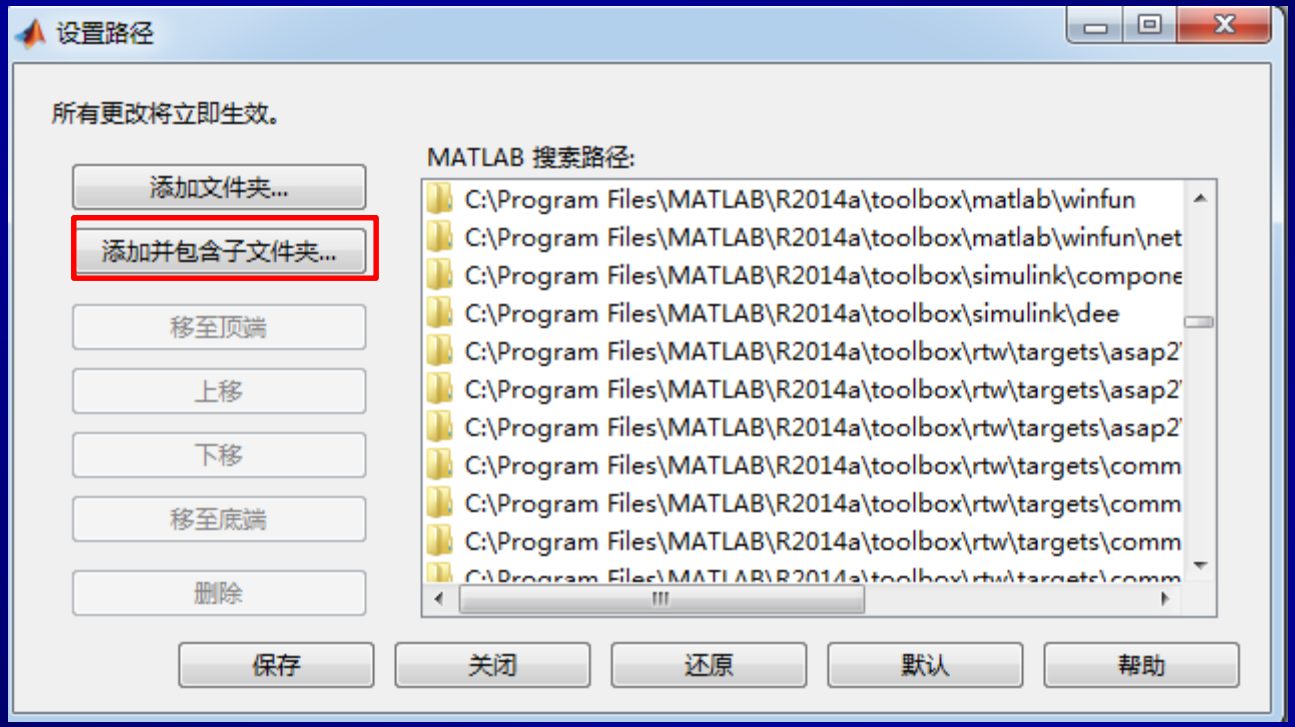
3. Notice

Do not include any Chinese characters or specific symbol.

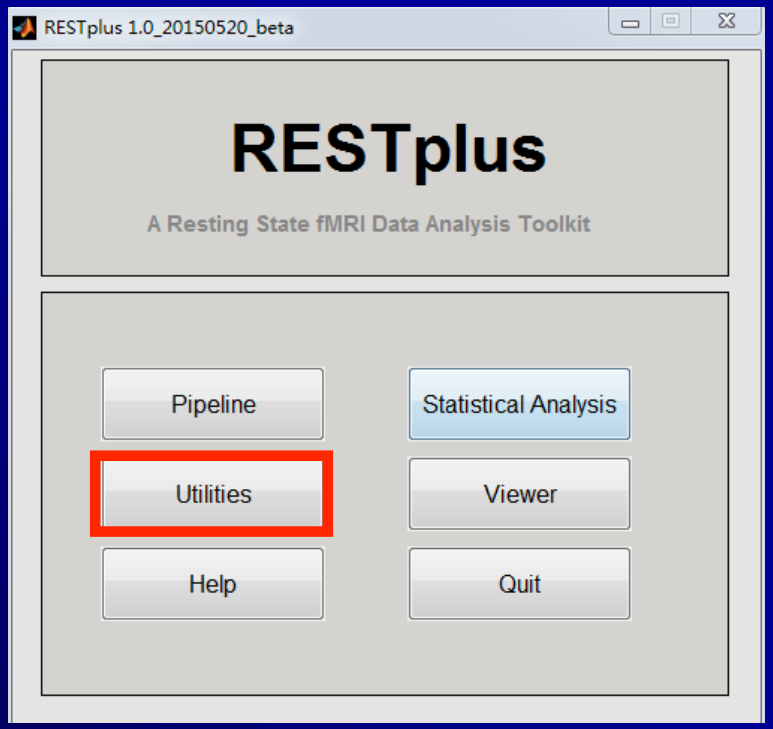
Install RESTplus

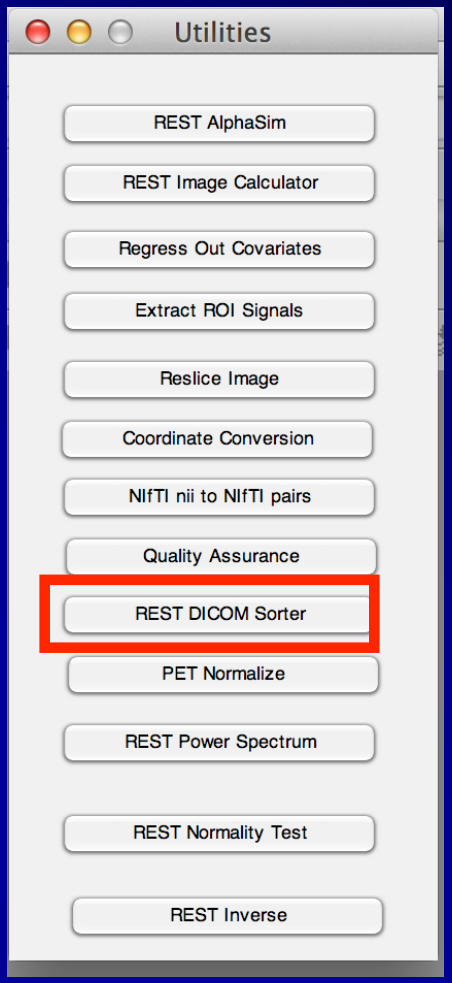


Install RESTplus

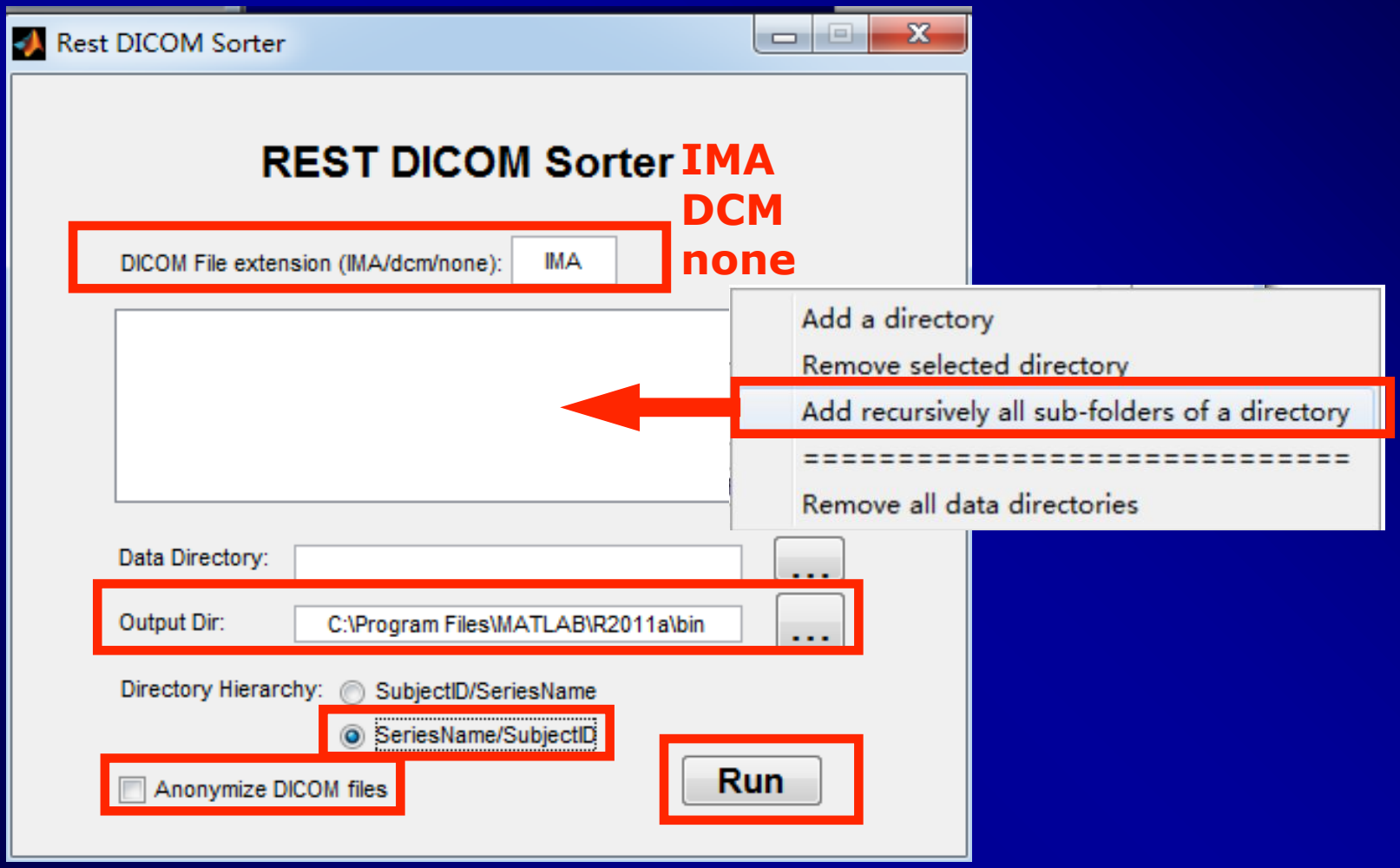


Data arrangement

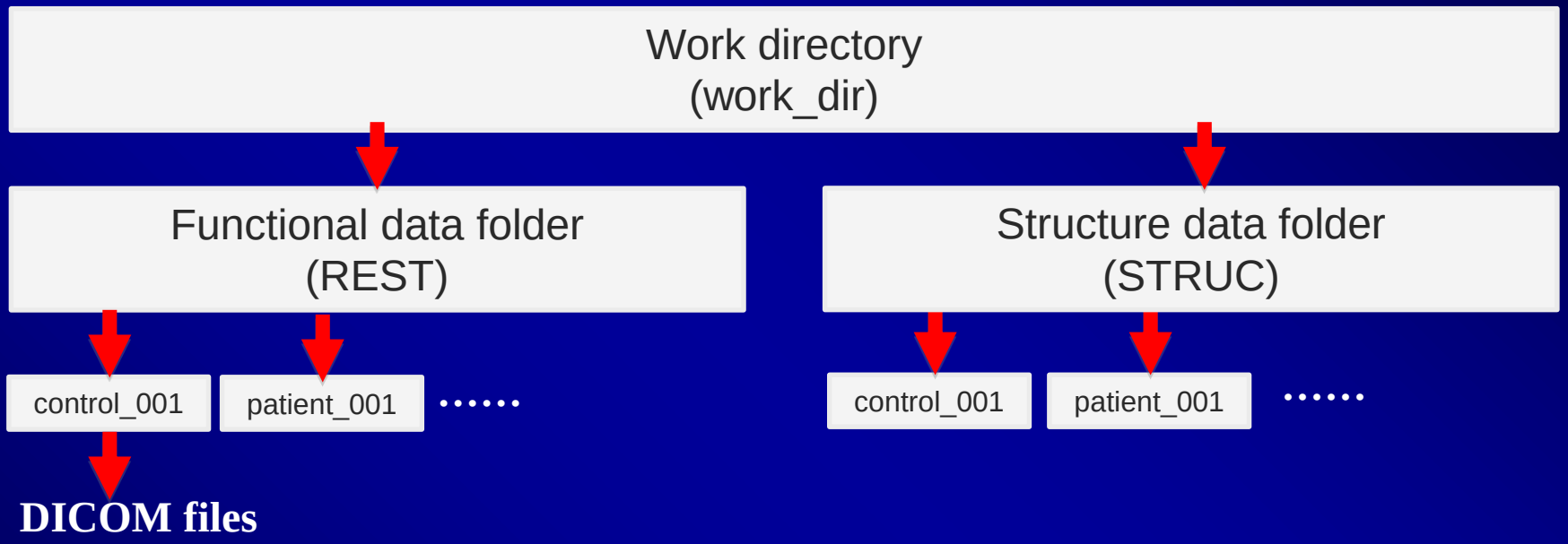




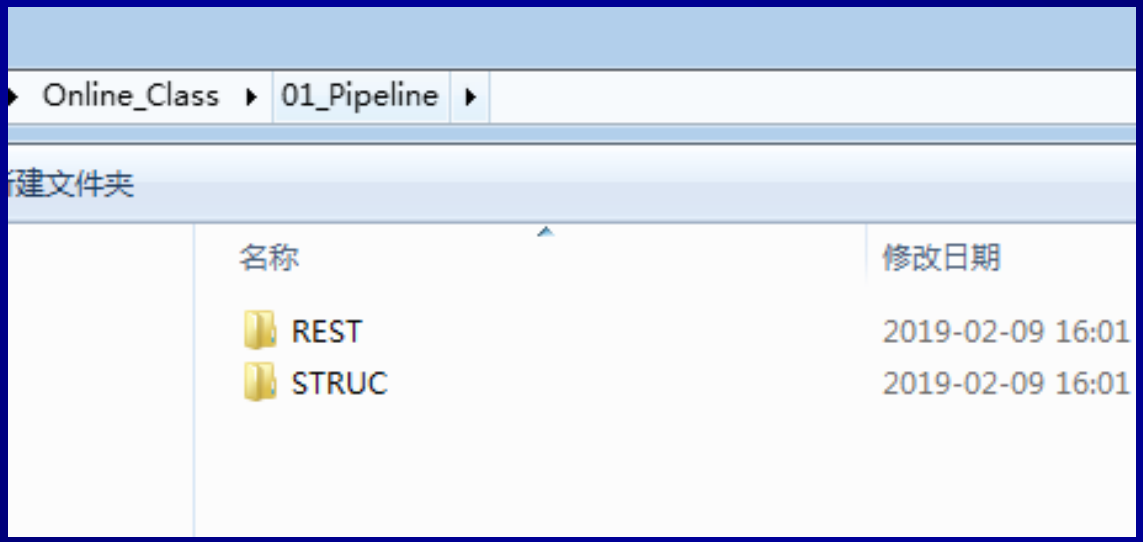
Data arrangement



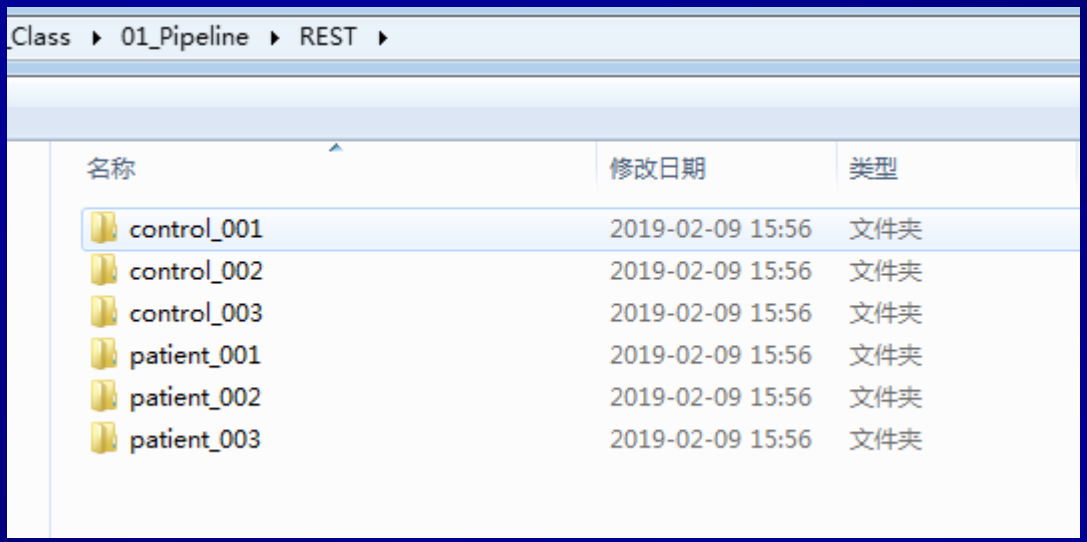
Data arrangement



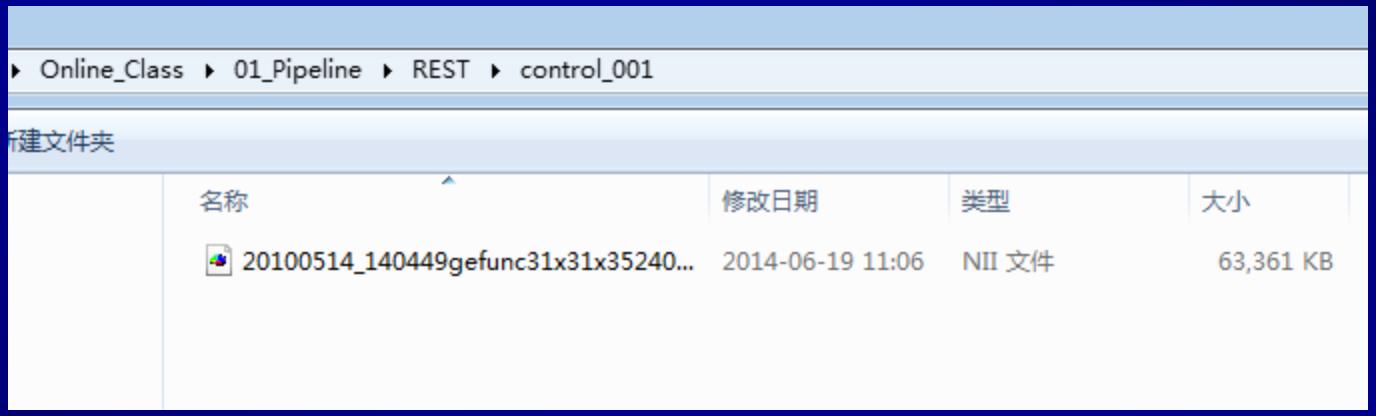
Example data



Example data



Example data

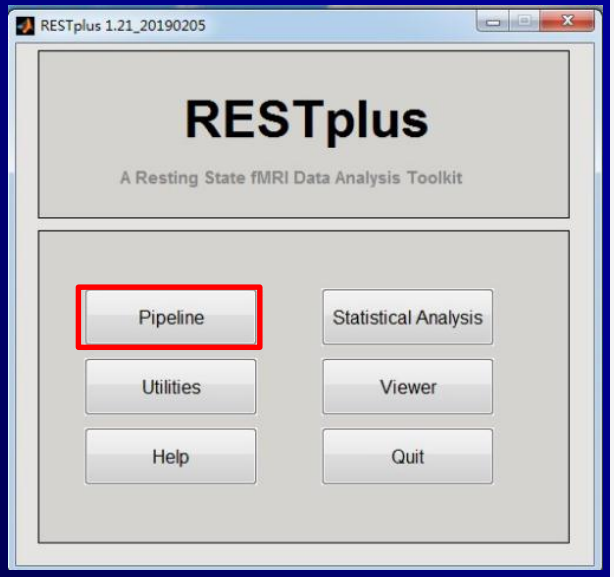


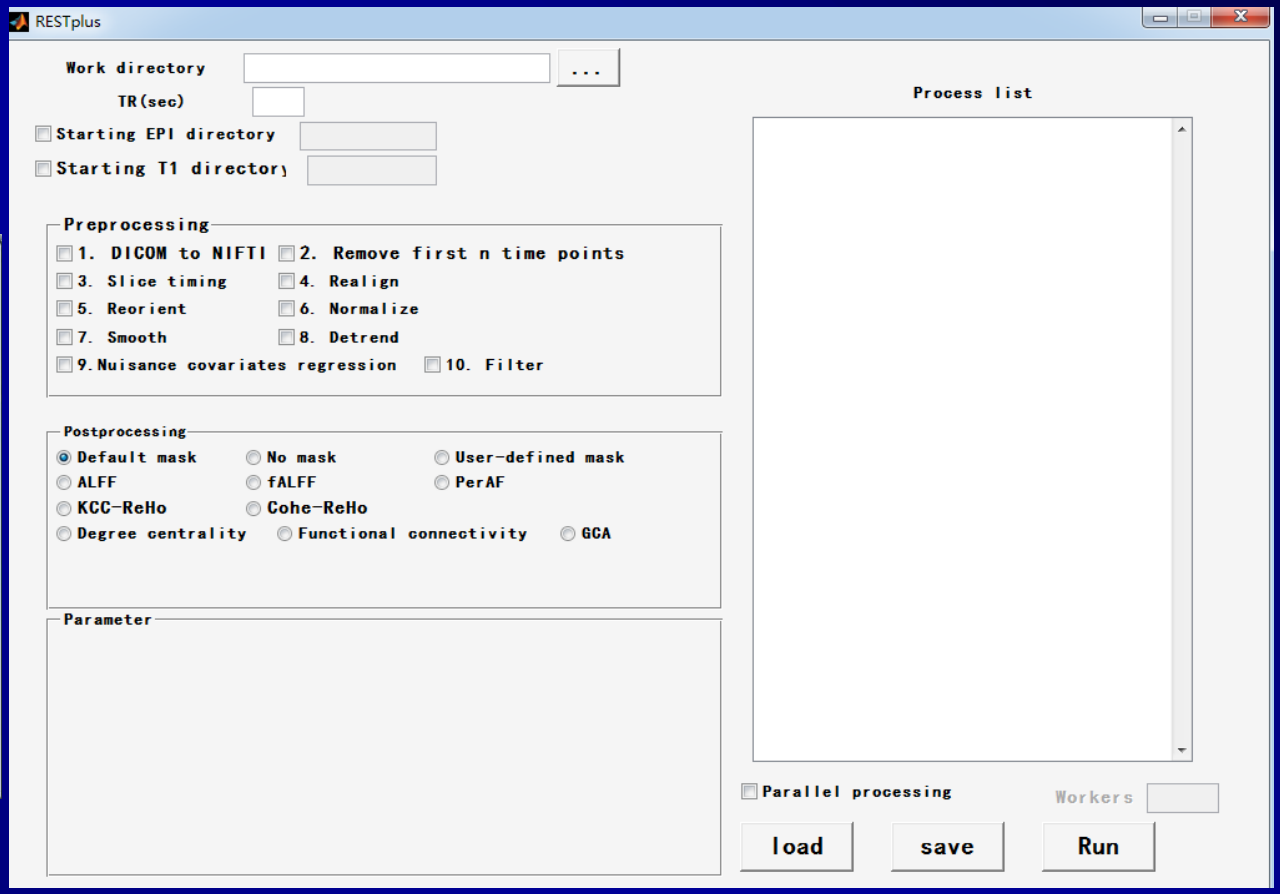
DICOM or NIFTI

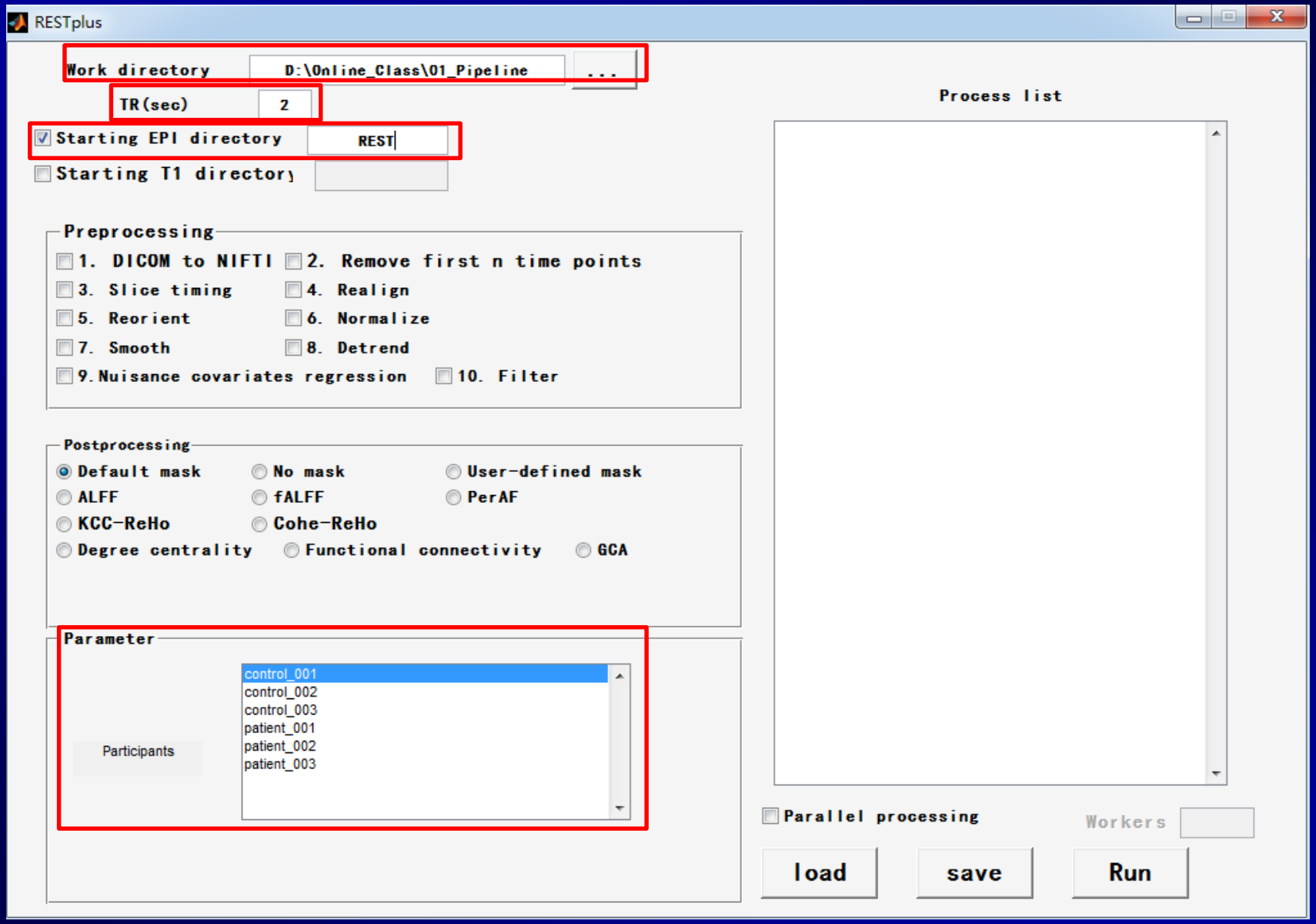
01.Pipeline

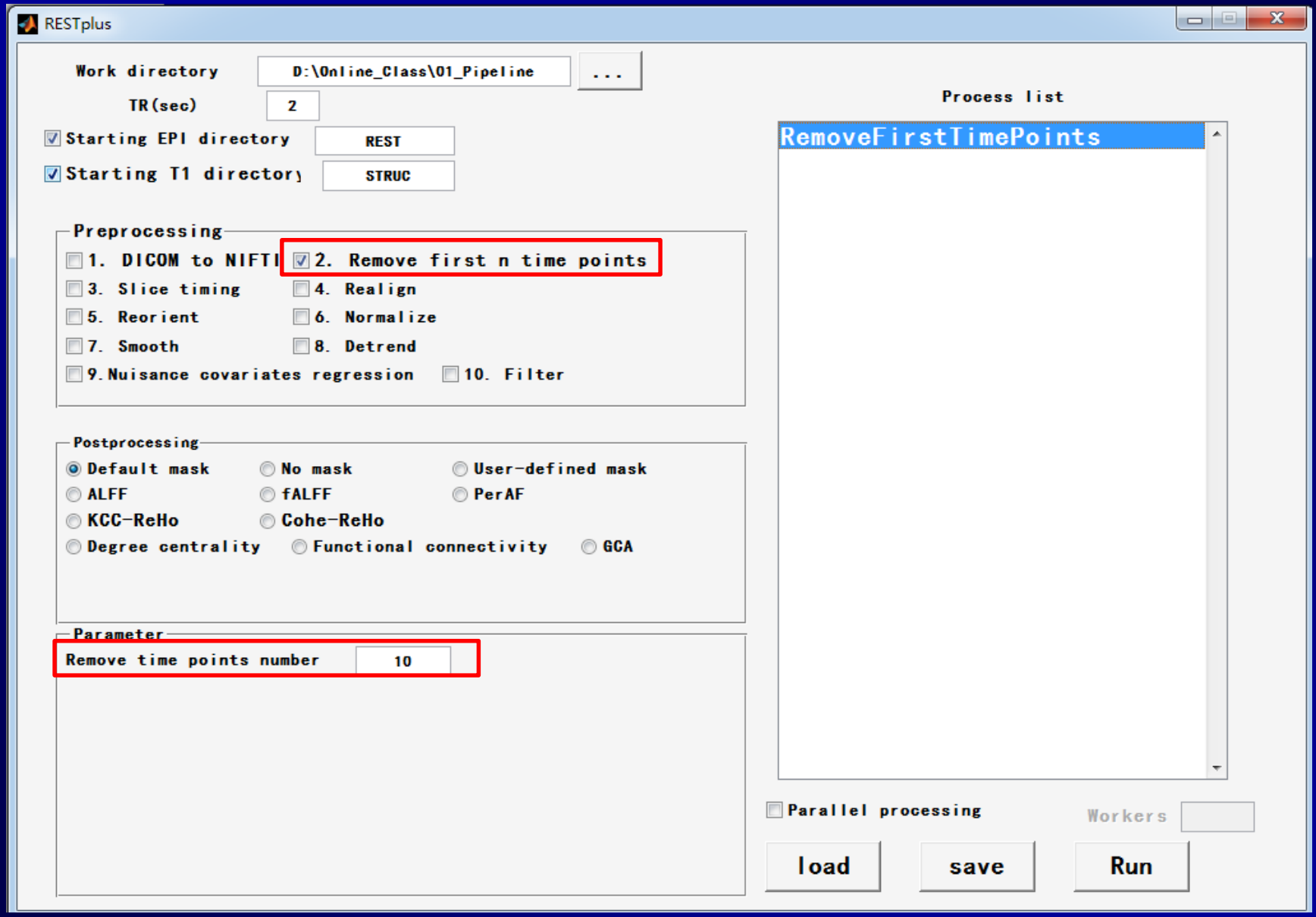
ALFF calculation

Pipeline

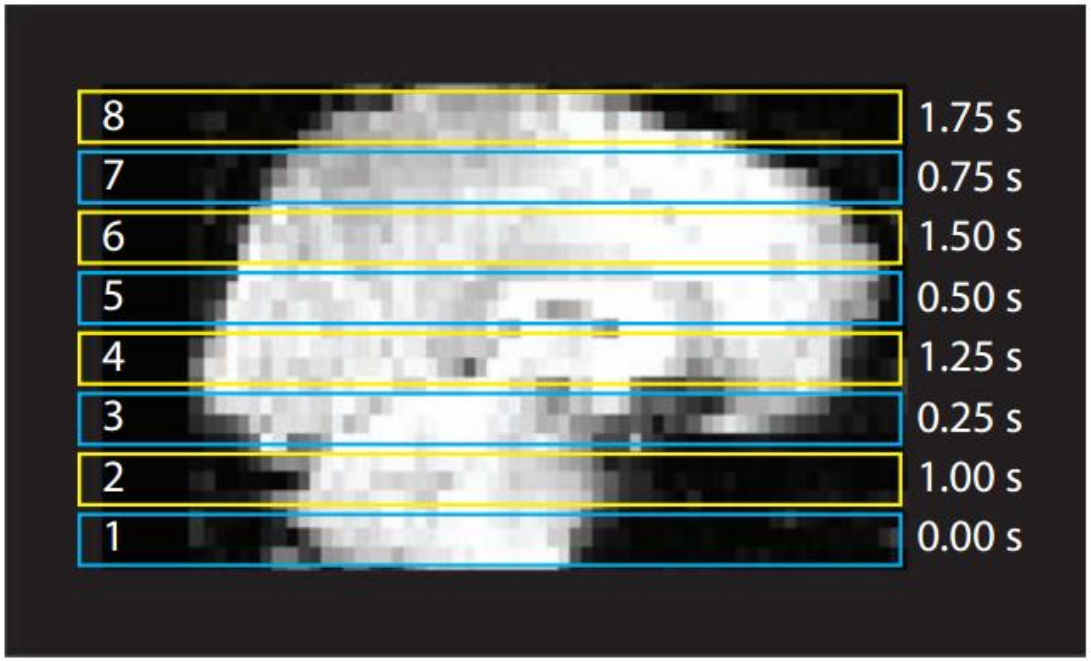

RESTplus 1.21_20190205
RESTplus
A Resting State fMRI Data Analysis Toolkit
Pipeline
Statistical Analysis
Utilities
Viewer
Help
Quit


RESTplus
Work directory
...
TR(sec)
Starting EPI directory
Starting T1 directory
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Process list
Parallel processing
Workers
load
save
Run


RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
Process list
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Participants
control_001
control_002
control_003
patient_001
patient_002
patient_003
Parallel processing
Workers
load
save
Run

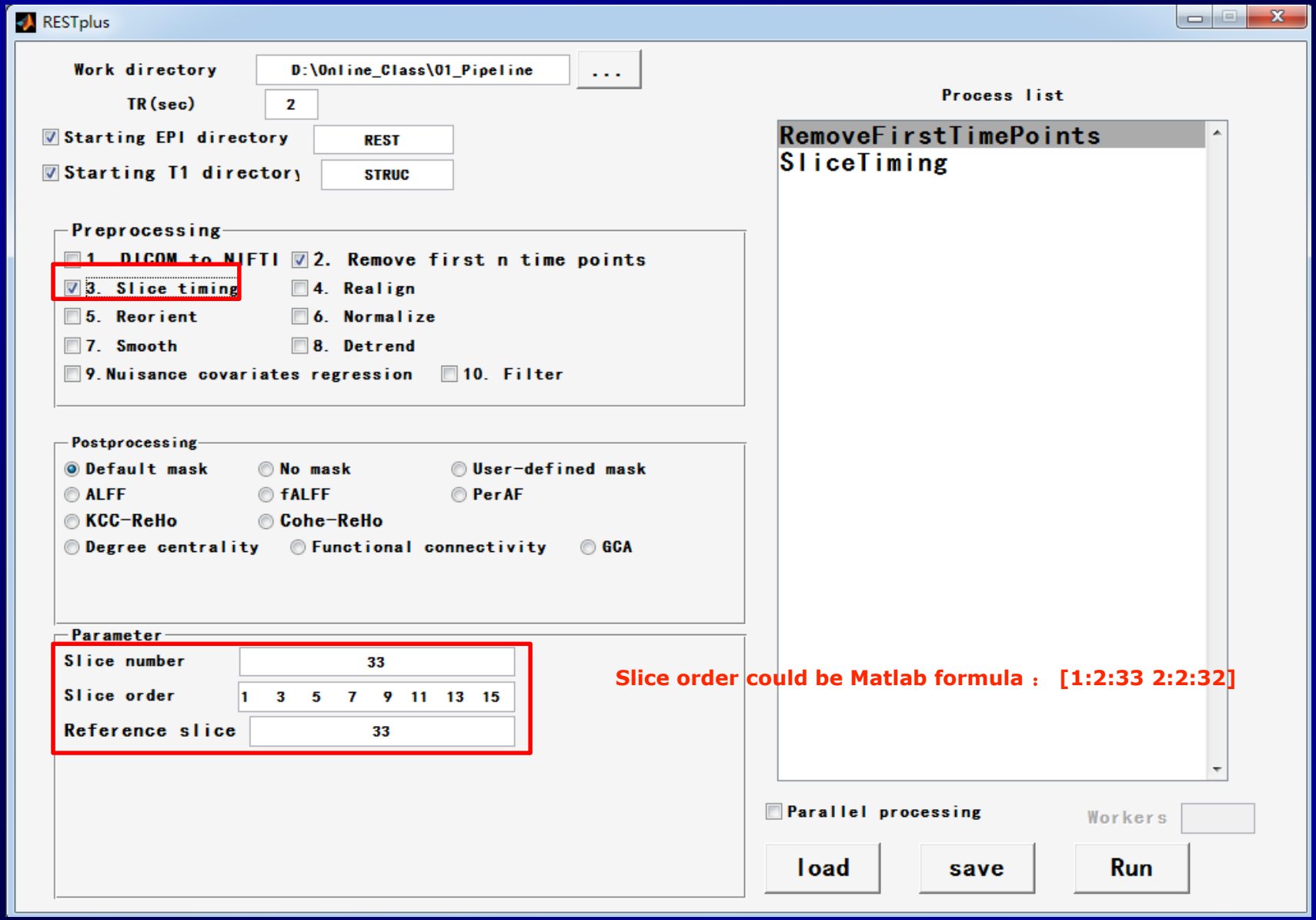

RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Remove time points number
10
Process list
RemoveFirstTimePoints
Parallel processing
Workers
load
save
Run

Slice timing

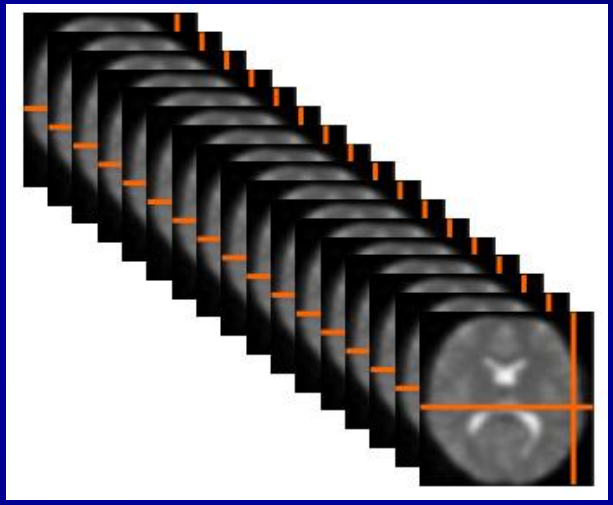


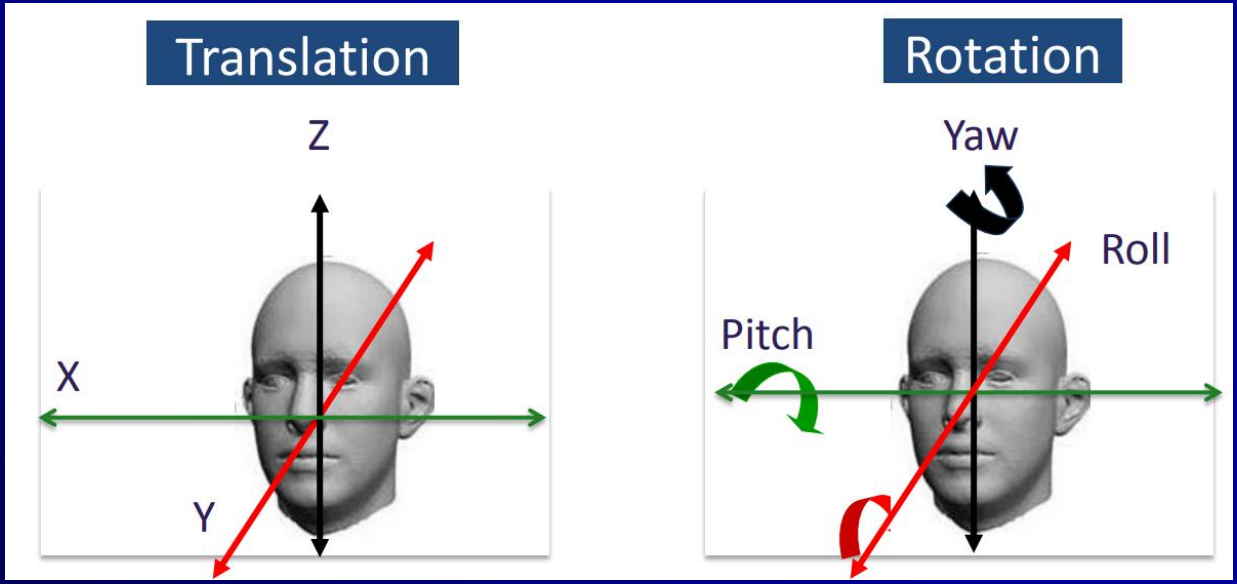
A depiction of slice timing in an interleaved MRI acquisition. The slices are acquired in the order 1-3-5-7-2-4-6-8; the times on the right show the relative time at which the data in the slice starts being acquired, assuming a repetition time of 2 seconds.

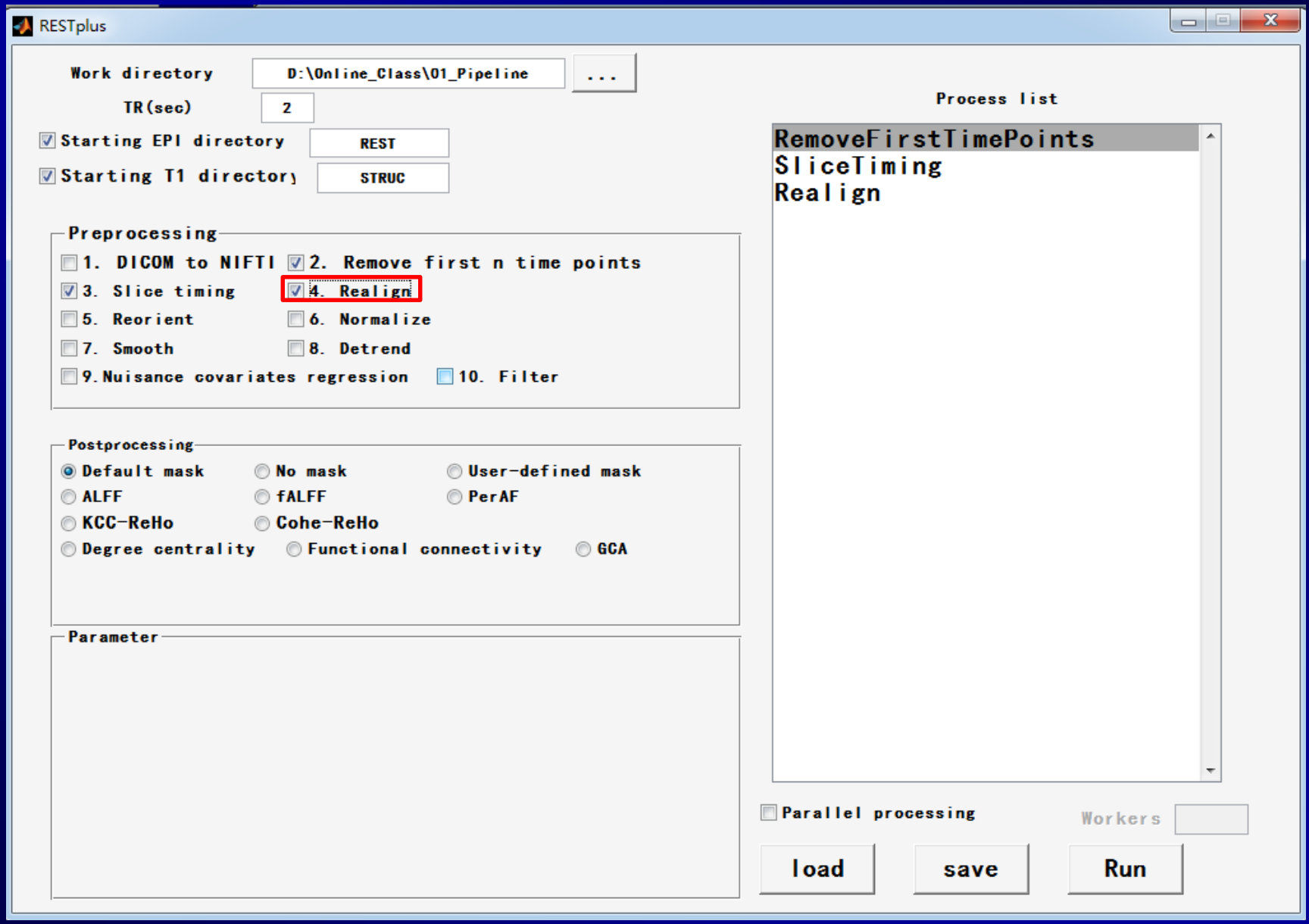
(Poldrack, Mumford et al. 2011)


RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Slice number
33
Slice order
1 3 5 7 9 11 13 15
Reference slice
33
Process list
RemoveFirstTimePoints
SliceTiming
Slice order could be Matlab formula : [1:2:33 2:2:32]
Parallel processing
Workers
load
save
Run

Motion correction






RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Parallel processing
Workers
load
save
Run

Normalization

- **Individual brains are highly variable in their size and shape**
- **Data be integrated across individuals (group analyses)**

Transform the brain images to reduce the variability between individuals and allow meaningful group analyses.

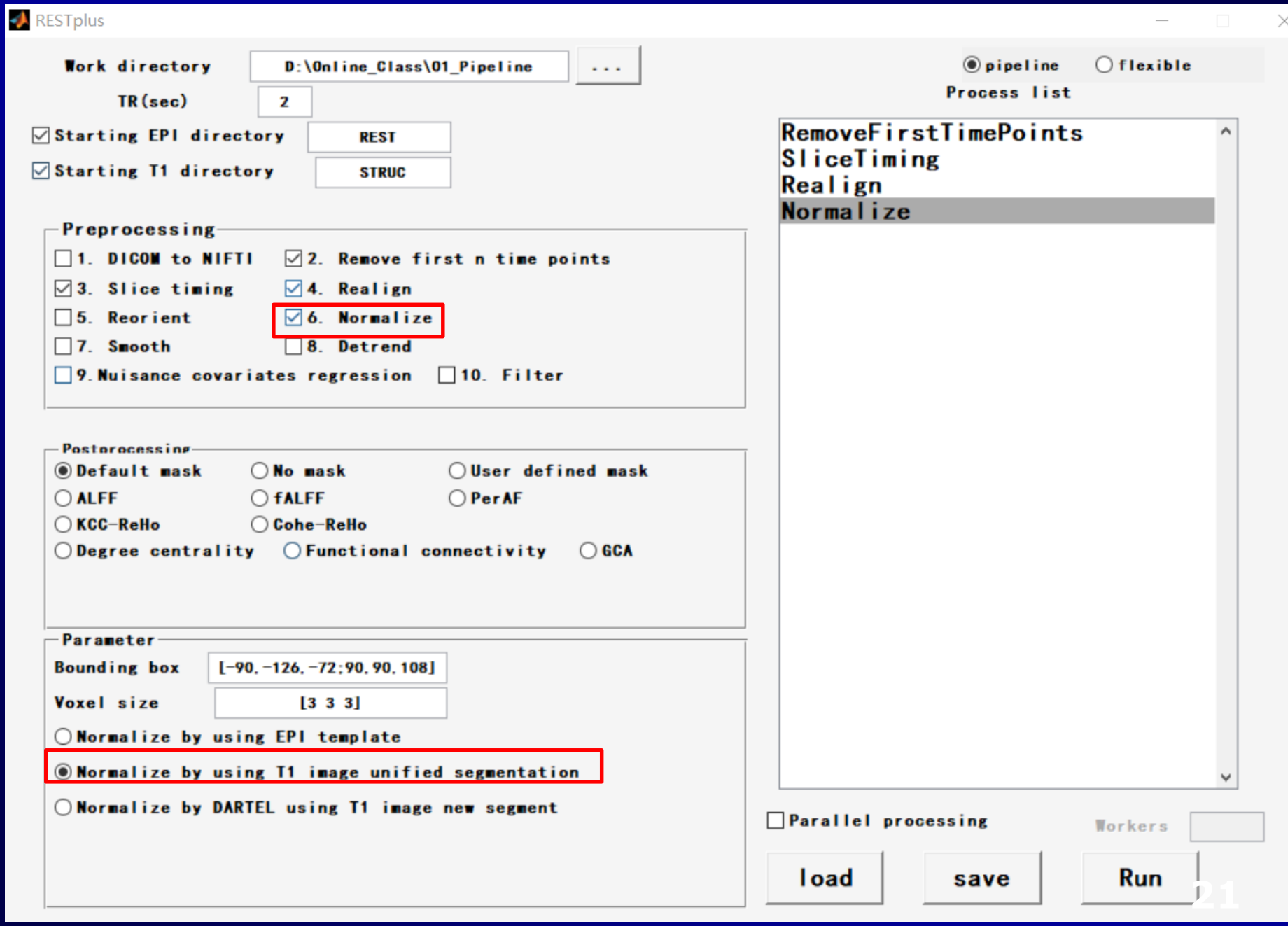
Normalization

- The Talairach atlas

  The best-known brain atlas is the one created by Talairach (1967) and subsequently updated by Talairach & Tournoux (1988).

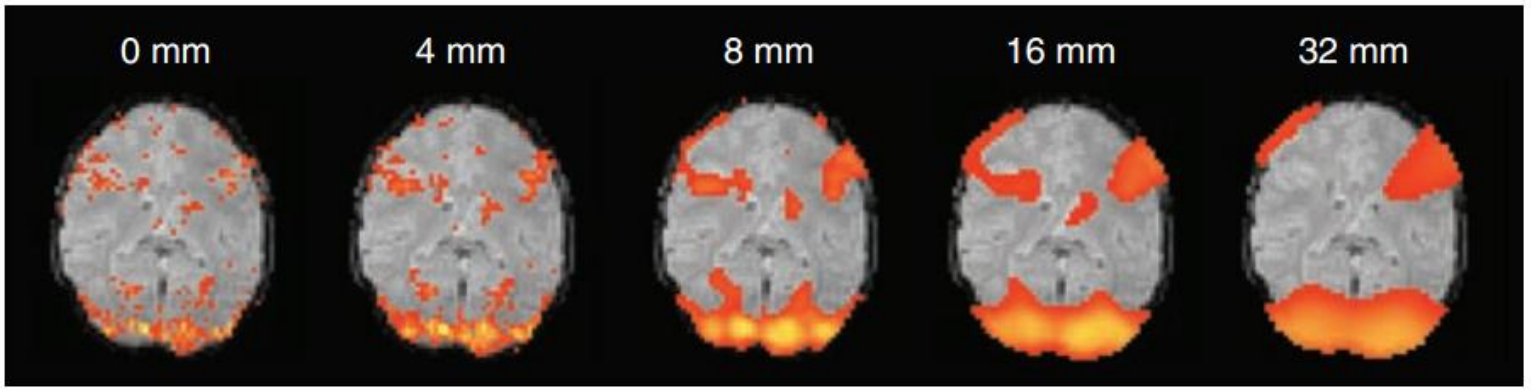
- The **MNI** templates

  Within the fMRI literature, the most common templates used for spatial normalization are those developed at the Montreal Neurological Institute, known as the *MNI templates*.


RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
pipeline
flexible
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Bounding box
[-90,-126,-72;90,90,108]
Voxel size
[3 3 3]
Normalize by using EPI template
Normalize by using T1 image unified segmentation
Normalize by DARTEL using T1 image new segment
Parallel processing
Workers
load
save
Run

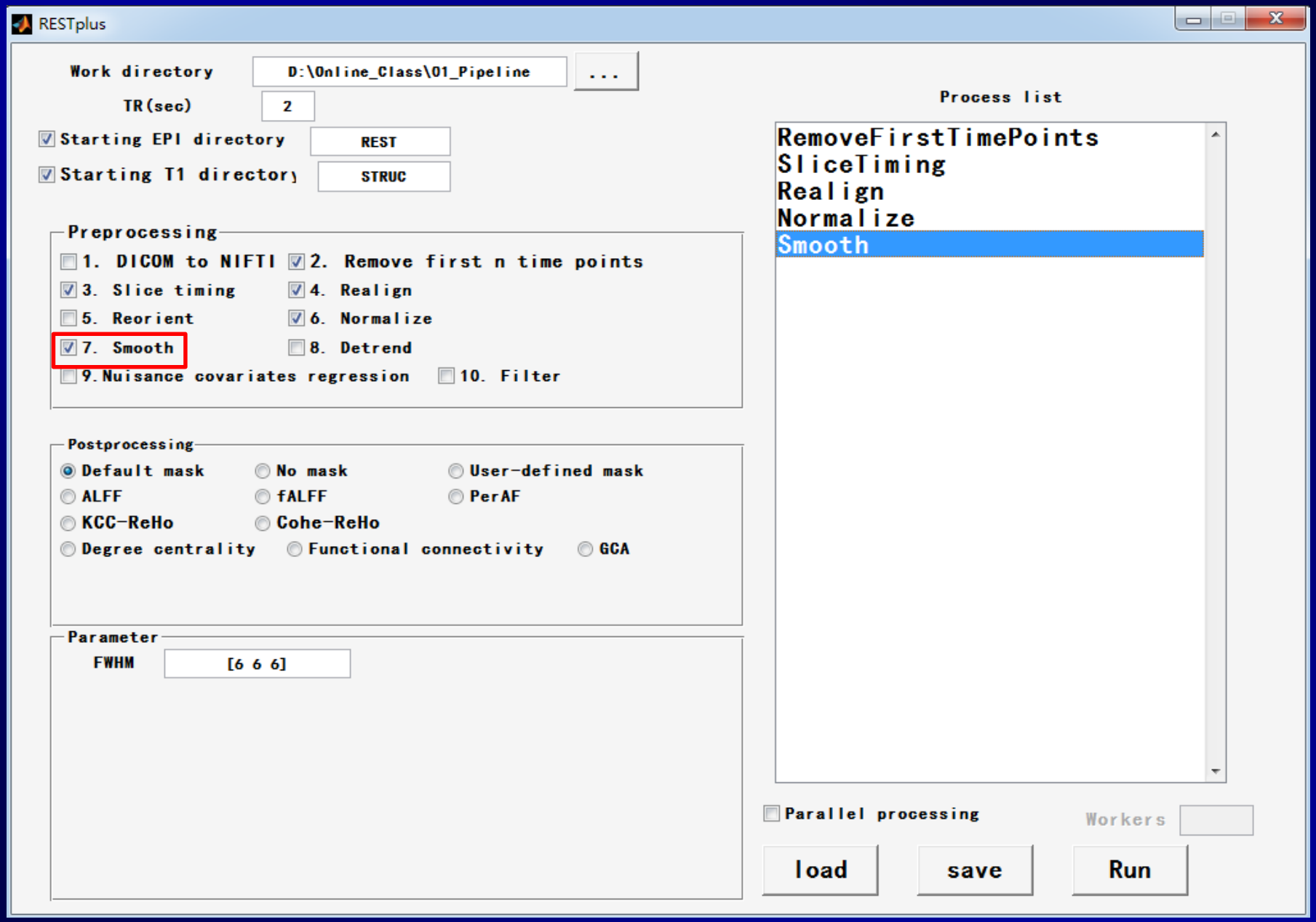
Spatial smoothing

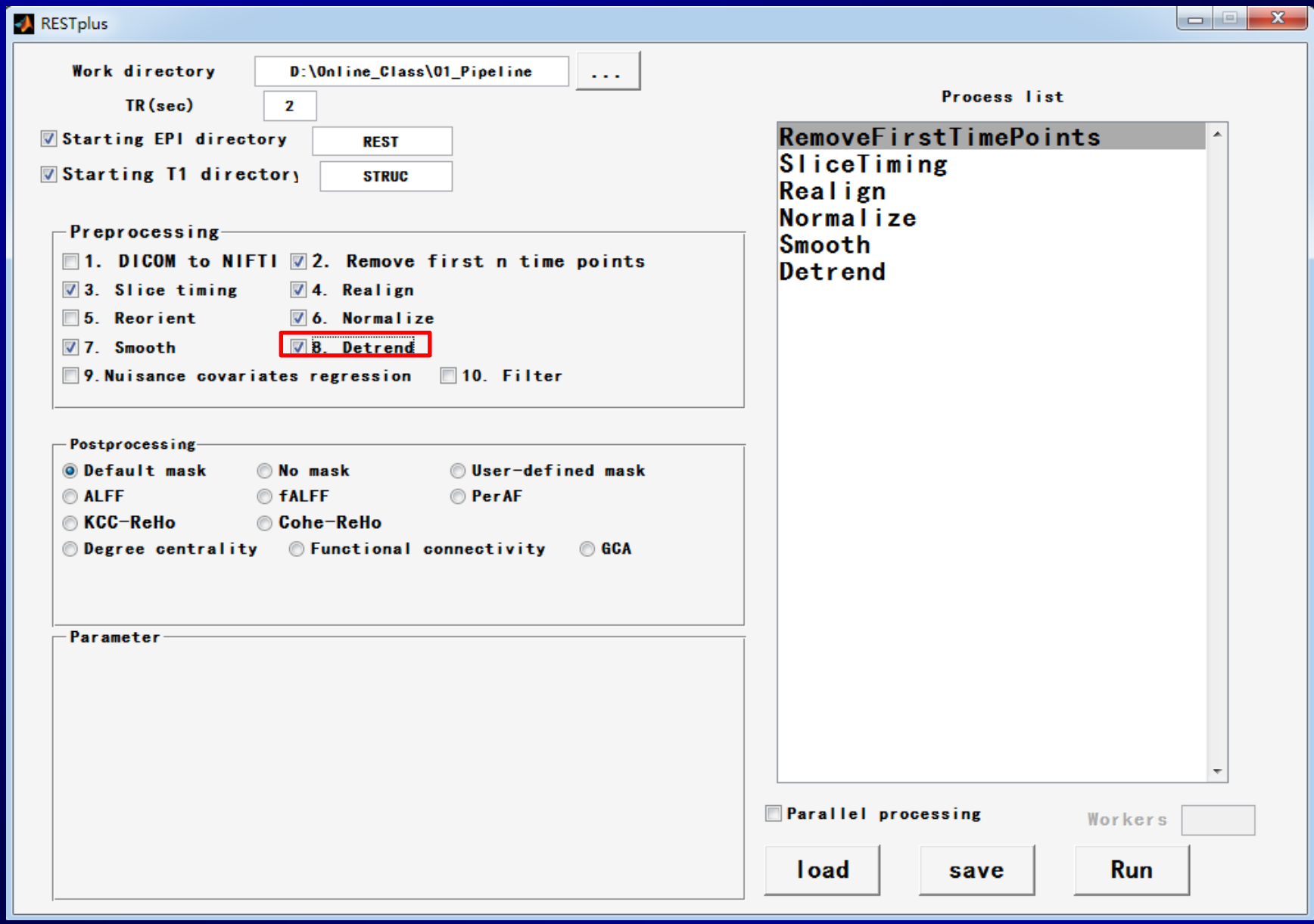
The most common means of spatial smoothing is the convolution of the three-dimensional image with a three-dimensional Gaussian kernel.

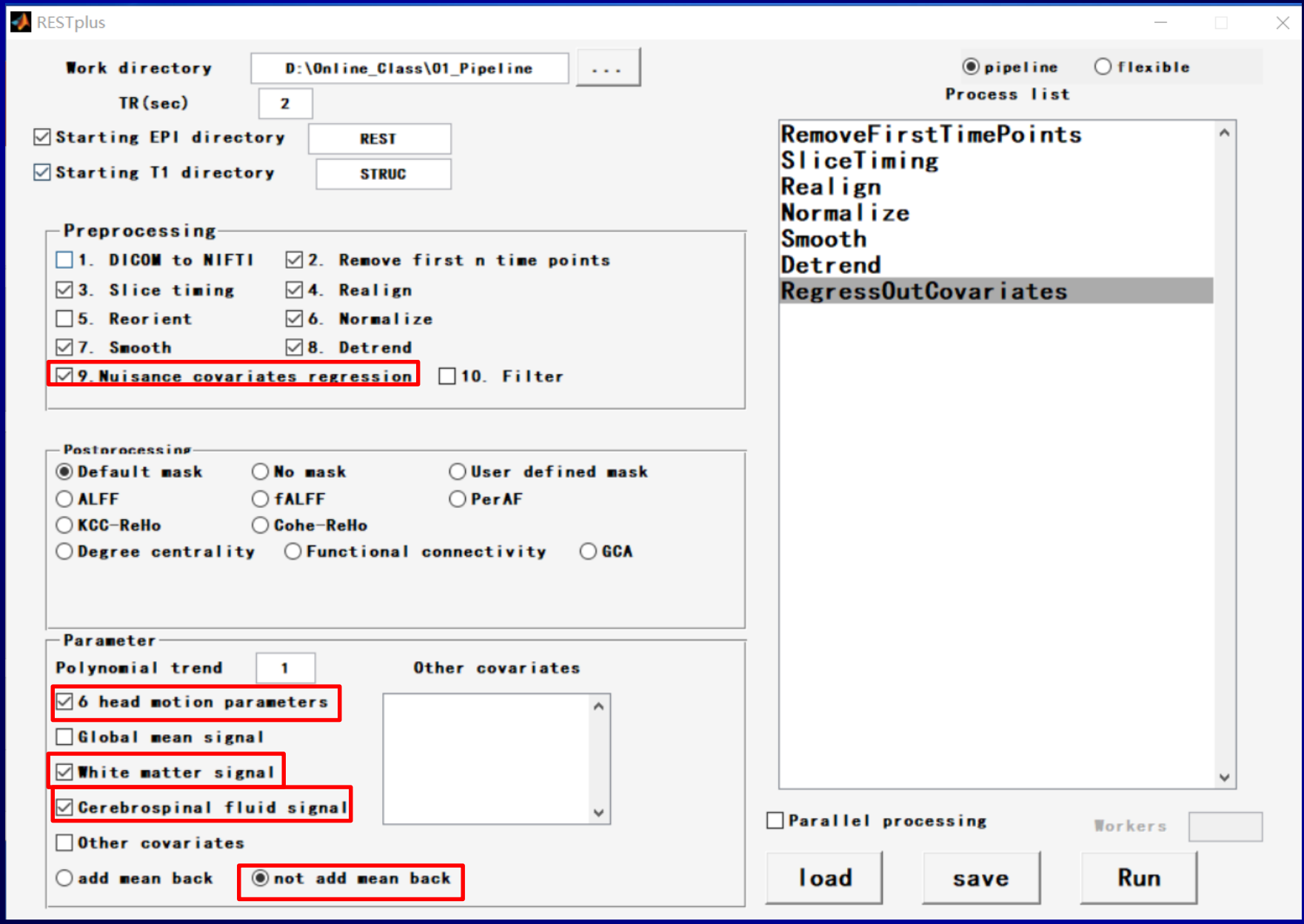


An example of the effects of spatial smoothing on activation; the numbers correspond to the FWHM of the smoothing kernel applied to the data before analysis. Increasing smoothing leads to greater detection of larger clusters but decreased detection of smaller clusters.

(Poldrack, Mumford et al. 2011)

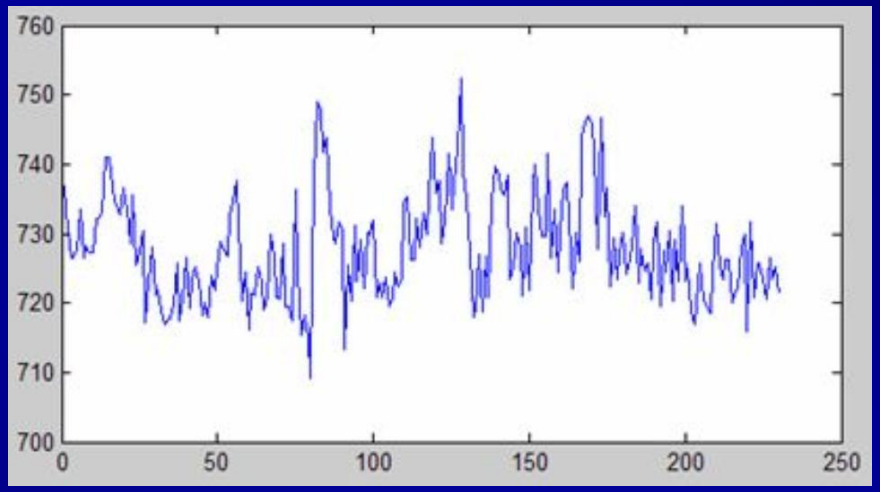

RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
FWHM
[6 6 6]
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Smooth
Parallel processing
Workers
load
save
Run


RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Smooth
Detrend
Parallel processing
Workers
load
save
Run

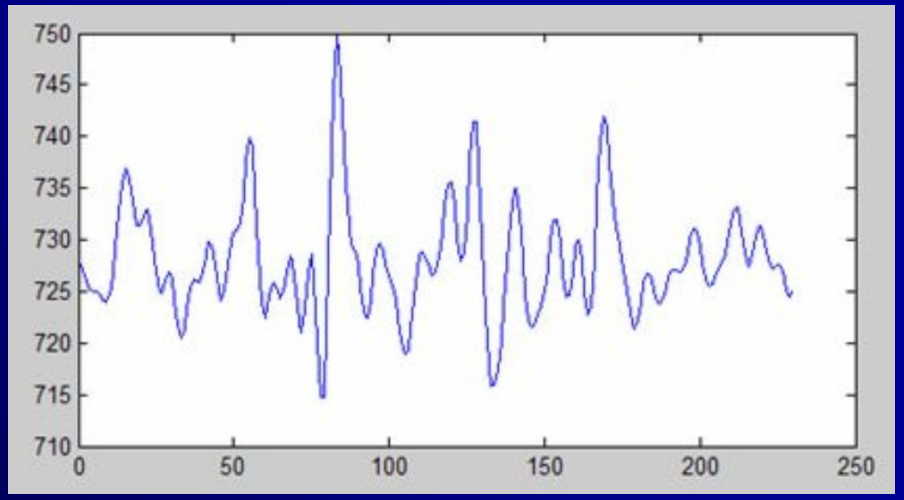

RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
pipeline
flexible
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Smooth
Detrend
RegressOutCovariates
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Polynomial trend
1
Other covariates
6 head motion parameters
Global mean signal
White matter signal
Cerebrospinal fluid signal
Other covariates
add mean back
not add mean back
Parallel processing
Workers
load
save
Run

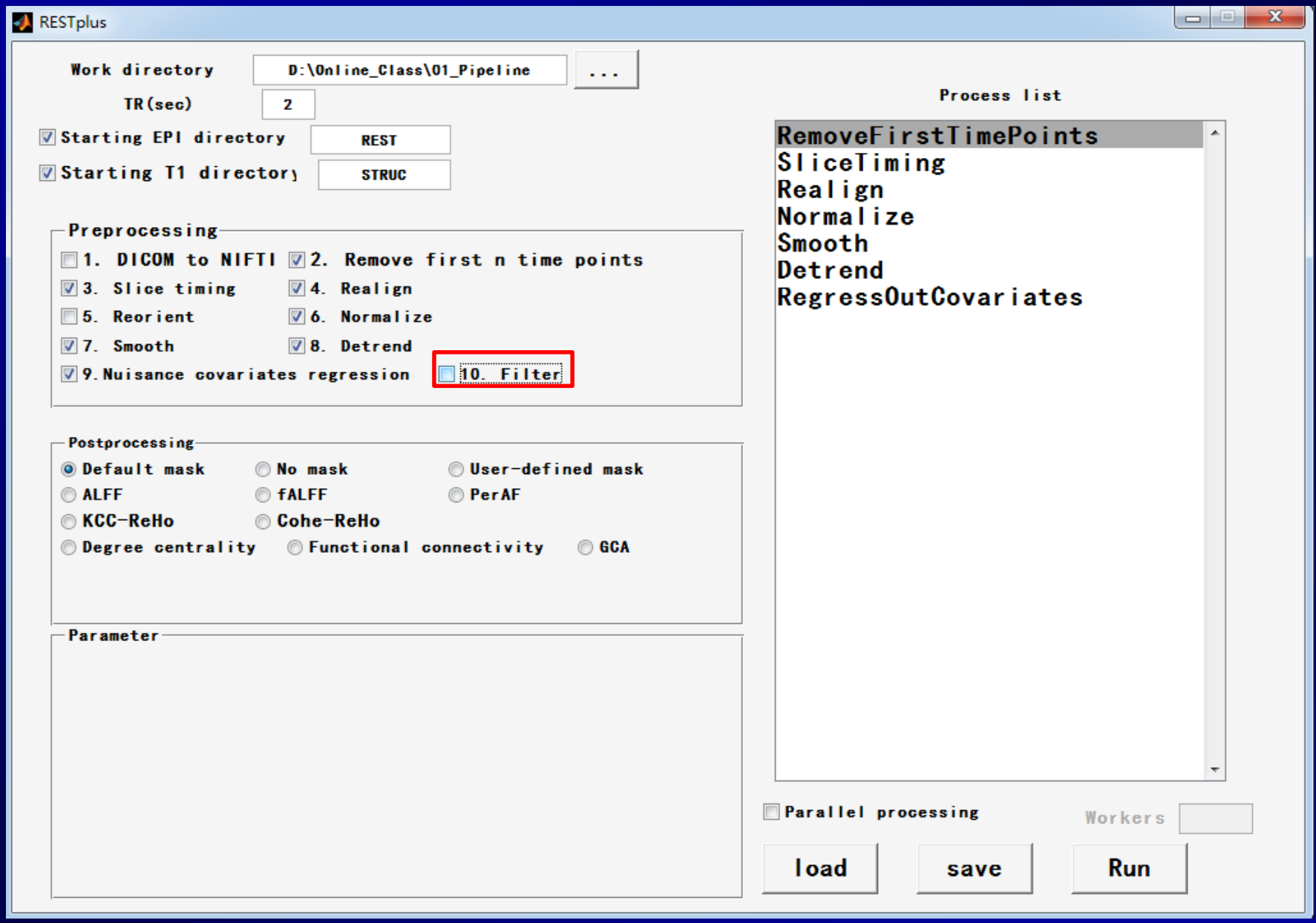
Filter (low-frequency)

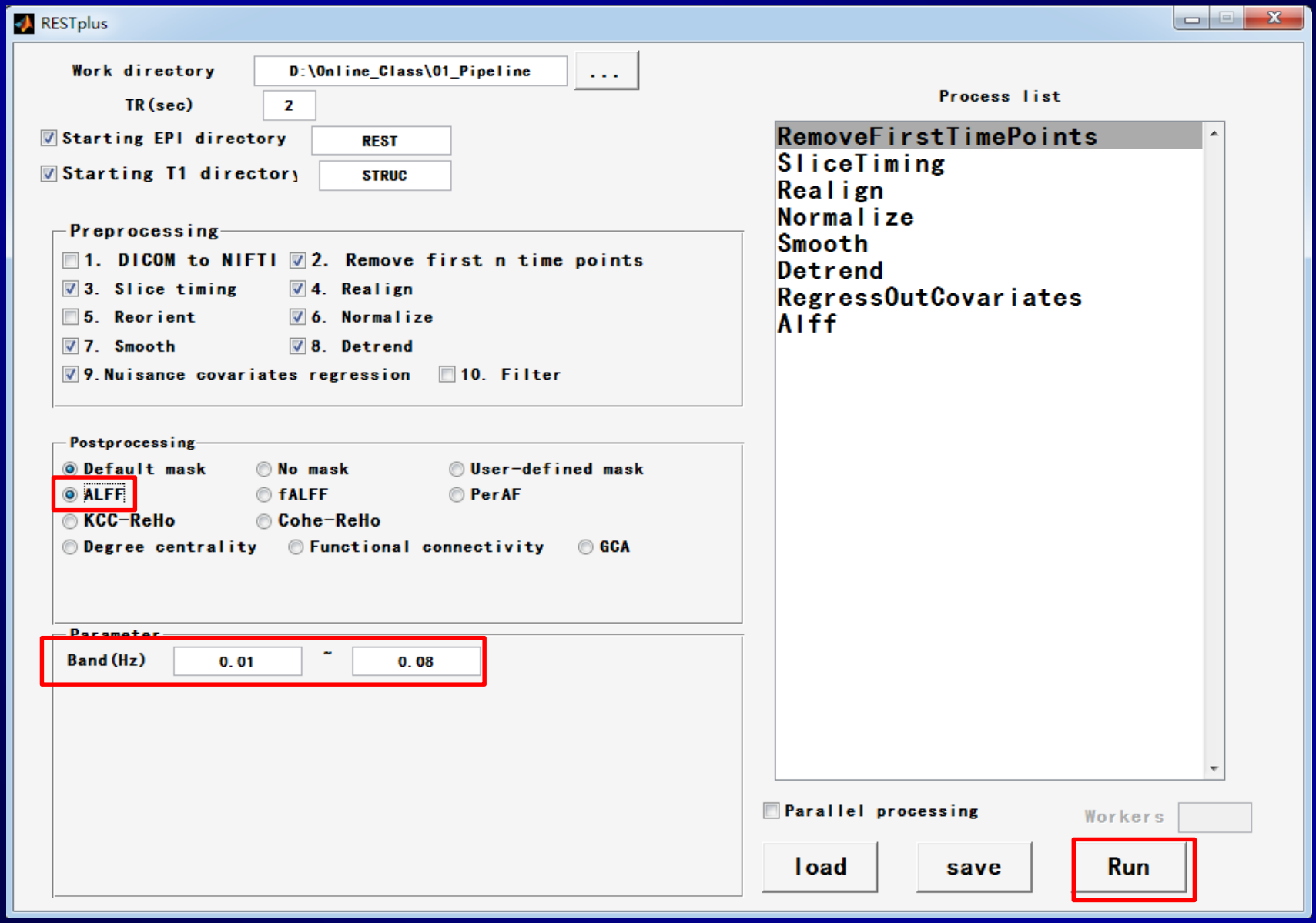
Before filter



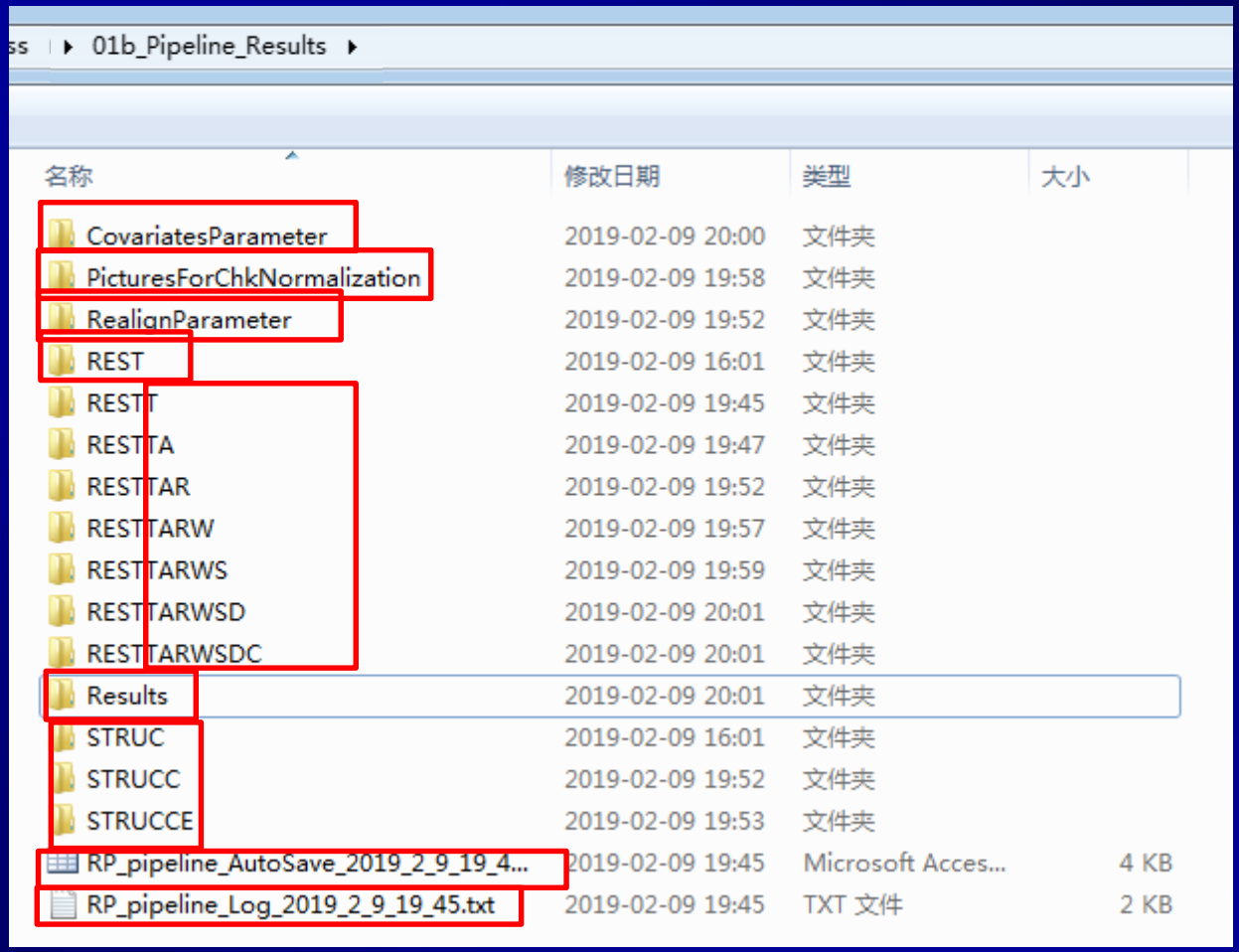
After filter




RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Smooth
Detrend
RegressOutCovariates
Parallel processing
Workers
load
save
Run


RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Band(Hz)
0.01
~
0.08
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Smooth
Detrend
RegressOutCovariates
Alff
Parallel processing
Workers
load
save
Run

01b_Pipeline_Results



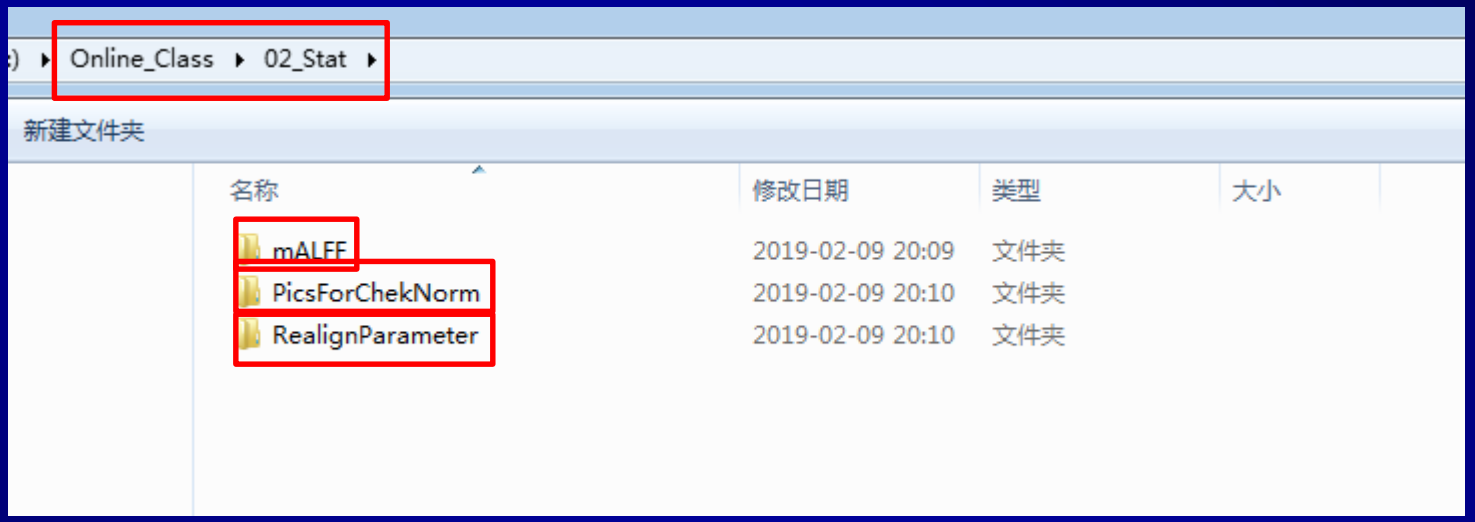
命令行窗口

```
>> open get_Postfix
```

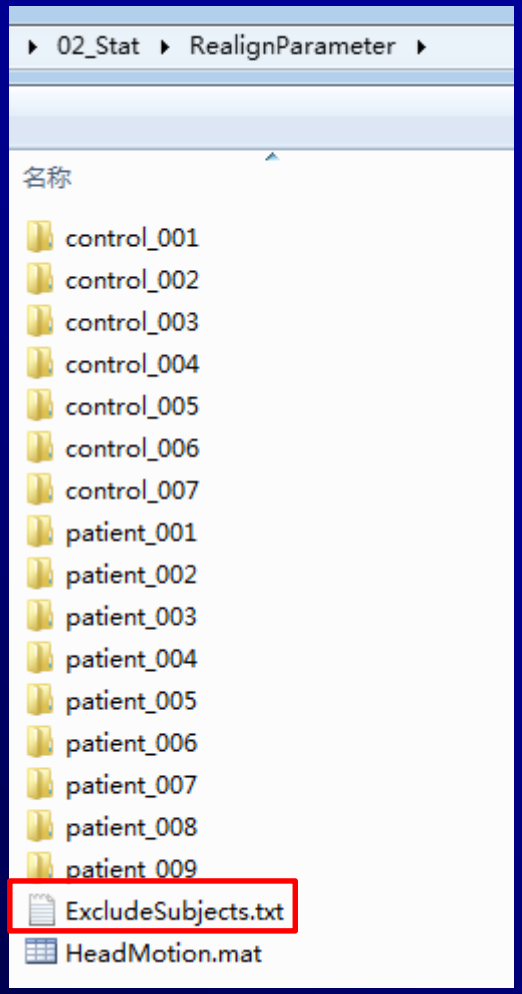
```
function Postfix=get_Postfix(Option)
%-----------------------------------------
%   Copyright(c) 2015
%   Center for Cognition and Brain Disord
%   Written by JIA Xi-Ze 201410
%   http://www.restfmri.net/
%   Mail to Authors: jxz.rest@gmail.com,

switch Option
    case 'DicomToNifti'
        Postfix='H';
    case 'RemoveFirstTimePoints'
        Postfix='T';
    case 'SliceTiming'
        Postfix='A';
    case 'Realign'
        Postfix='R';
    case 'Normalize'
        Postfix='W';
    case 'Normalize_dartel'
        Postfix='w';
    case 'Normalize_NewSeg'
        Postfix='w';
    case 'Normalize_sym'
        Postfix='sym';
    case 'T1CoregisterFun'
```

02. Statistical analysis

Two sample t-test

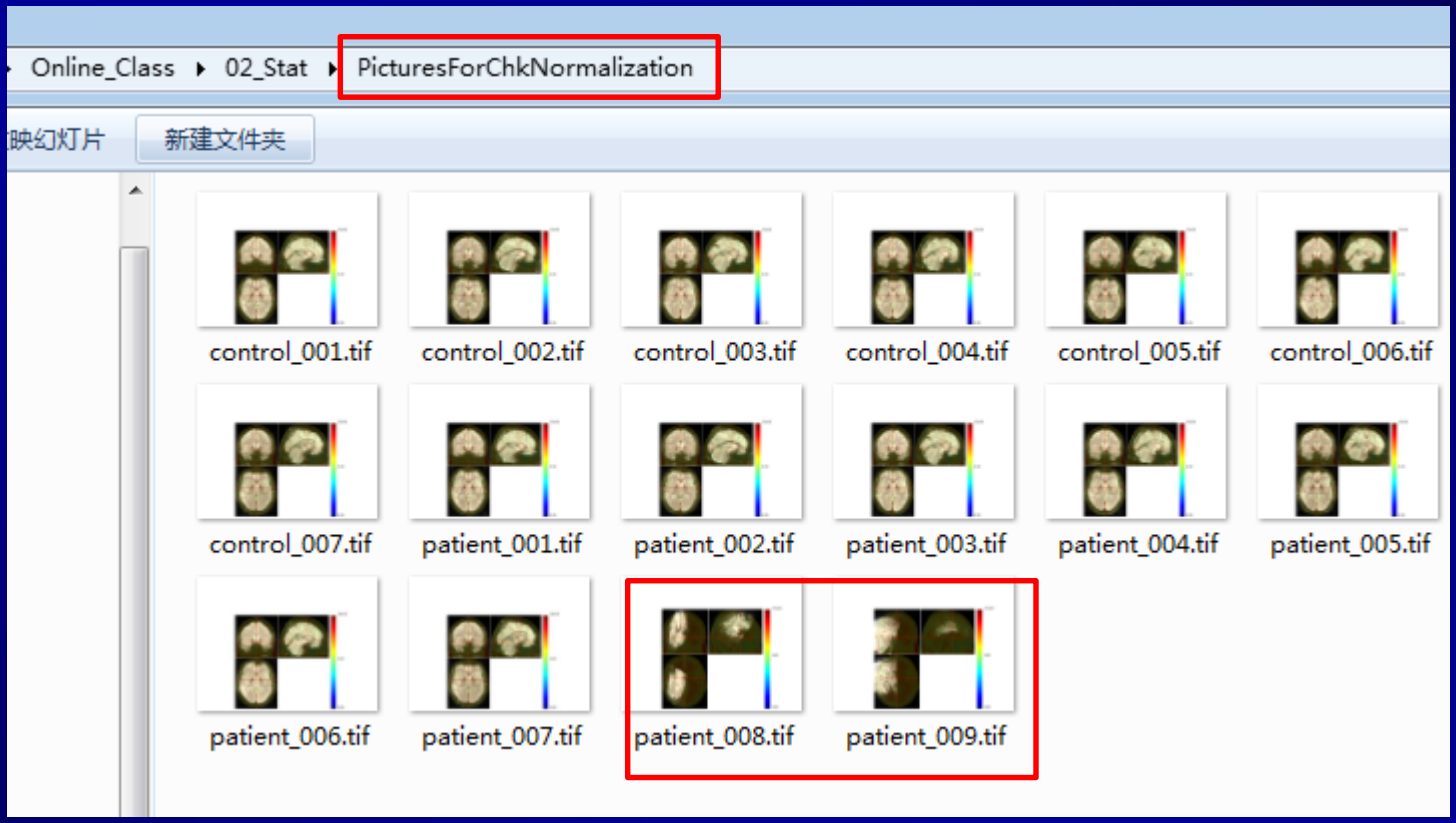

Online_Class
02_Stat
新建文件夹
名称
修改日期
类型
大小
mALFF
2019-02-09 20:09
文件夹
PicsForChekNorm
2019-02-09 20:10
文件夹
RealignParameter
2019-02-09 20:10
文件夹

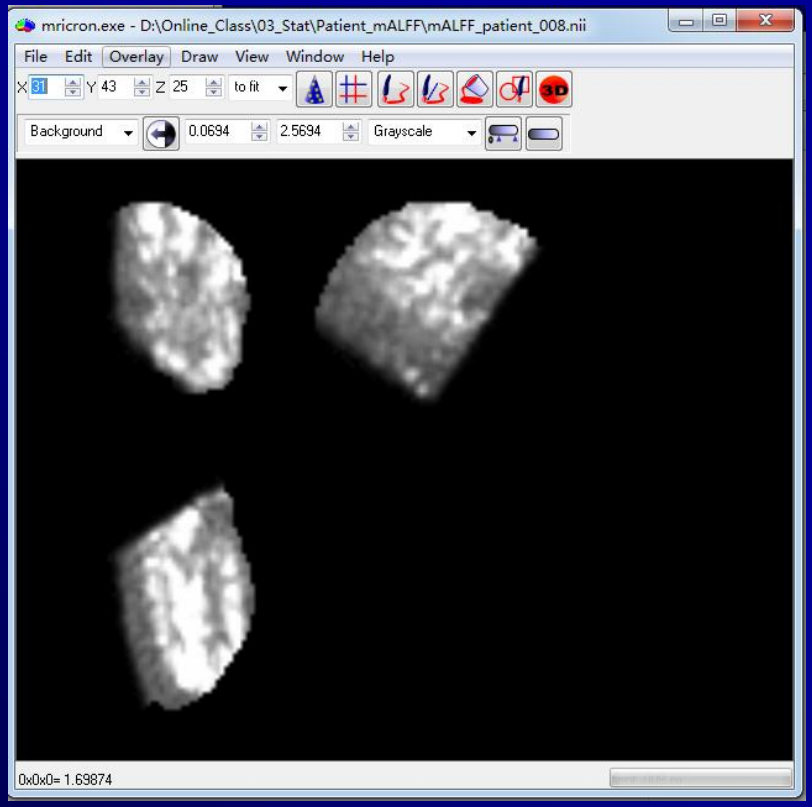
Head motion

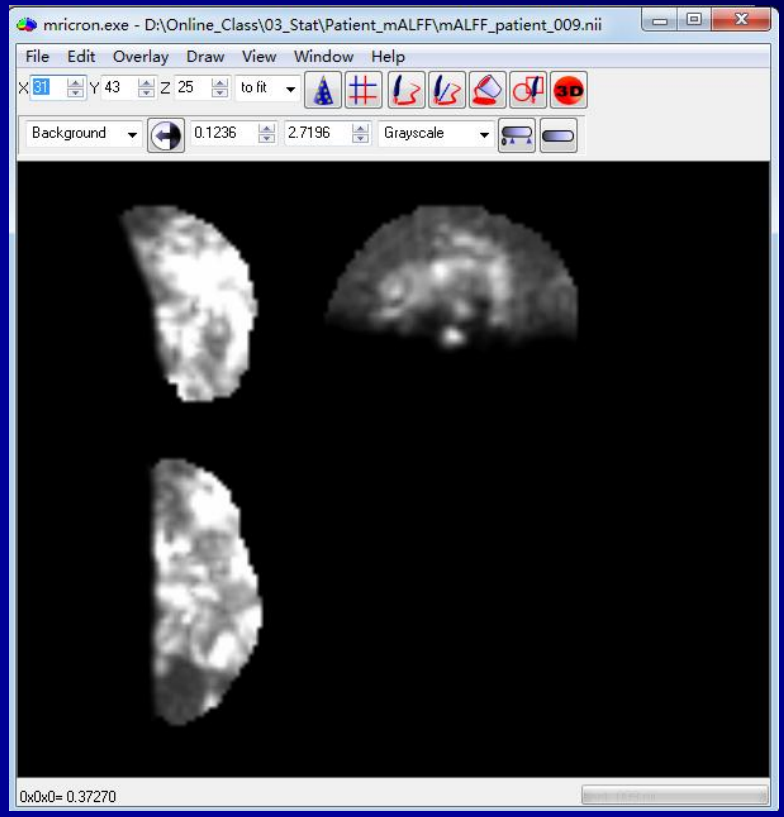


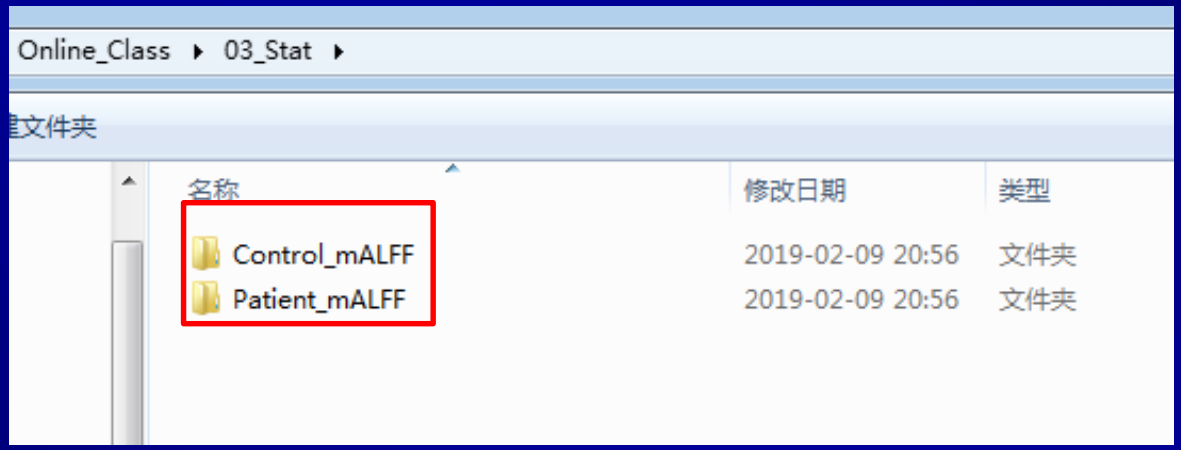
ExcludeSubjects.txt

```
1
2  Excluding Criteria: 3.0mm and 3.0 degree
3  None
4
5
6
7  Excluding Criteria: 2.5mm and 2.5 degree
8  patient_009
9
10
11
12 Excluding Criteria: 2.0mm and 2.0 degree
13 patient_008
14
15
16
17 Excluding Criteria: 1.5mm and 1.5 degree
18 None
19
20
21
22 Excluding Criteria: 1.0mm and 1.0 degree
23 None
24
25
26
27 Excluding Criteria: 0.5mm and 0.5 degree
28 control_001
29 patient_001
30 patient_002
31 patient_007
32
33
34
35
```


Online_Class
02_Stat
PicturesForChkNormalization
映幻灯片
新建文件夹
control_001.tif
control_002.tif
control_003.tif
control_004.tif
control_005.tif
control_006.tif
control_007.tif
patient_001.tif
patient_002.tif
patient_003.tif
patient_004.tif
patient_005.tif
patient_006.tif
patient_007.tif
patient_008.tif
patient_009.tif


mricron.exe - D:\Online_Class\03_Stat\Patient_mALFF\mALFF_patient_008.nii
File Edit Overlay Draw View Window Help
X 31 Y 43 Z 25 to fit
Background 0.0694 2.5694 Grayscale
0x0x0= 1.69874


mricron.exe - D:\Online_Class\03_Stat\Patient_mALFF\mALFF_patient_009.nii
File Edit Overlay Draw View Window Help
X 31 Y 43 Z 25 to fit
Background 0.1236 2.7196 Grayscale
0x0x0= 0.37270


Online_Class
03_Stat
文件夹
名称
修改日期
类型
Control_mALFF
2019-02-09 20:56
文件夹
Patient_mALFF
2019-02-09 20:56
文件夹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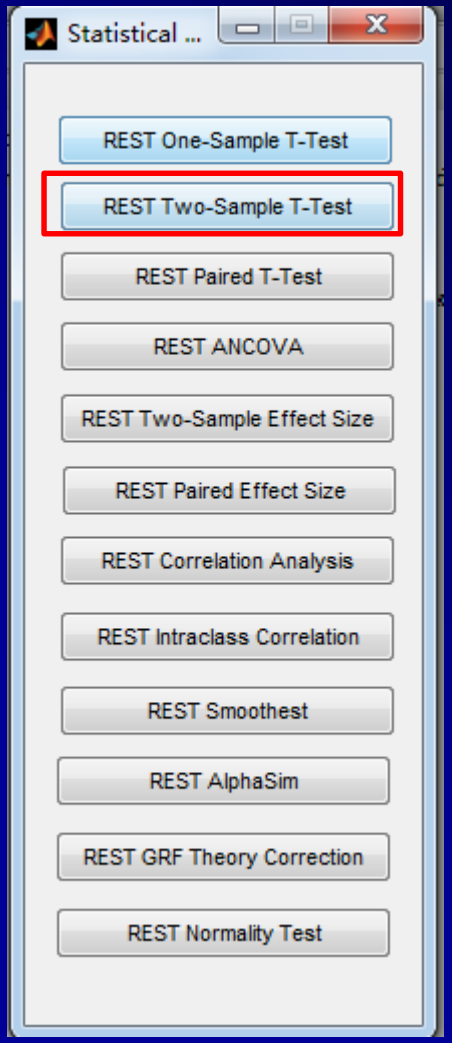
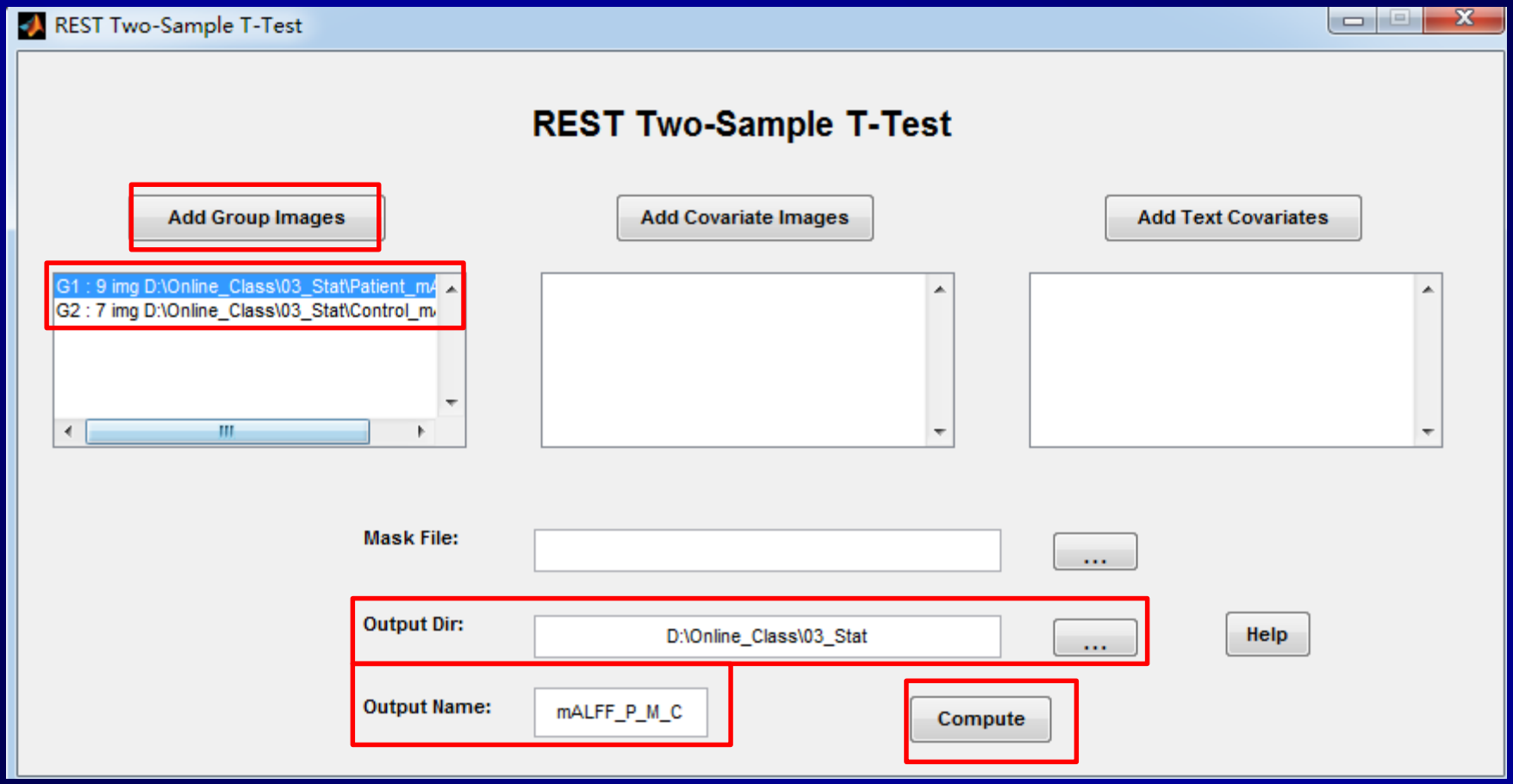
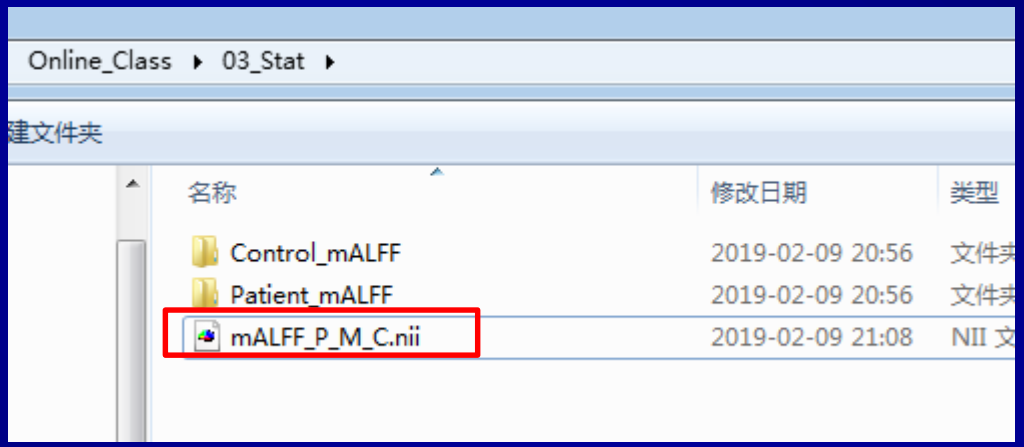
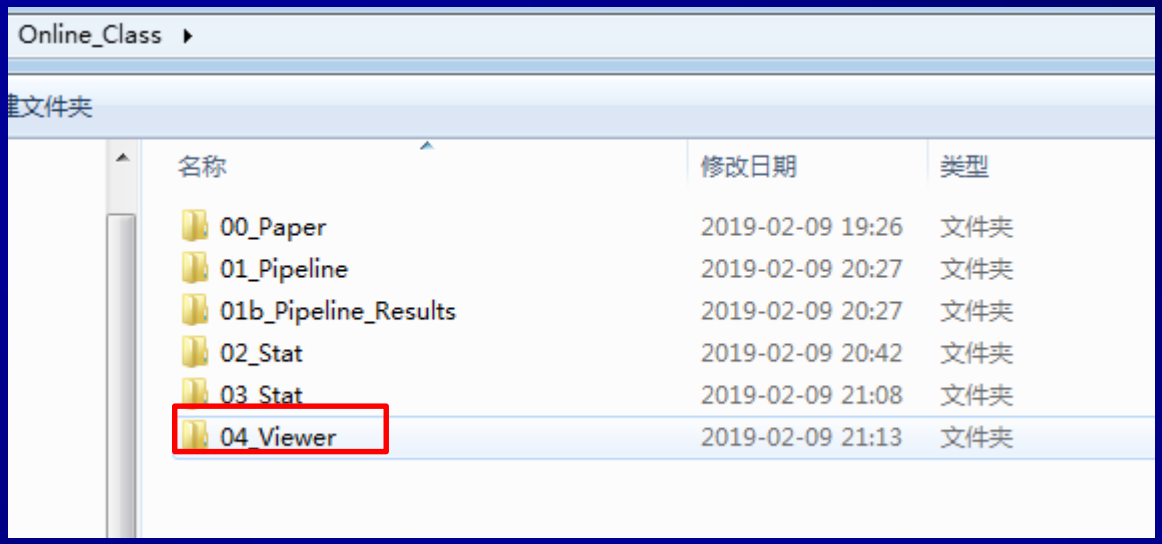

Statistical ...
REST One-Sample T-Test
REST Two-Sample T-Test
REST Paired T-Test
REST ANCOVA
REST Two-Sample Effect Size
REST Paired Effect Size
REST Correlation Analysis
REST Intraclass Correlation
REST Smoothest
REST AlphaSim
REST GRF Theory Correction
REST Normality Test


REST Two-Sample T-Test
REST Two-Sample T-Test
Add Group Images
Add Covariate Images
Add Text Covariates
G1 : 9 img D:\Online_Class\03_Stat\Patient_m
G2 : 7 img D:\Online_Class\03_Stat\Control_m
Mask File:
...
Output Dir:
D:\Online_Class\03_Stat
...
Help
Output Name:
mALFF_P_M_C
Compute


Online_Class ▸ 03_Stat ▸
建文件夹
名称
修改日期
类型
Control_mALFF
2019-02-09 20:56
Patient_mALFF
2019-02-09 20:56
mALFF_P_M_C.nii
2019-02-09 21:08
NII 文

03. Viewer


Online_Class
建文件夹
名称
修改日期
类型
00_Paper
2019-02-09 19:26
文件夹
01_Pipeline
2019-02-09 20:27
文件夹
01b_Pipeline_Results
2019-02-09 20:27
文件夹
02_Stat
2019-02-09 20:42
文件夹
03_Stat
2019-02-09 21:08
文件夹
04_Viewer
2019-02-09 21:13
文件夹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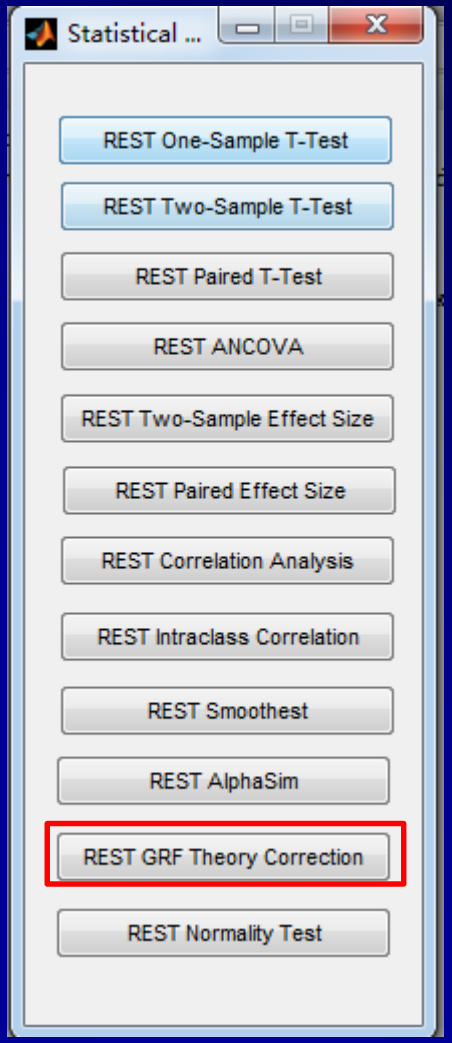
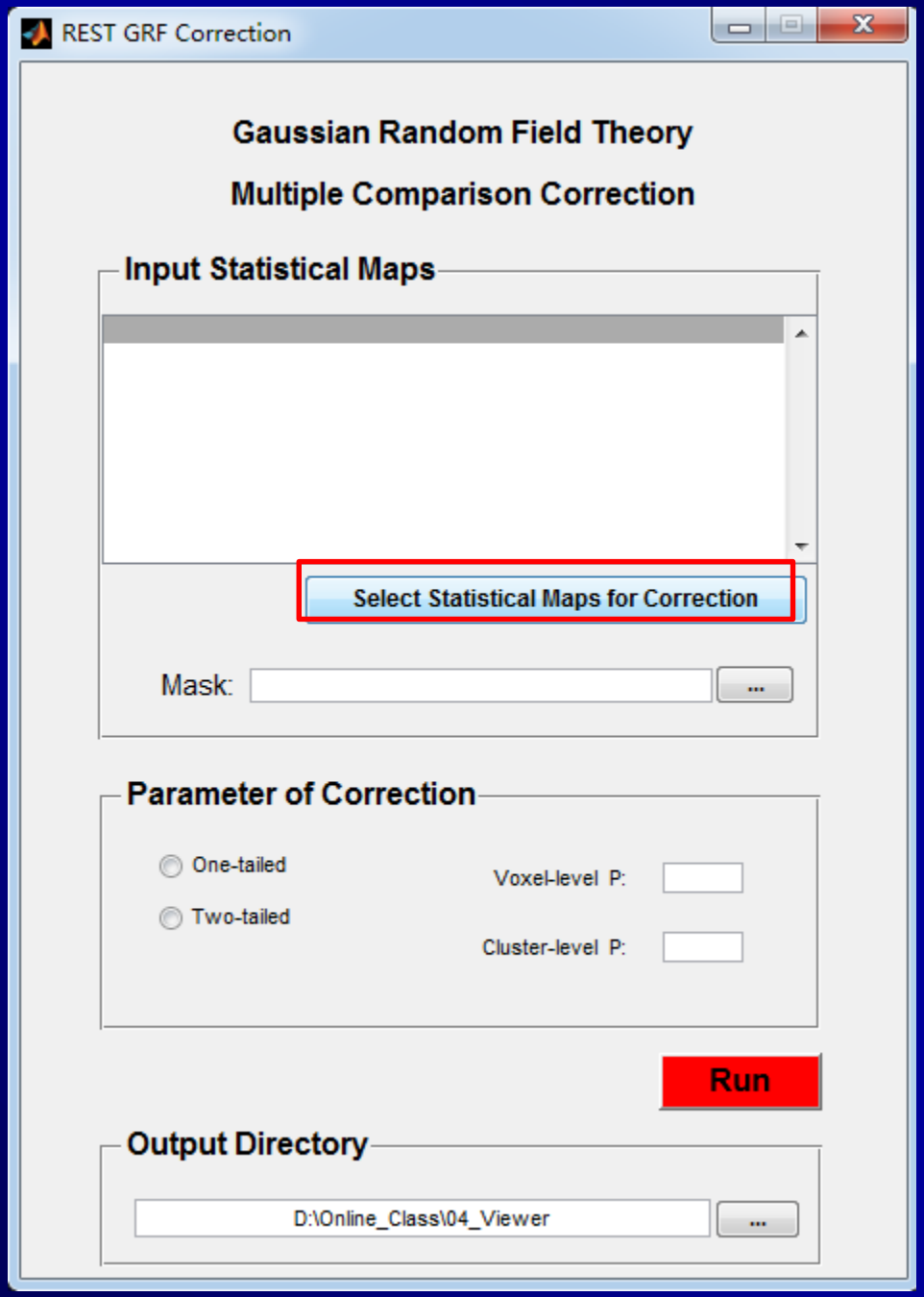
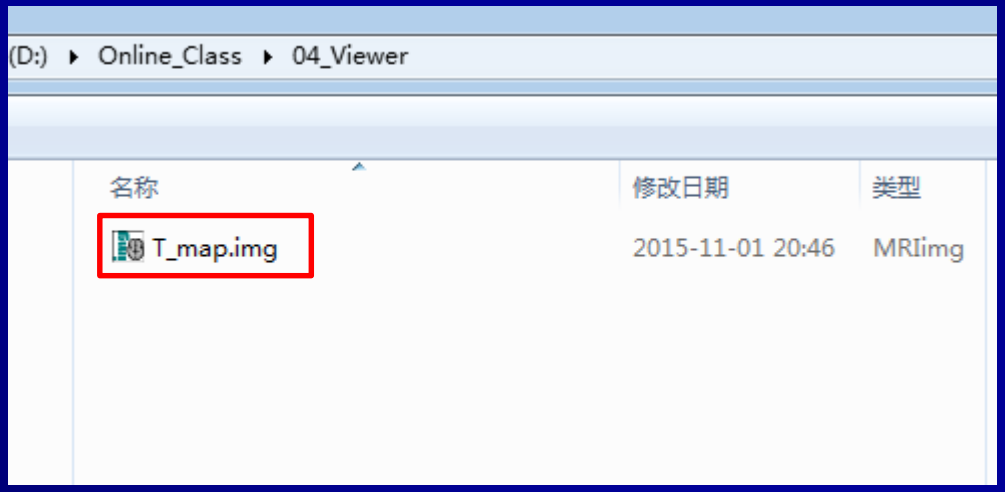
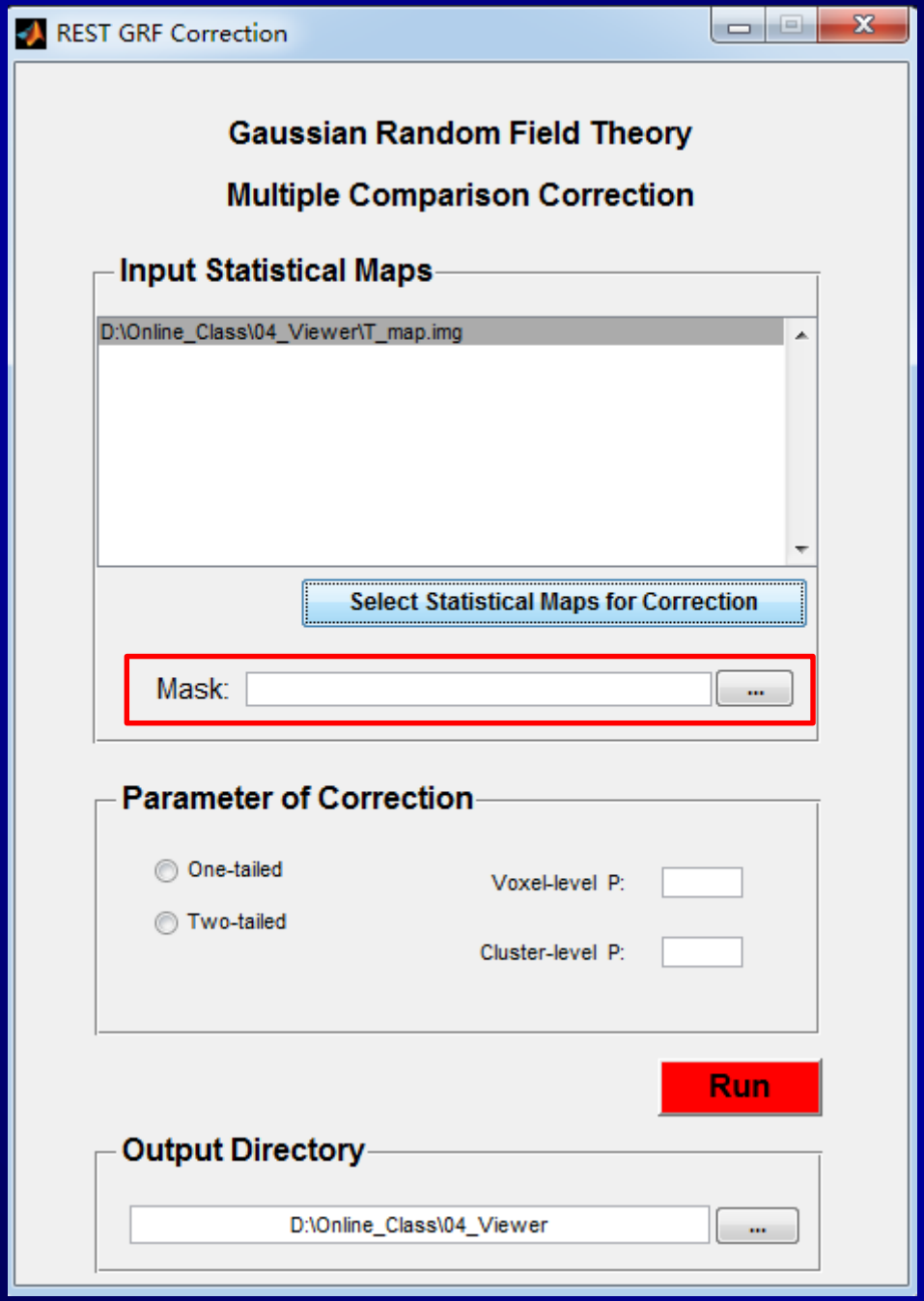
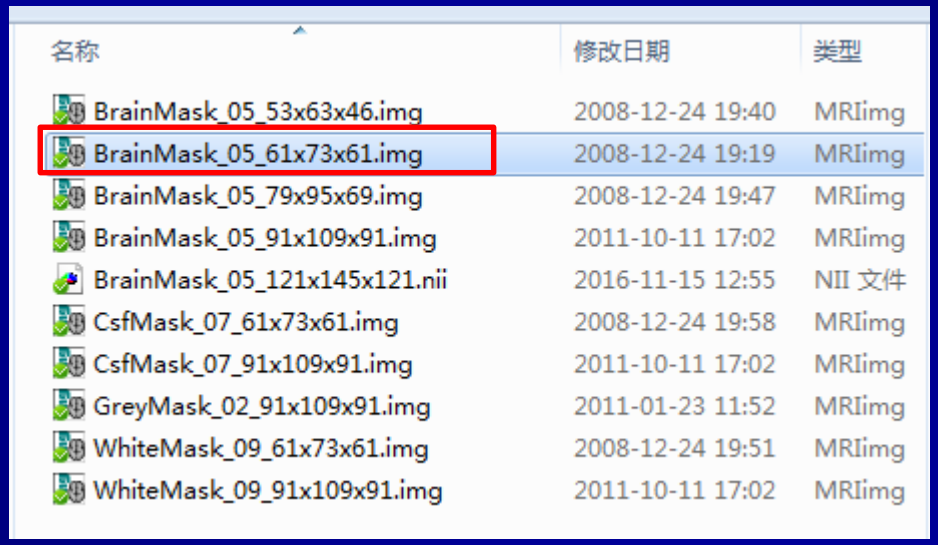
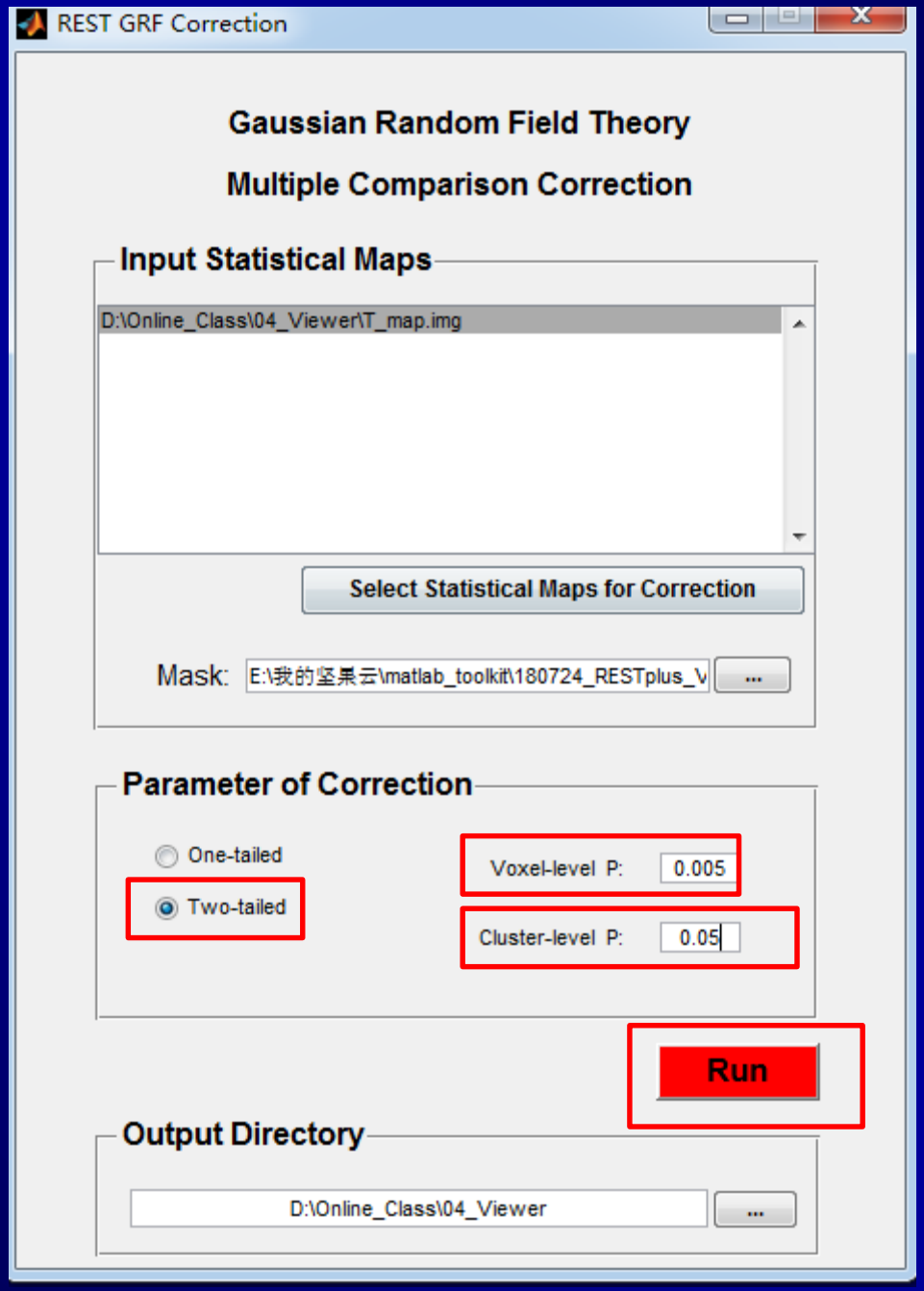

Statistical ...
REST One-Sample T-Test
REST Two-Sample T-Test
REST Paired T-Test
REST ANCOVA
REST Two-Sample Effect Size
REST Paired Effect Size
REST Correlation Analysis
REST Intraclass Correlation
REST Smoothest
REST AlphaSim
REST GRF Theory Correction
REST Normality Test

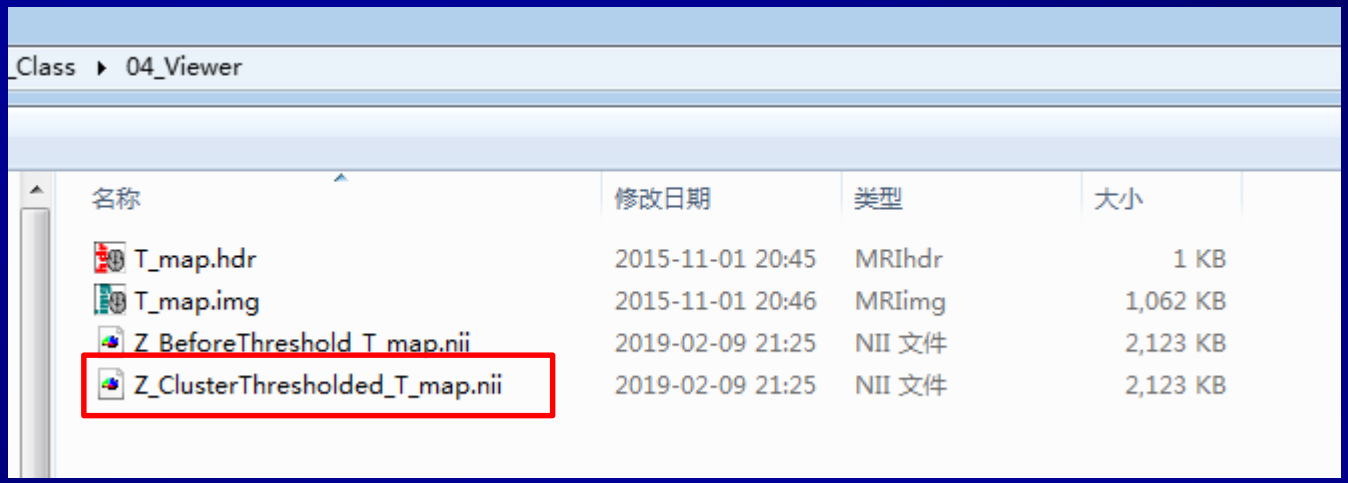

REST GRF Correction
Gaussian Random Field Theory
Multiple Comparison Correction
Input Statistical Maps
Select Statistical Maps for Correction
Mask:
...
Parameter of Correction
One-tailed
Two-tailed
Voxel-level P:
Cluster-level P:
Run
Output Directory
D:\Online_Class\04_Viewer
...

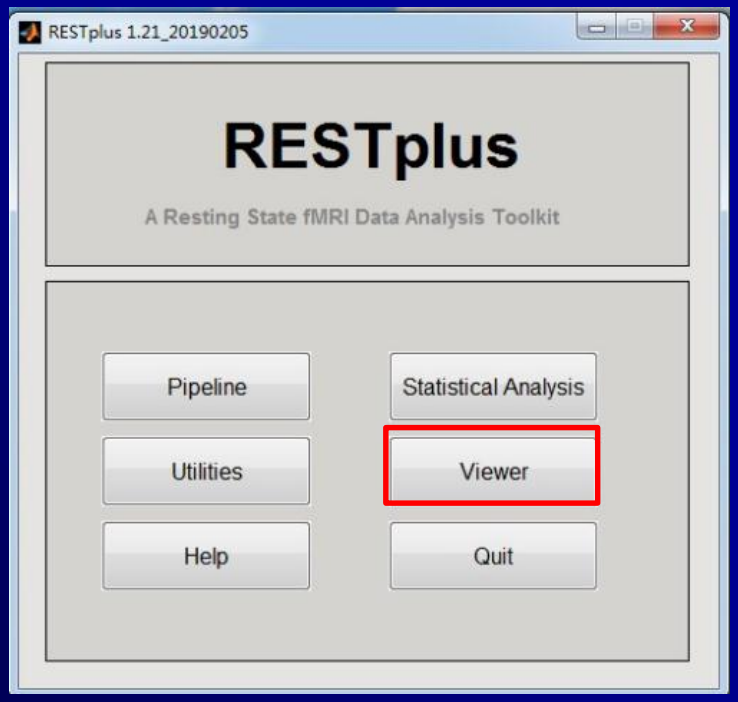

(D:) ▸ Online_Class ▸ 04_Viewer
名称
修改日期
类型
T_map.img
2015-11-01 20:46
MRIimg


REST GRF Correction
Gaussian Random Field Theory
Multiple Comparison Correction
Input Statistical Maps
D:\Online_Class\04_Viewer\T_map.img
Select Statistical Maps for Correction
Mask:
...
Parameter of Correction
One-tailed
Two-tailed
Voxel-level P:
Cluster-level P:
Run
Output Directory
D:\Online_Class\04_Viewer
...


名称
修改日期
类型
BrainMask_05_53x63x46.img 2008-12-24 19:40 MRIimg
BrainMask_05_61x73x61.img 2008-12-24 19:19 MRIimg
BrainMask_05_79x95x69.img 2008-12-24 19:47 MRIimg
BrainMask_05_91x109x91.img 2011-10-11 17:02 MRIimg
BrainMask_05_121x145x121.nii 2016-11-15 12:55 NII 文件
CsfMask_07_61x73x61.img 2008-12-24 19:58 MRIimg
CsfMask_07_91x109x91.img 2011-10-11 17:02 MRIimg
GreyMask_02_91x109x91.img 2011-01-23 11:52 MRIimg
WhiteMask_09_61x73x61.img 2008-12-24 19:51 MRIimg
WhiteMask_09_91x109x91.img 2011-10-11 17:02 MRIimg


REST GRF Correction
Gaussian Random Field Theory
Multiple Comparison Correction
Input Statistical Maps
D:\Online_Class\04_Viewer\T_map.img
Select Statistical Maps for Correction
Mask:
E:\我的坚果云\matlab_toolkit\180724_RESTplus_V
...
Parameter of Correction
One-tailed
Two-tailed
Voxel-level P:
0.005
Cluster-level P:
0.05
Run
Output Directory
D:\Online_Class\04_Viewer
...


_Class ▸ 04_Viewer
名称
修改日期
类型
大小
T_map.hdr
2015-11-01 20:45
MRIhdr
1 KB
T_map.img
2015-11-01 20:46
MRIimg
1,062 KB
Z_BeforeThreshold_T_map.nii
2019-02-09 21:25
NII 文件
2,123 KB
Z_ClusterThresholded_T_map.nii
2019-02-09 21:25
NII 文件
2,123 KB


RESTplus 1.21_20190205
RESTplus
A Resting State fMRI Data Analysis Toolkit
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Utilities
Viewer
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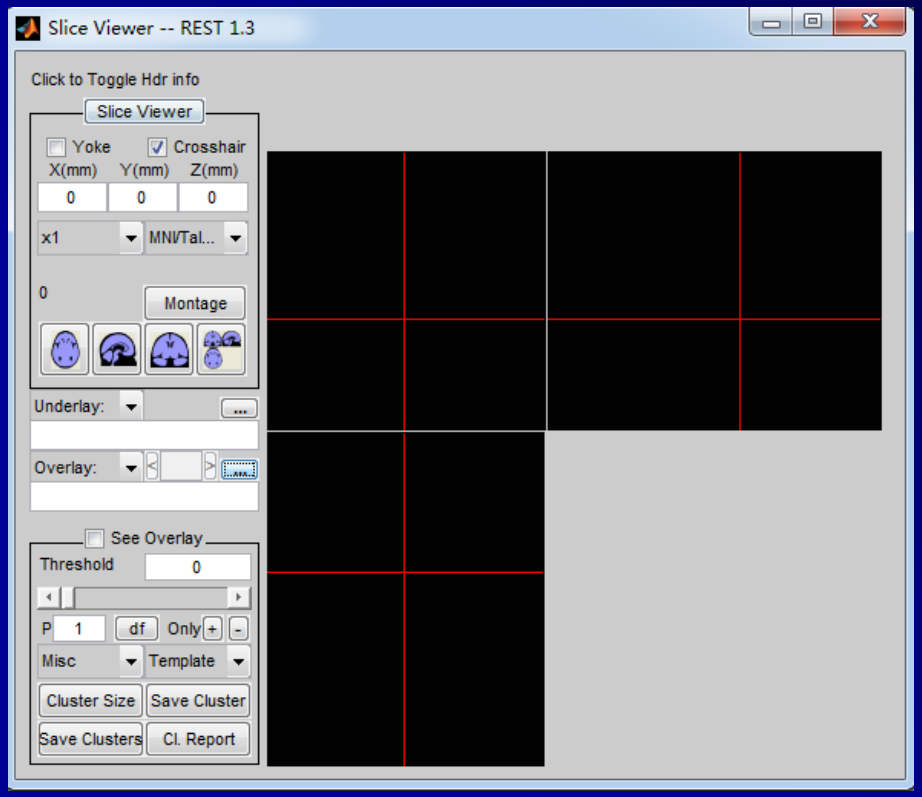
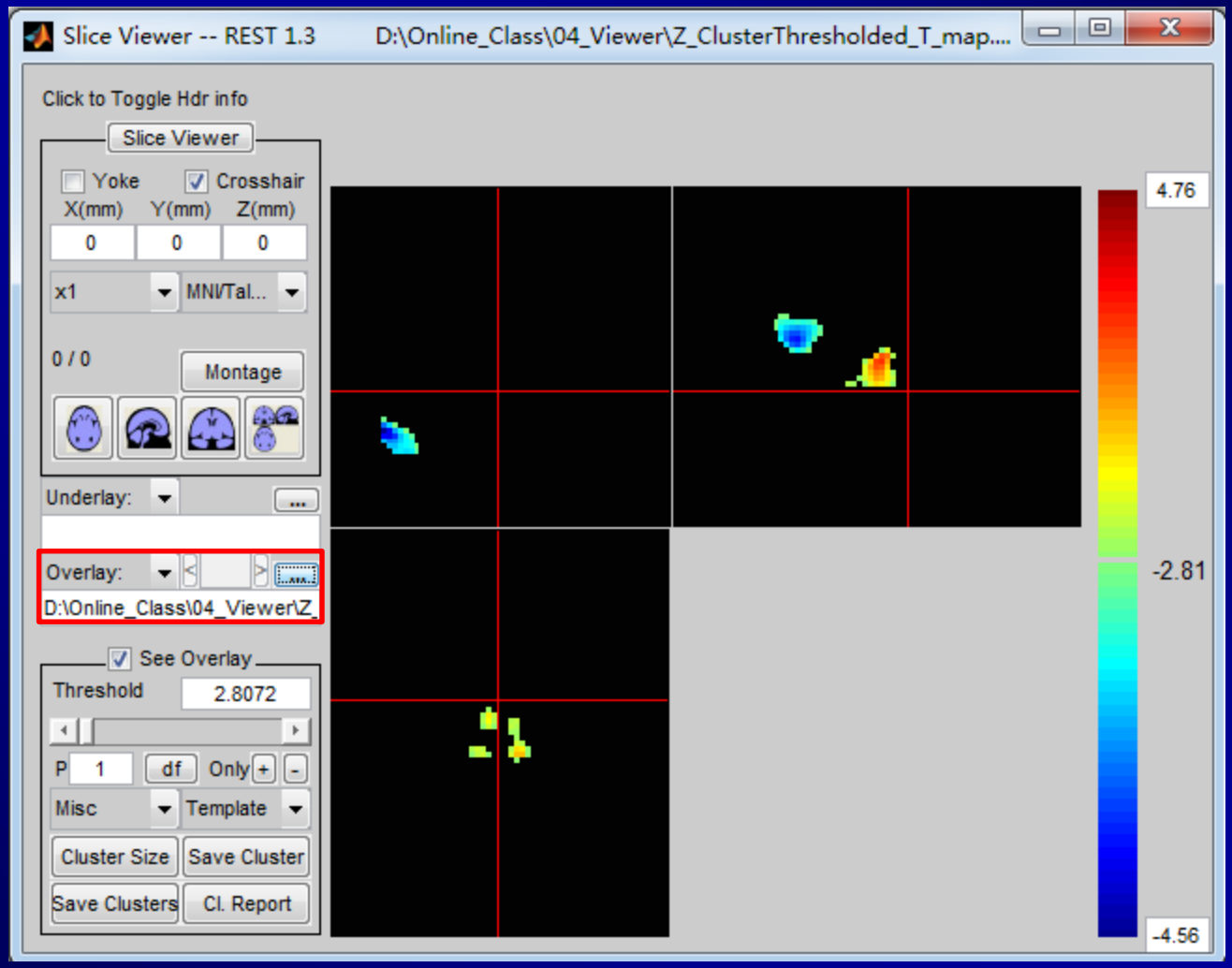
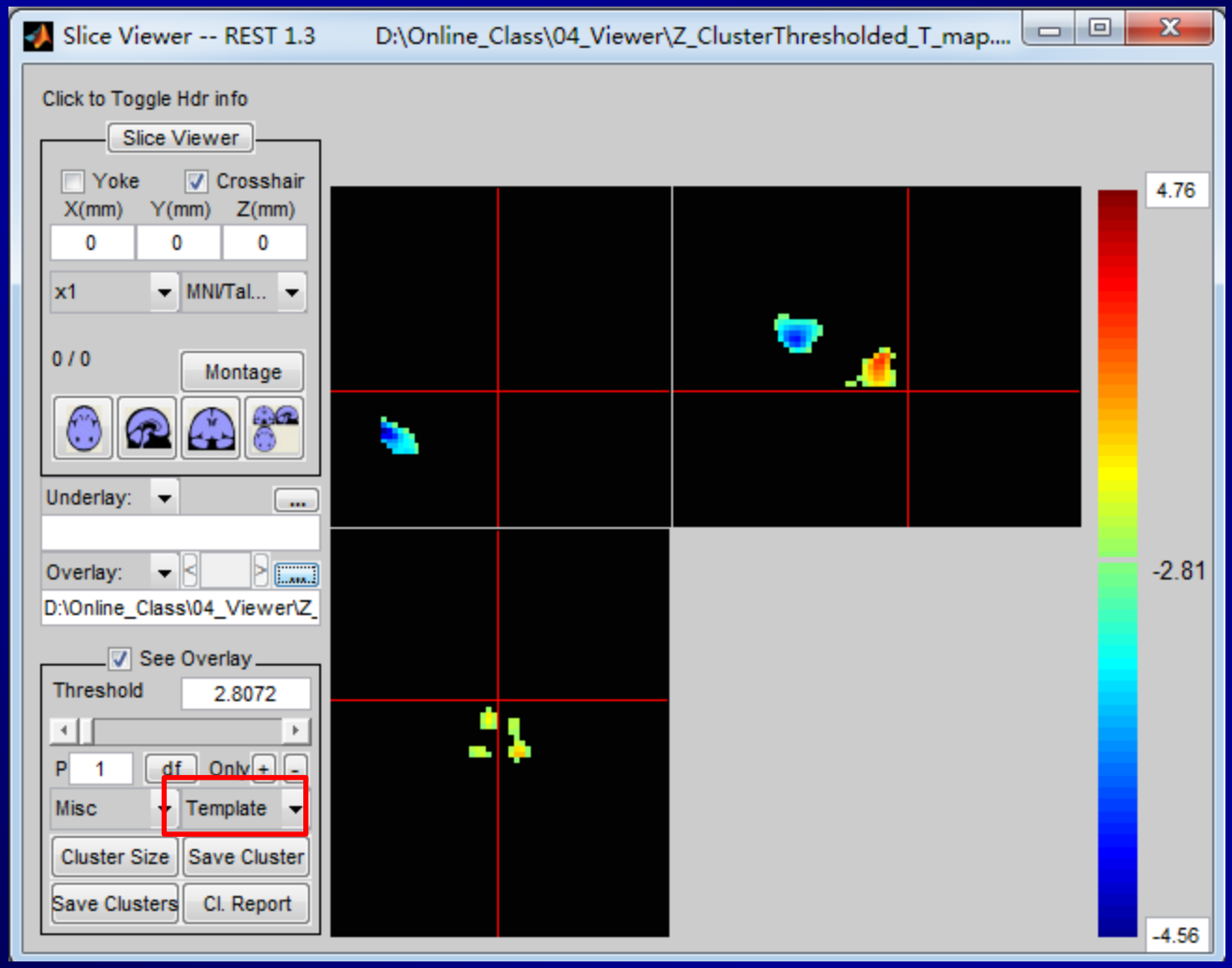
Quit


Slice Viewer -- REST 1.3
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
0
0
0
x1
MNI/Tal...
0
Montage
Underlay:
Overlay:
See Overlay
Threshold
0
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report


Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
0
0
0
x1
MNI/Tal...
0 / 0
Montage
Underlay:
...
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
4.76
-2.81
-4.56


Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
0
0
0
x1
MNI/Tal...
0 / 0
Montage
Underlay:
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
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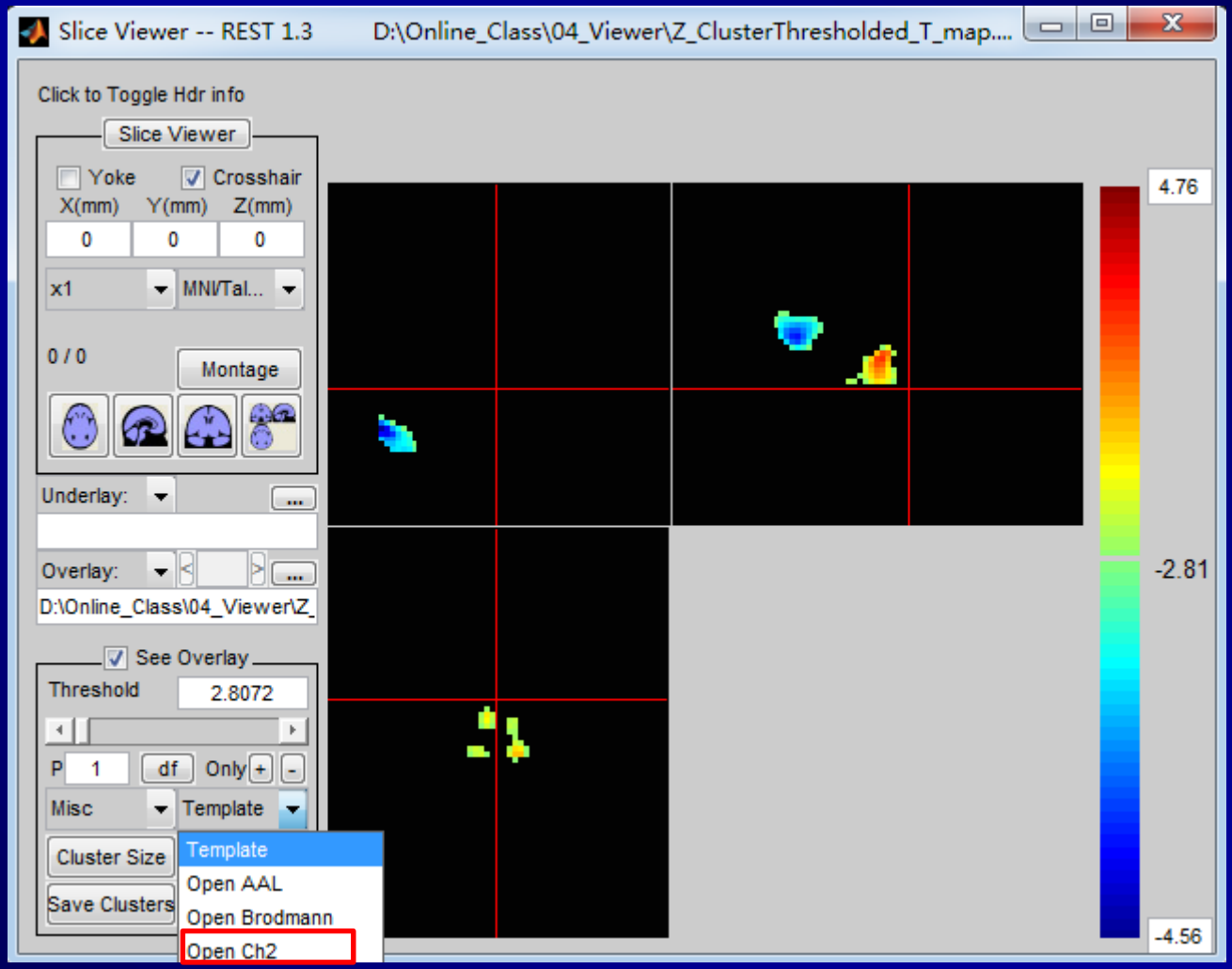
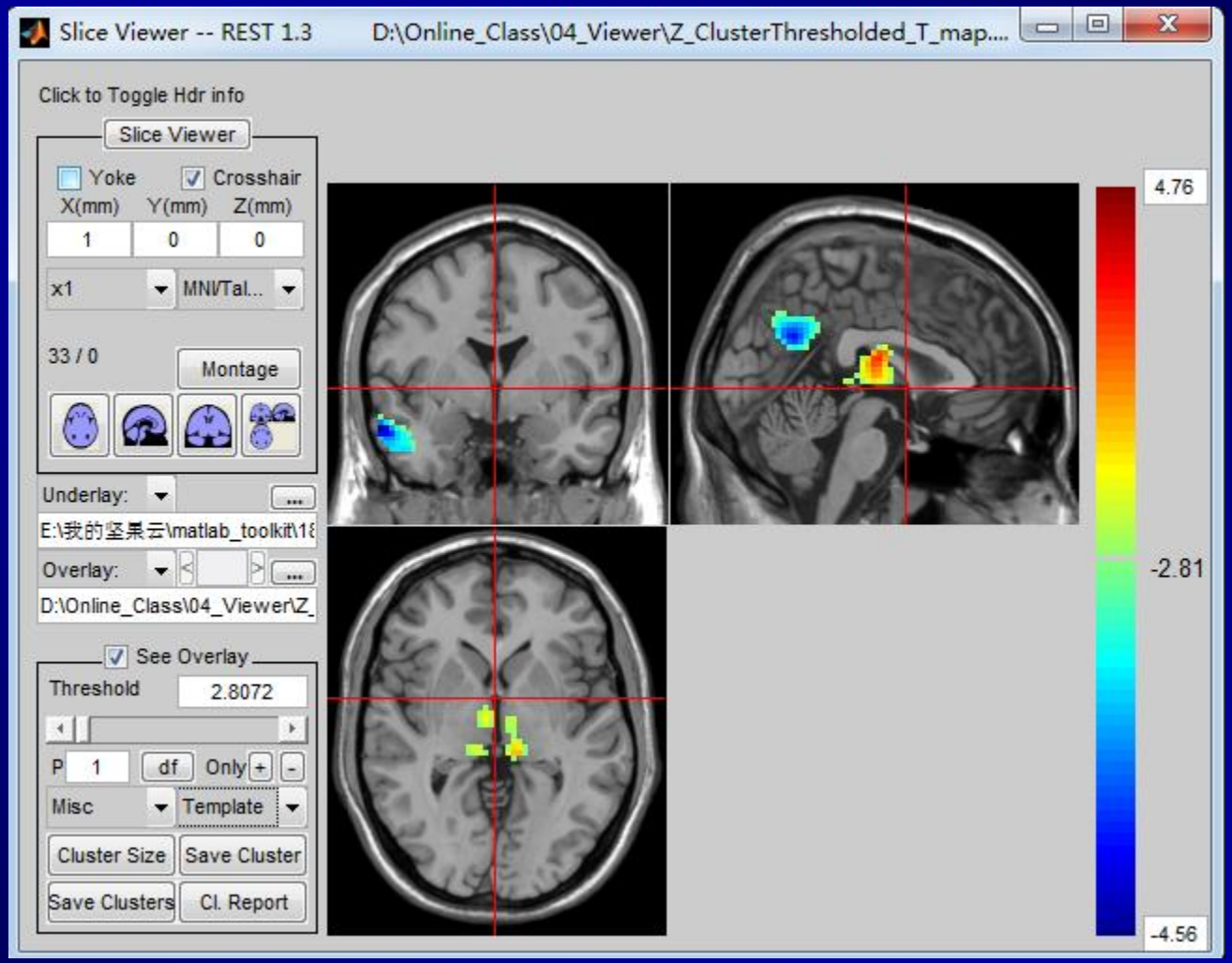
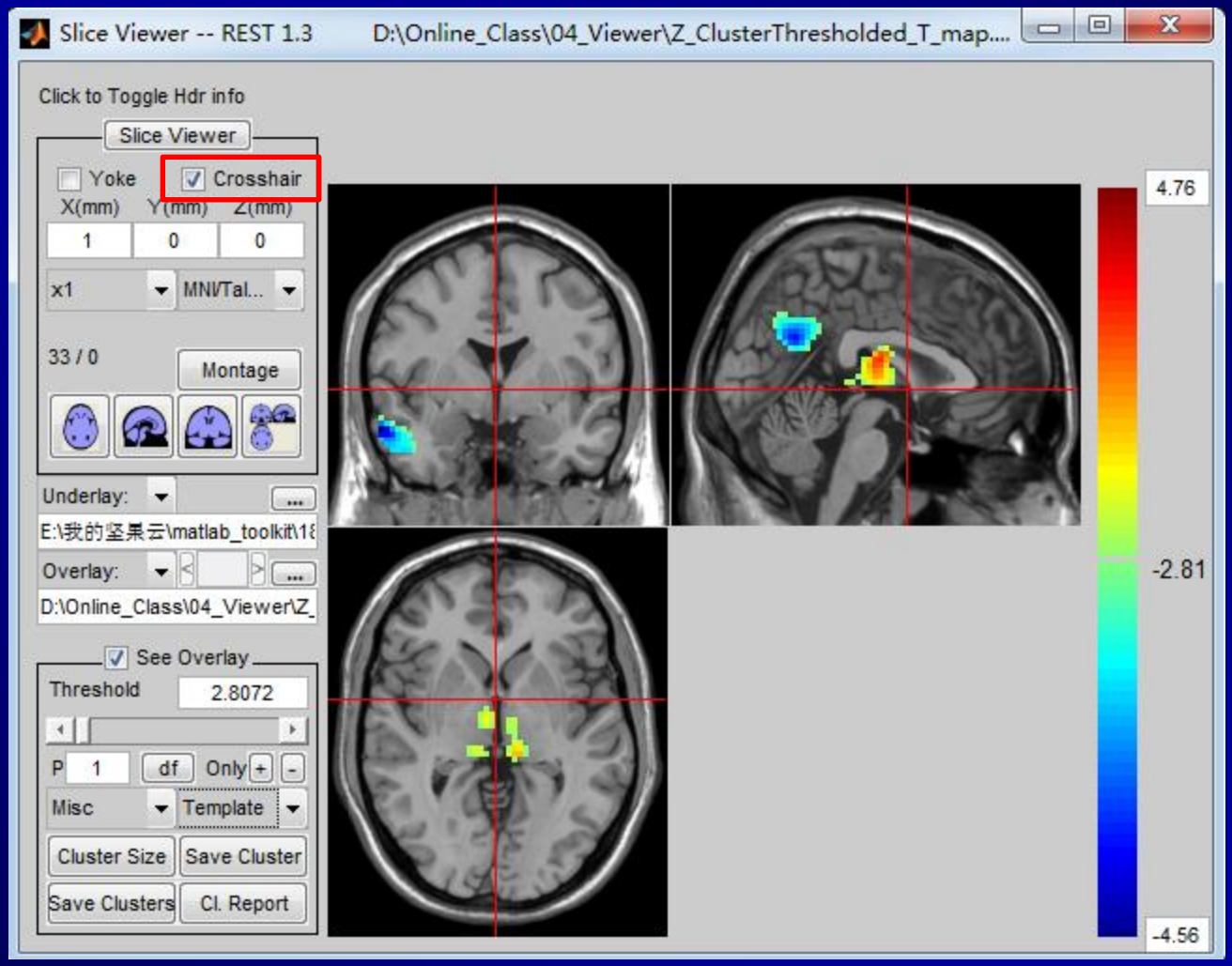
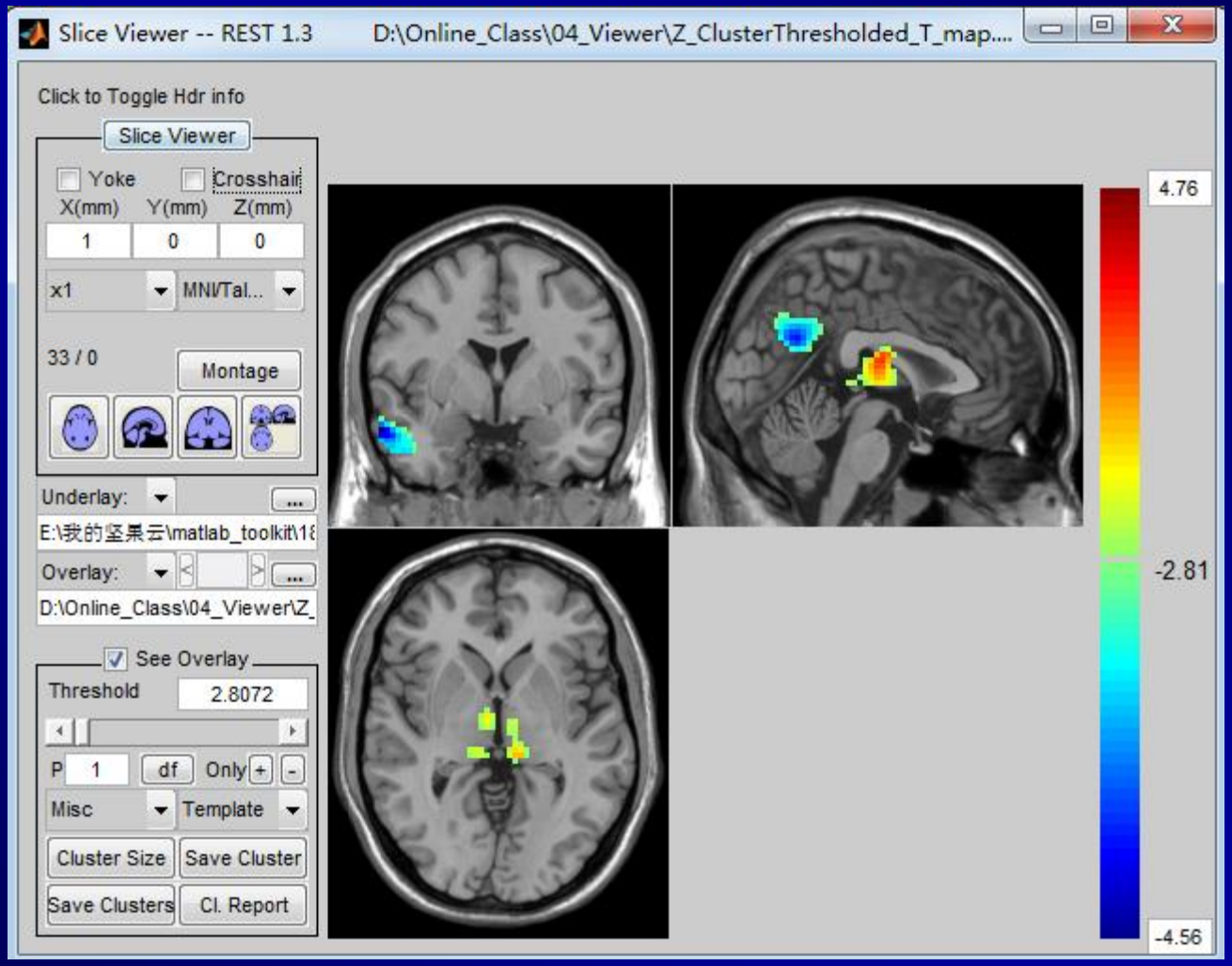
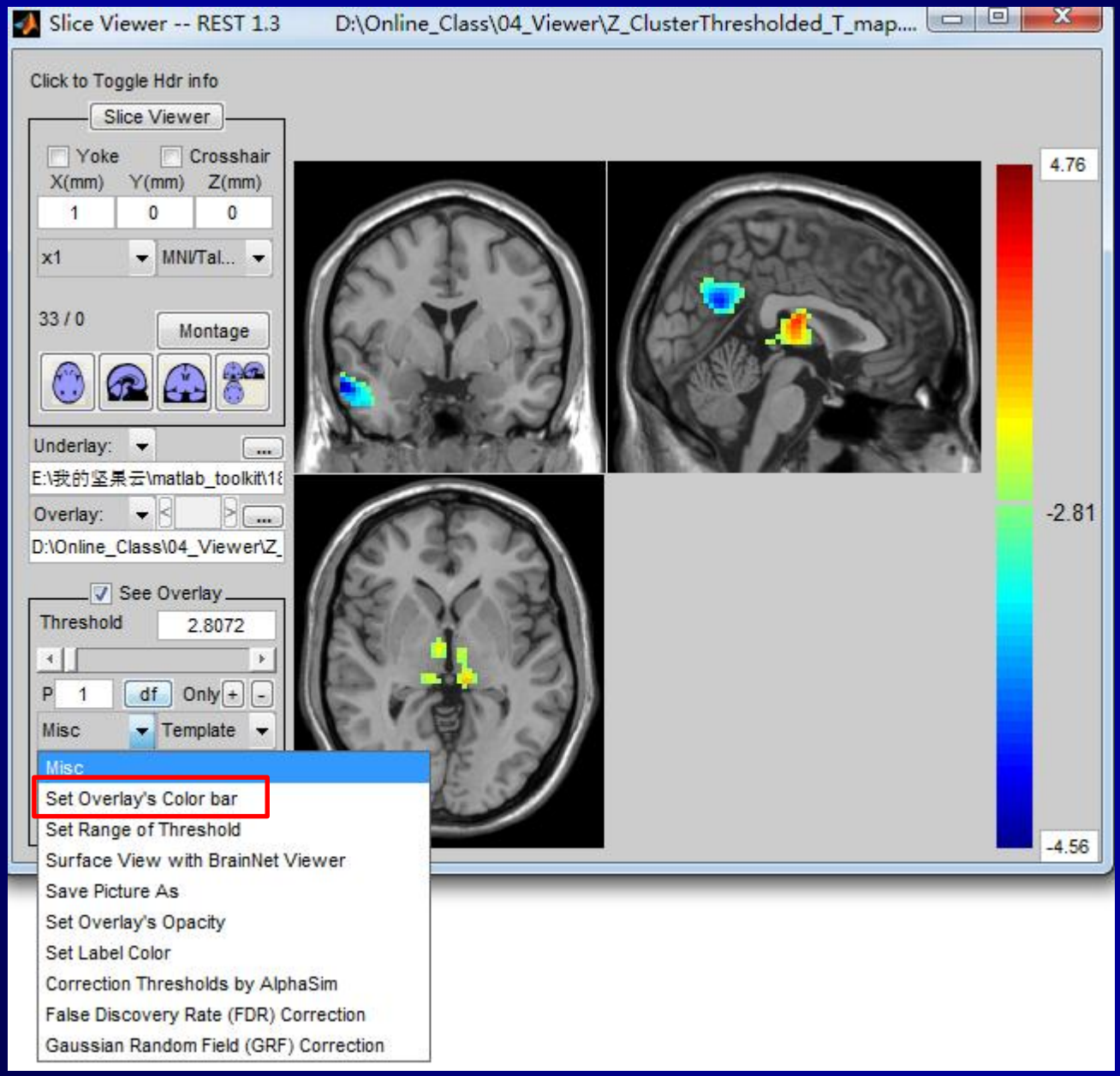
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
4.76
-2.81
-4.56

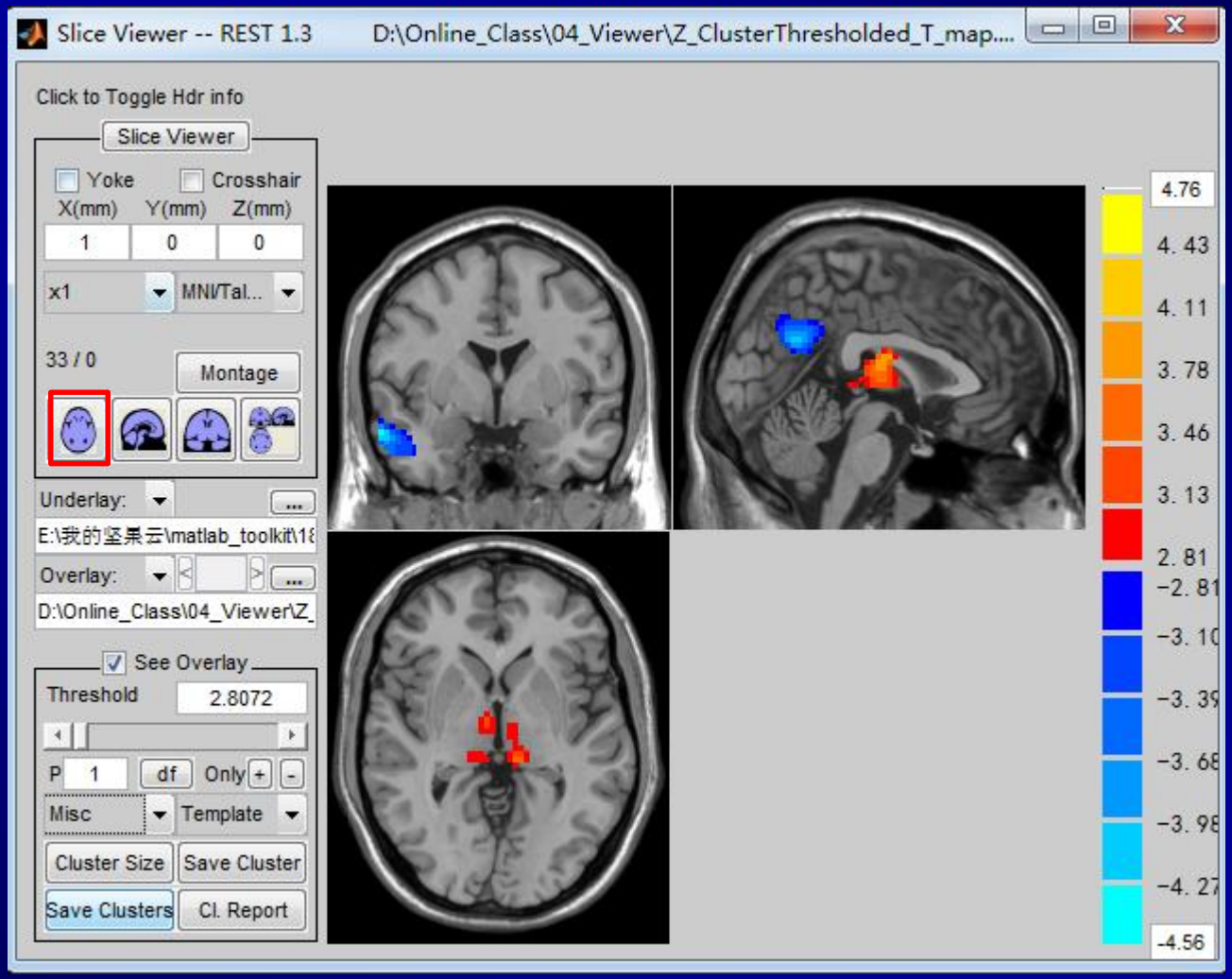

Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
0
0
0
x1
MNI/Tal...
0 / 0
Montage
Underlay:
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Clusters
Template
Open AAL
Open Brodmann
Open Ch2
4.76
-2.81
-4.56

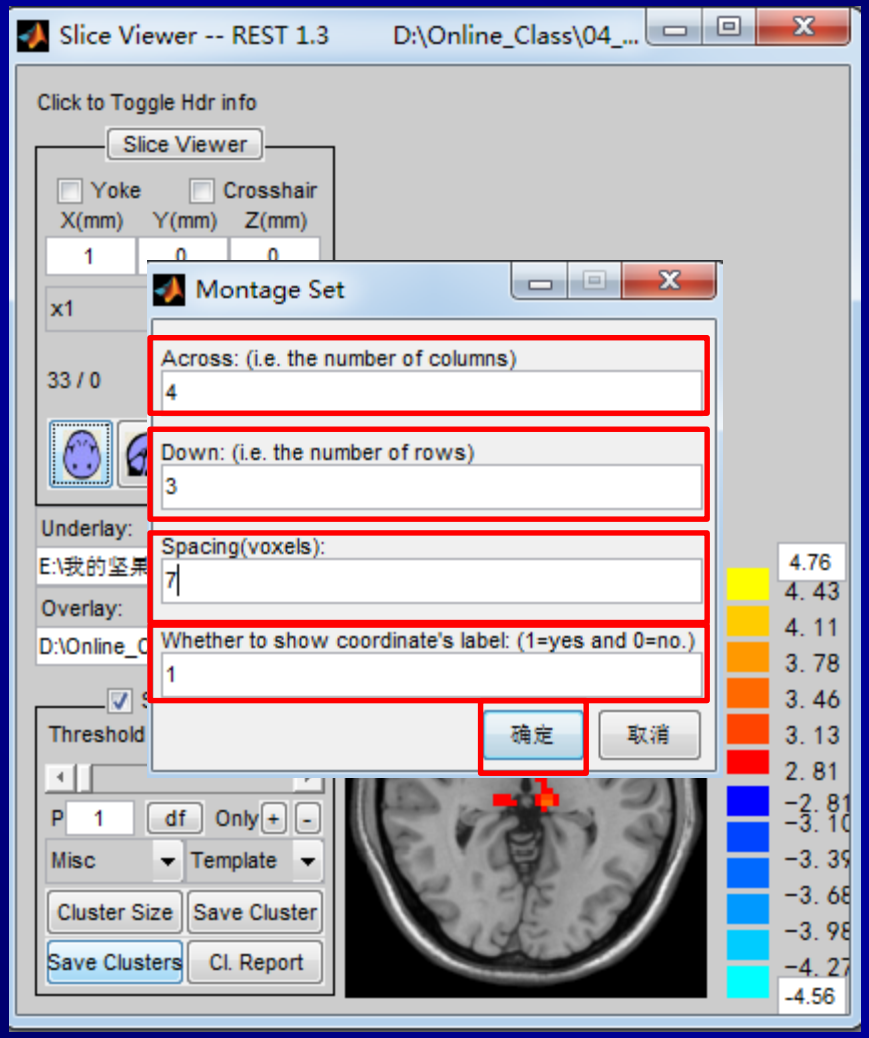

Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
MNI/Tal...
33 / 0
Montage
Underlay:
E:\我的坚果云\matlab_toolkit\18
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
4.76
-2.81
-4.56

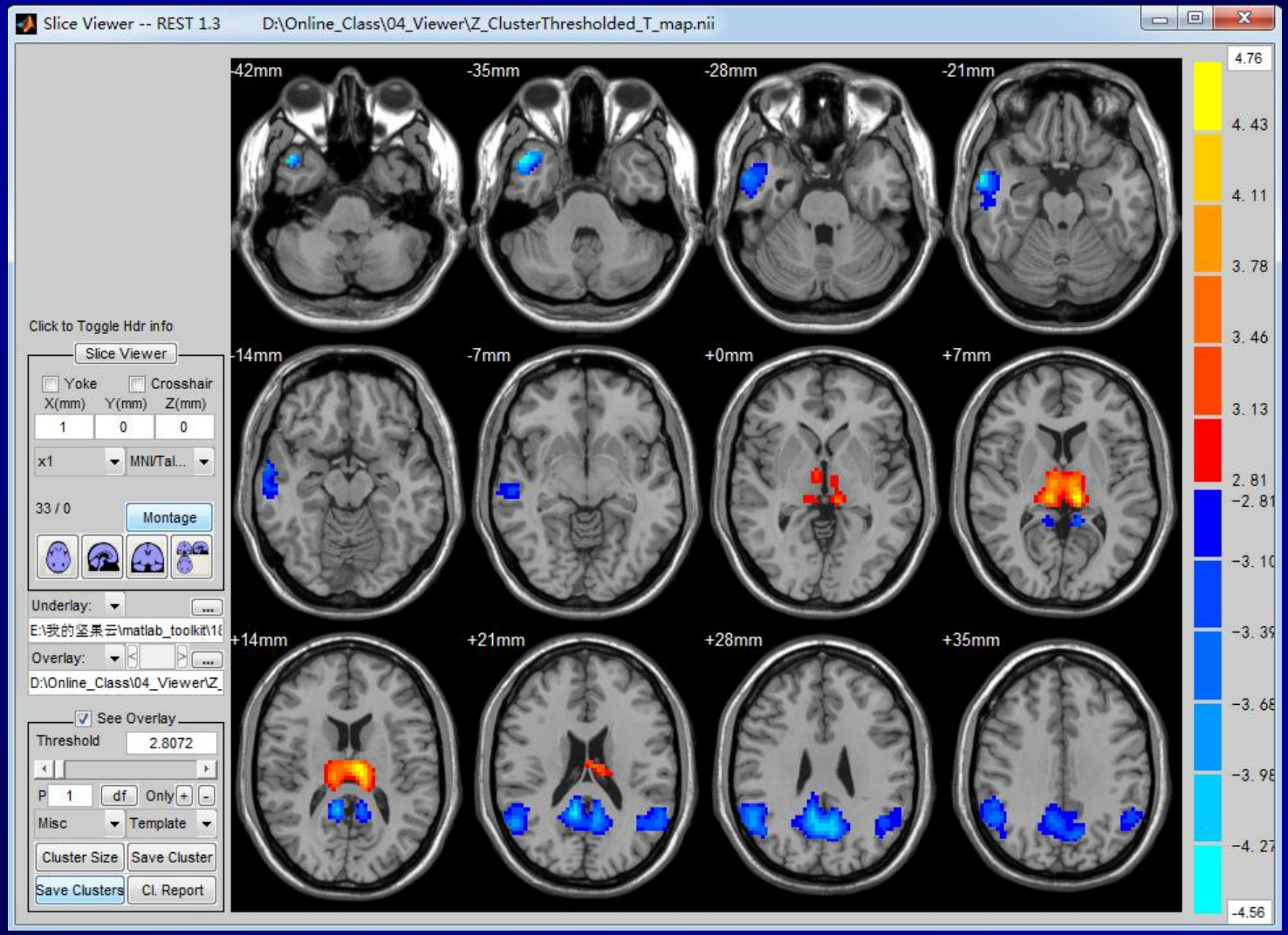

Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
MNI/Tal...
33 / 0
Montage
Underlay:
E:\我的坚果云\matlab_toolkit\18
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
4.76
-2.81
-4.56

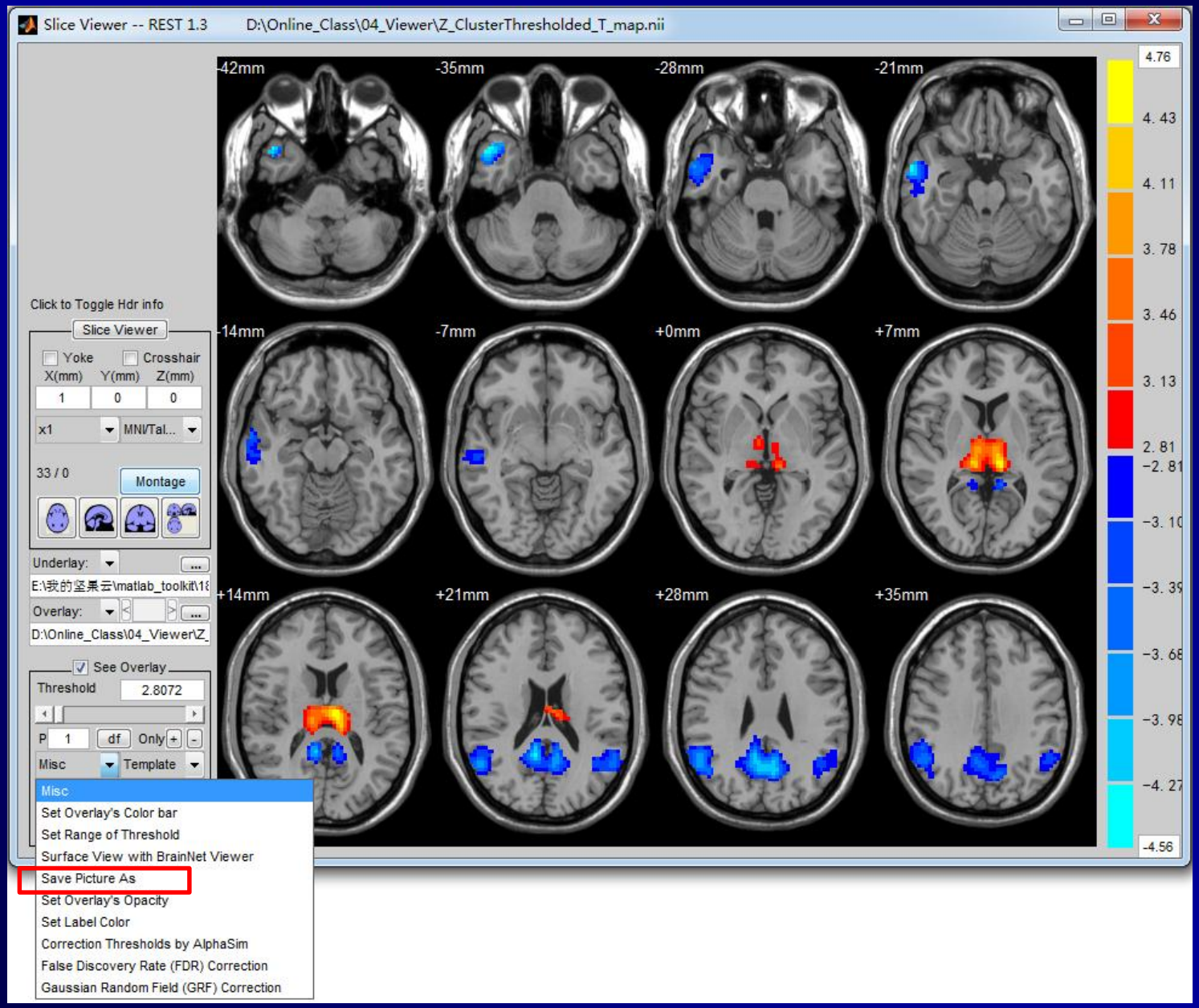

Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
MNI/Tal...
33 / 0
Montage
Underlay:
E:\我的坚果云\matlab_toolkit\18
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
4.76
-2.81
-4.56


Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
MNI/Tal...
33 / 0
Montage
Underlay:
E:\我的坚果云\matlab_toolkit\18
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
Misc
Template
Misc
Set Overlay's Color bar
Set Range of Threshold
Surface View with BrainNet Viewer
Save Picture As
Set Overlay's Opacity
Set Label Color
Correction Thresholds by AlphaSim
False Discovery Rate (FDR) Correction
Gaussian Random Field (GRF) Correction
4.76
-2.81
-4.56


Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map....
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
MNI/Tal...
33 / 0
Montage
Underlay:
E:\我的坚果云\matlab_toolkit\18
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
4.76
4. 43
4. 11
3. 78
3. 46
3. 13
2. 81
-2. 81
-3. 10
-3. 39
-3. 68
-3. 98
-4. 27
-4.56

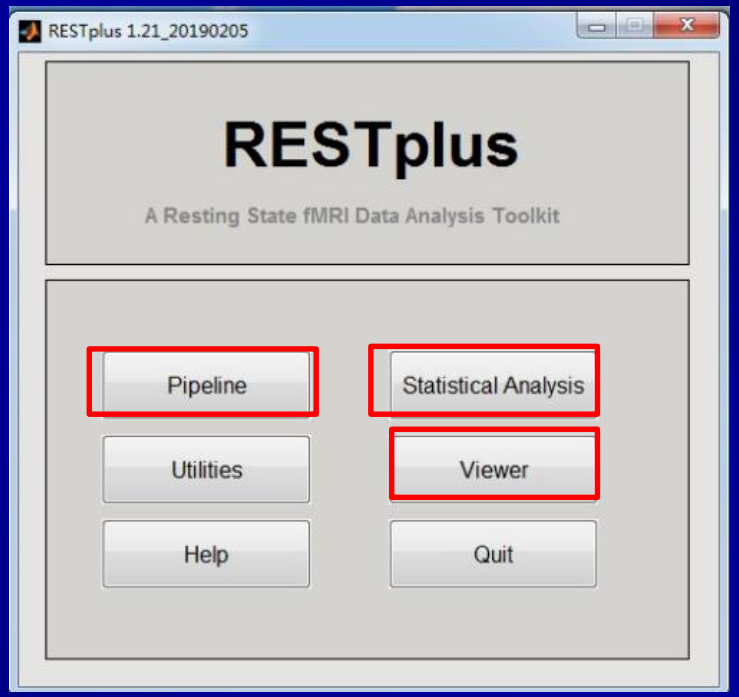

Slice Viewer -- REST 1.3
D:\Online_Class\04_...
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
33 / 0
Underlay:
E:\我的坚果
Overlay:
D:\Online_C
Threshold
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
Montage Set
Across: (i.e. the number of columns)
4
Down: (i.e. the number of rows)
3
Spacing(voxels):
7
Whether to show coordinate's label: (1=yes and 0=no.)
1
确定
取消
4.76
4. 43
4. 11
3. 78
3. 46
3. 13
2. 81
-2. 81
-3. 10
-3. 39
-3. 68
-3. 98
-4. 27
-4.56

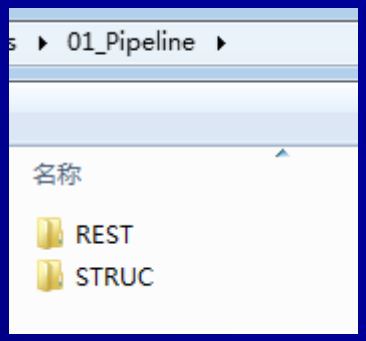

Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map.nii
-42mm
-35mm
-28mm
-21mm
-14mm
-7mm
+0mm
+7mm
+14mm
+21mm
+28mm
+35mm
4.76
4. 43
4. 11
3. 78
3. 46
3. 13
2. 81
-2. 81
-3. 10
-3. 39
-3. 68
-3. 98
-4. 27
-4.56
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
MNI/Tal...
33 / 0
Montage
Underlay:
E:\我的坚果云\matlab_toolkit\1
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report

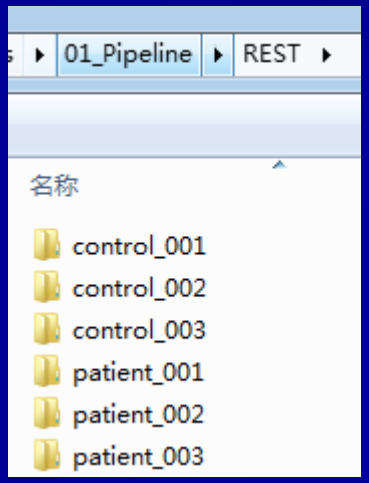

Slice Viewer -- REST 1.3
D:\Online_Class\04_Viewer\Z_ClusterThresholded_T_map.nii
-42mm
-35mm
-28mm
-21mm
-14mm
-7mm
+0mm
+7mm
+14mm
+21mm
+28mm
+35mm
4.76
4. 43
4. 11
3. 78
3. 46
3. 13
2. 81
-2. 81
-3. 10
-3. 39
-3. 68
-3. 98
-4. 27
-4.56
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
1
0
0
x1
MNI/Tal...
33 / 0
Montage
Underlay:
E:\我的坚果云\matlab_toolkit\18
Overlay:
D:\Online_Class\04_Viewer\Z_
See Overlay
Threshold
2.8072
P
1
df
Only
Misc
Template
Misc
Set Overlay's Color bar
Set Range of Threshold
Surface View with BrainNet Viewer
Save Picture As
Set Overlay's Opacity
Set Label Color
Correction Thresholds by AlphaSim
False Discovery Rate (FDR) Correction
Gaussian Random Field (GRF) Correction

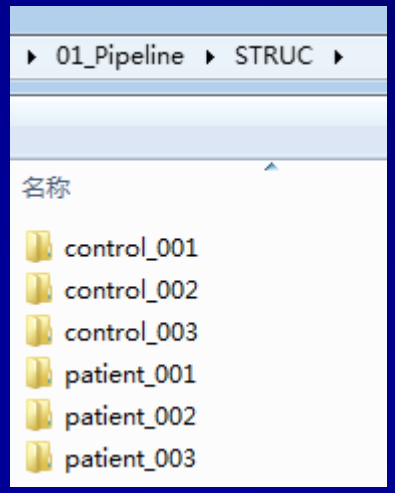
04. Summary

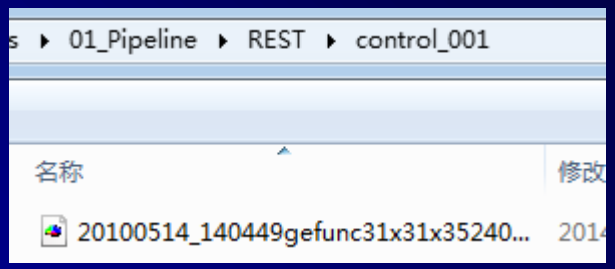
RESTplus

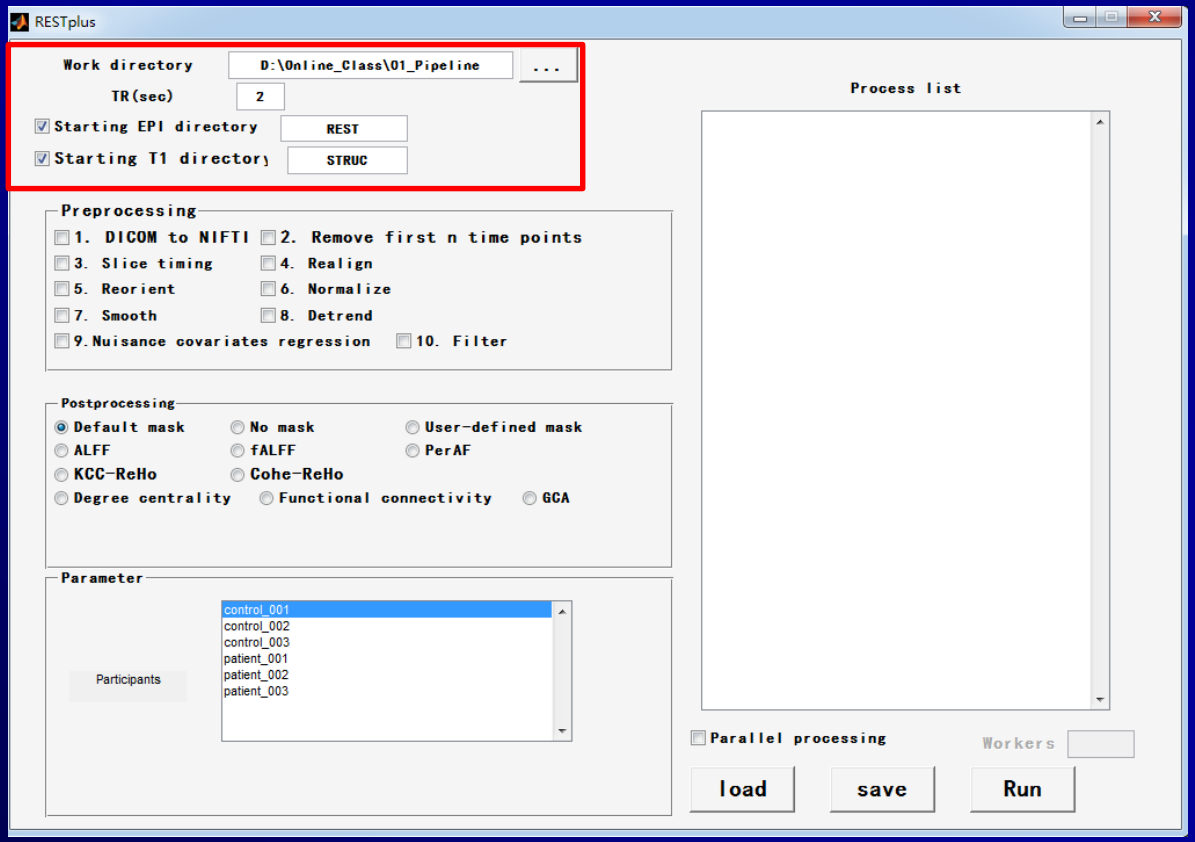

RESTplus 1.21_20190205
RESTplus
A Resting State fMRI Data Analysis Toolkit
Pipeline
Statistical Analysis
Utilities
Viewer
Help
Quit

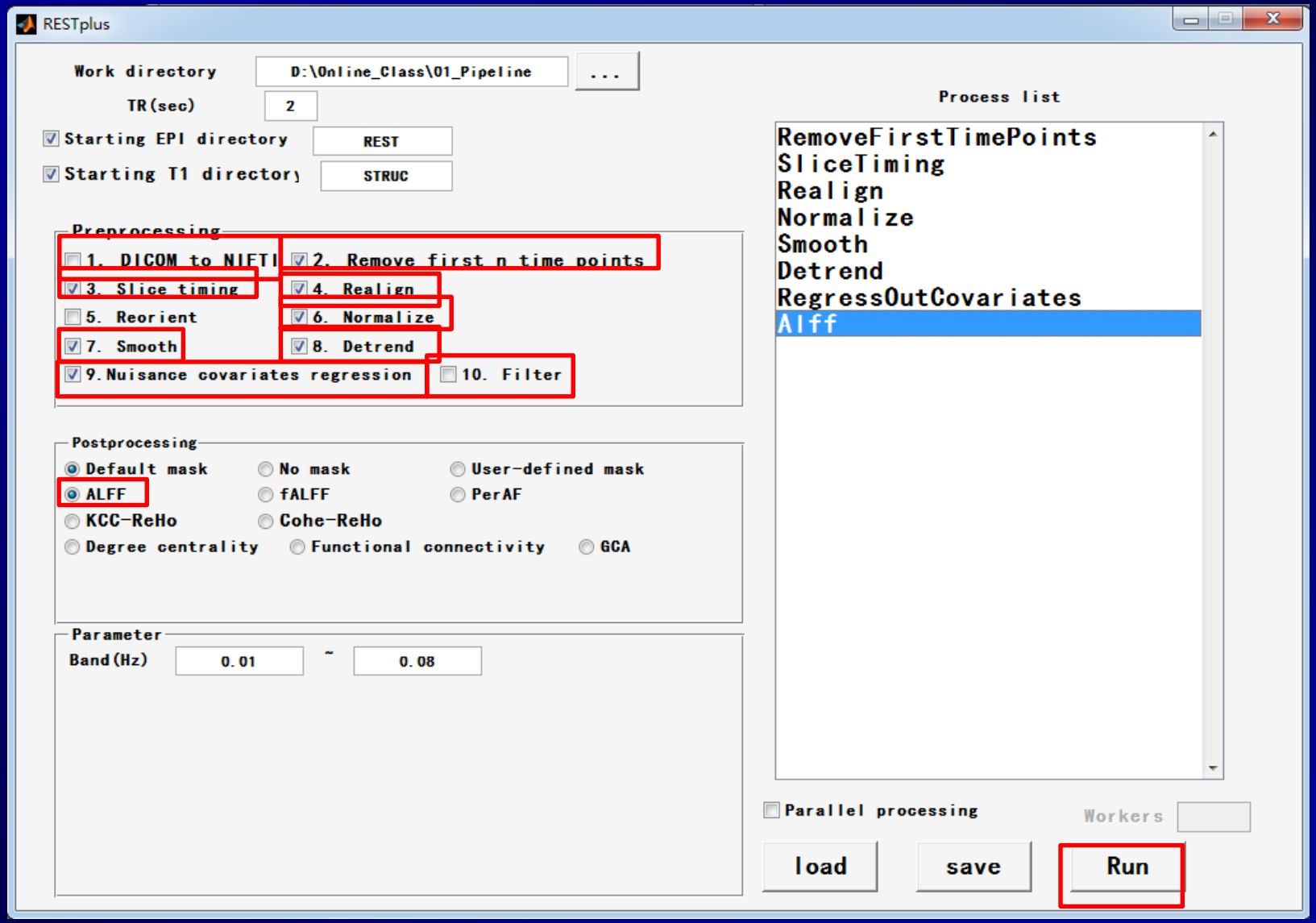

01_Pipeline
名称
REST
STRUC


01_Pipeline
REST
名称
control_001
control_002
control_003
patient_001
patient_002
patient_003

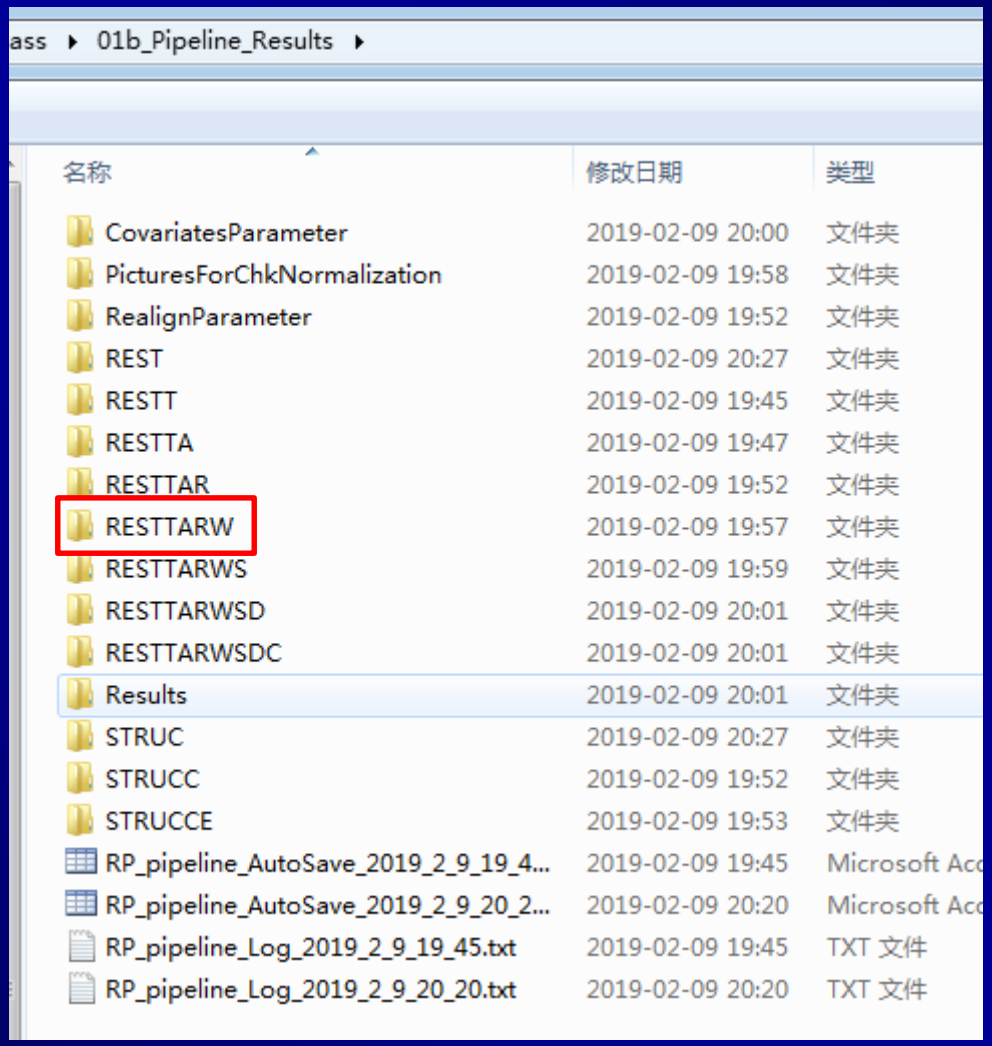

01_Pipeline
STRUC
名称
control_001
control_002
control_003
patient_001
patient_002
patient_003

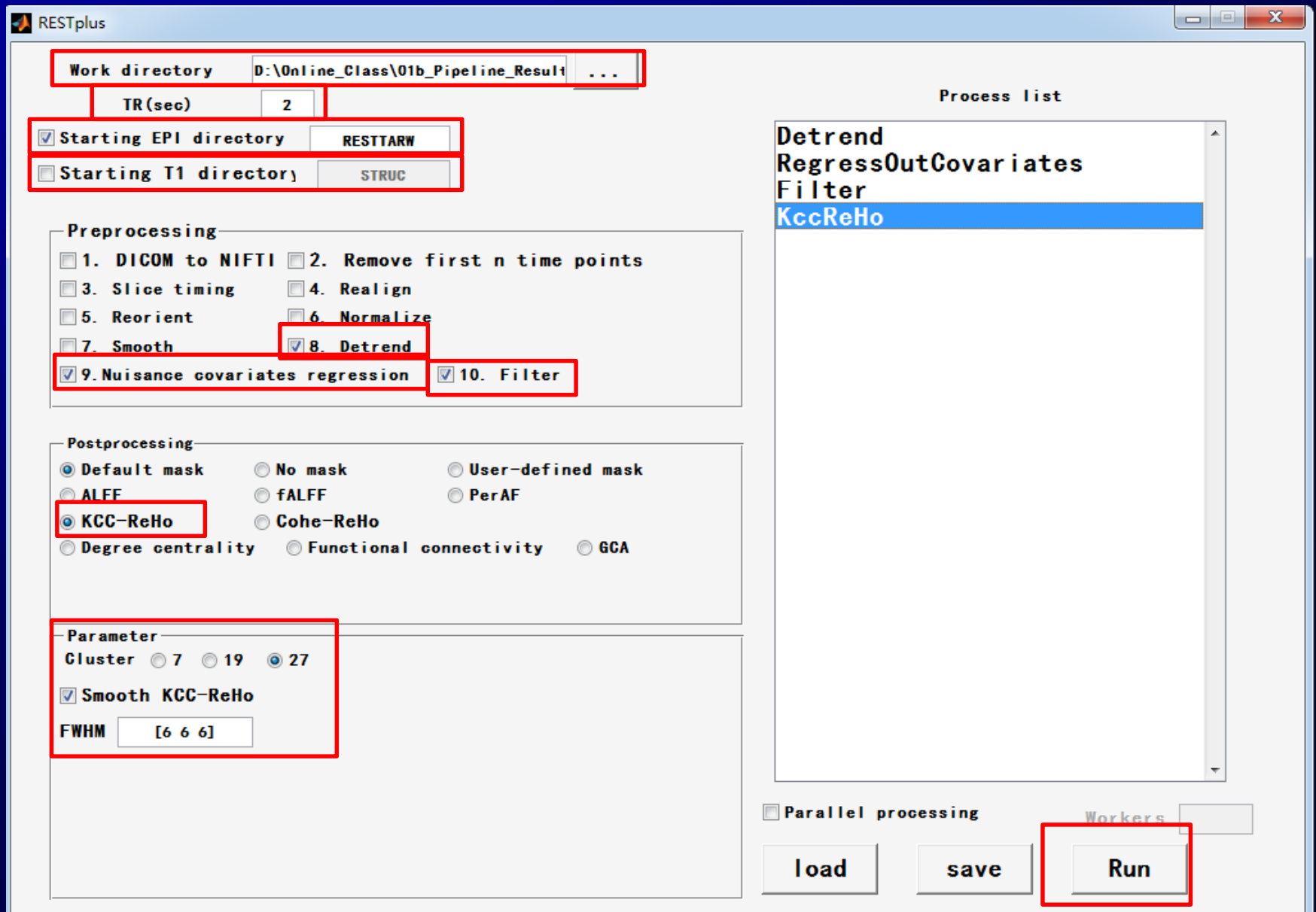

01_Pipeline
REST
control_001
名称
修改
20100514_140449gefunc31x31x35240...

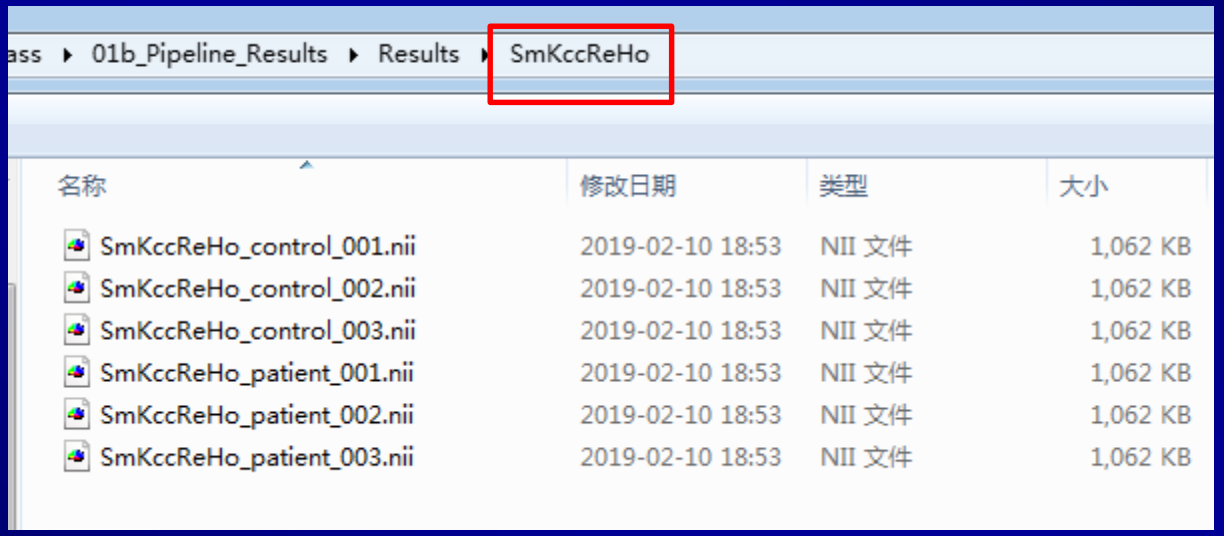

RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Process list
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Participants
control_001
control_002
control_003
patient_001
patient_002
patient_003
Parallel processing
Workers
load
save
Run


RESTplus
Work directory
D:\Online_Class\01_Pipeline
...
TR(sec)
2
Starting EPI directory
REST
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Band(Hz)
0.01
~
0.08
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Smooth
Detrend
RegressOutCovariates
Alff
Parallel processing
Workers
load
save
Run

05. pipeline


ass ▸ 01b_Pipeline_Results ▸
名称
修改日期
类型
CovariatesParameter 2019-02-09 20:00 文件夹
PicturesForChkNormalization 2019-02-09 19:58 文件夹
RealignParameter 2019-02-09 19:52 文件夹
REST 2019-02-09 20:27 文件夹
RESTT 2019-02-09 19:45 文件夹
RESTTA 2019-02-09 19:47 文件夹
RESTTAR 2019-02-09 19:52 文件夹
RESTTARW 2019-02-09 19:57 文件夹
RESTTARWS 2019-02-09 19:59 文件夹
RESTTARWSD 2019-02-09 20:01 文件夹
RESTTARWSDC 2019-02-09 20:01 文件夹
Results 2019-02-09 20:01 文件夹
STRUC 2019-02-09 20:27 文件夹
STRUCC 2019-02-09 19:52 文件夹
STRUCCE 2019-02-09 19:53 文件夹
RP_pipeline_AutoSave_2019_2_9_19_4... 2019-02-09 19:45 Microsoft Acc
RP_pipeline_AutoSave_2019_2_9_20_2... 2019-02-09 20:20 Microsoft Acc
RP_pipeline_Log_2019_2_9_19_45.txt 2019-02-09 19:45 TXT 文件
RP_pipeline_Log_2019_2_9_20_20.txt 2019-02-09 20:20 TXT 文件


RESTplus
Work directory
D:\Online_Class\01b_Pipeline_Result
...
TR(sec)
2
Starting EPI directory
RESTARW
Starting T1 directory
STRUC
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9. Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User-defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Cluster
7
19
27
Smooth KCC-ReHo
FWHM
[6 6 6]
Process list
Detrend
RegressOutCovariates
Filter
KccReHo
Parallel processing
Workers
load
save
Run


ass ▸ 01b_Pipeline_Results ▸ Results ▸ SmKccReHo
名称
修改日期
类型
大小
SmKccReHo_control_001.nii 2019-02-10 18:53 NII 文件 1,062 KB
SmKccReHo_control_002.nii 2019-02-10 18:53 NII 文件 1,062 KB
SmKccReHo_control_003.nii 2019-02-10 18:53 NII 文件 1,062 KB
SmKccReHo_patient_001.nii 2019-02-10 18:53 NII 文件 1,062 KB
SmKccReHo_patient_002.nii 2019-02-10 18:53 NII 文件 1,062 KB
SmKccReHo_patient_003.nii 2019-02-10 18:53 NII 文件 1,062 KB

06. Other metrics

Fractional ALFF (fALFF)

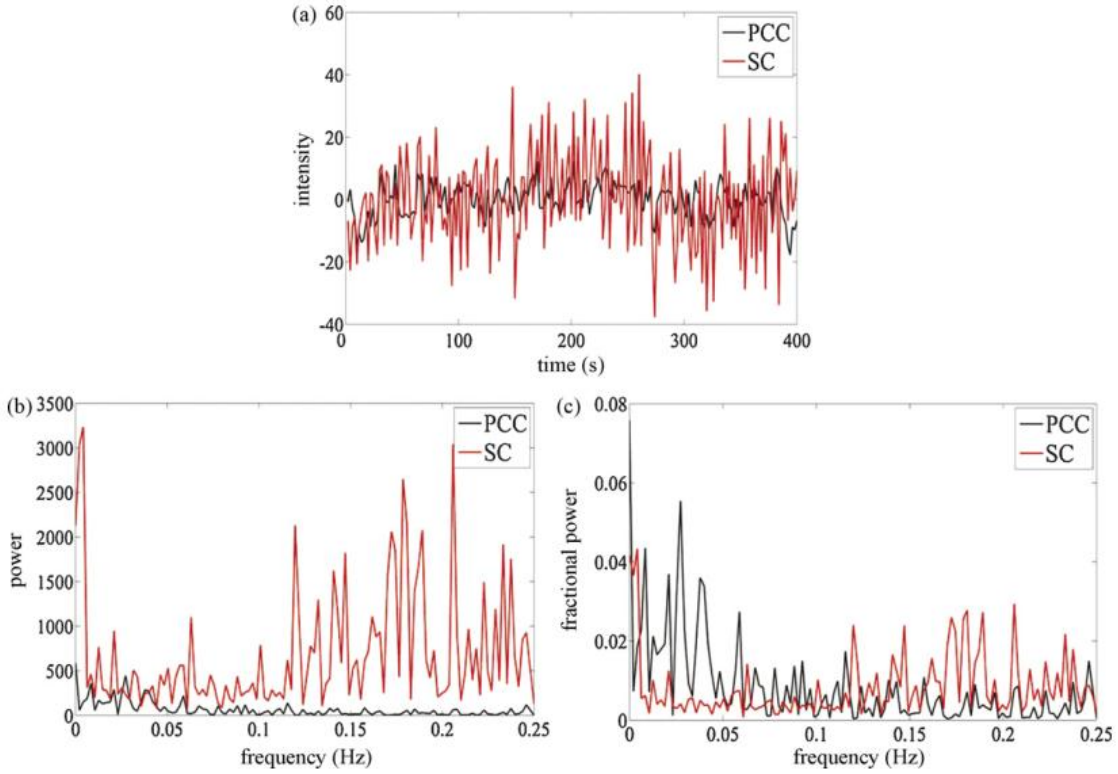
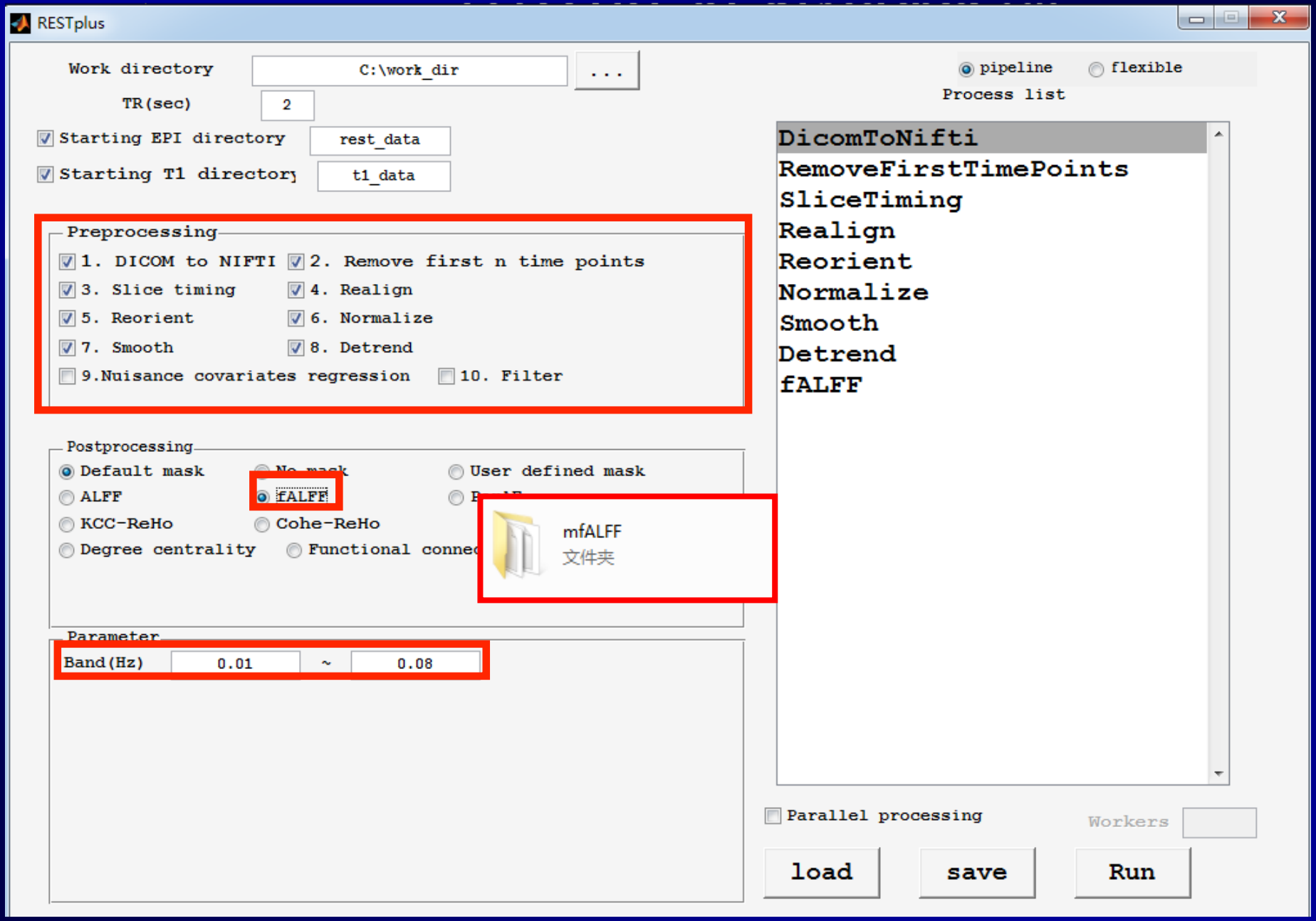


Fig. 2. Illustration of the improvement of ALFF approach. (a) The time series (without filtering) from a typical voxel in the suprasellar cistern (SC) (−1, −2, −18) and the posterior cingulate cortex (PCC) (−4, −56, 25) of an individual. (b) The power in the SC is higher than that in PCC at almost every frequency. (c) The ratio of the power at each frequency to the integrate power of the entire frequency range indicates that the power in the low-frequency range (0.01–0.08 Hz) is significantly suppressed in the SC.

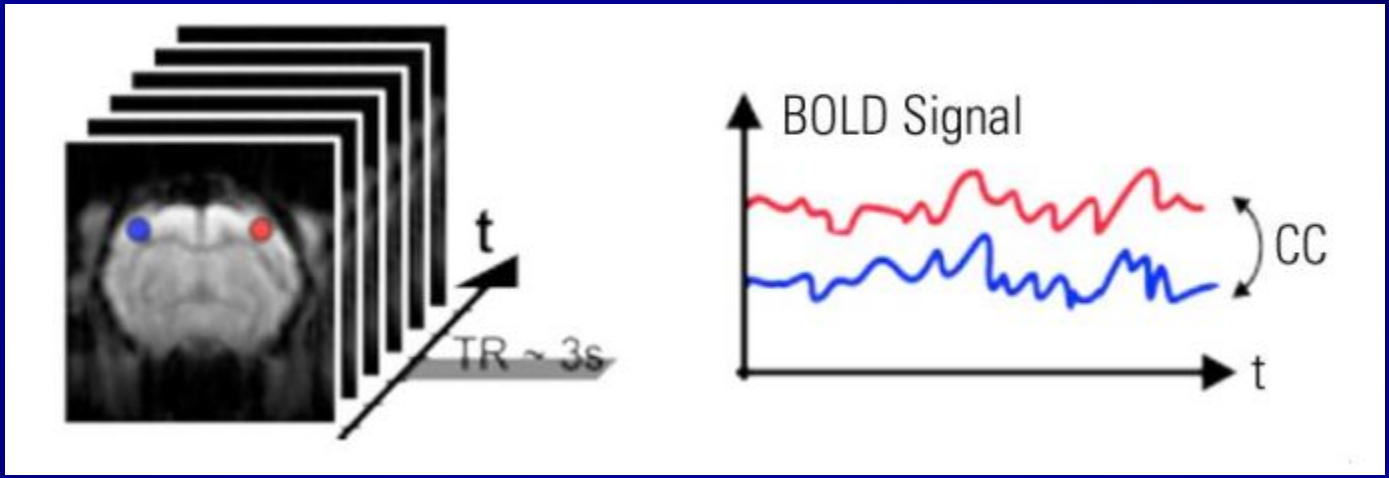
Zou Q H, Zhu C Z, Yang Y, et al. An improved approach to detection of amplitude of low-frequency fluctuation (ALFF) for resting-state fMRI: fractional ALFF[J]. Journal of neuroscience methods, 2008, 172(1): 137-141.

fALFF

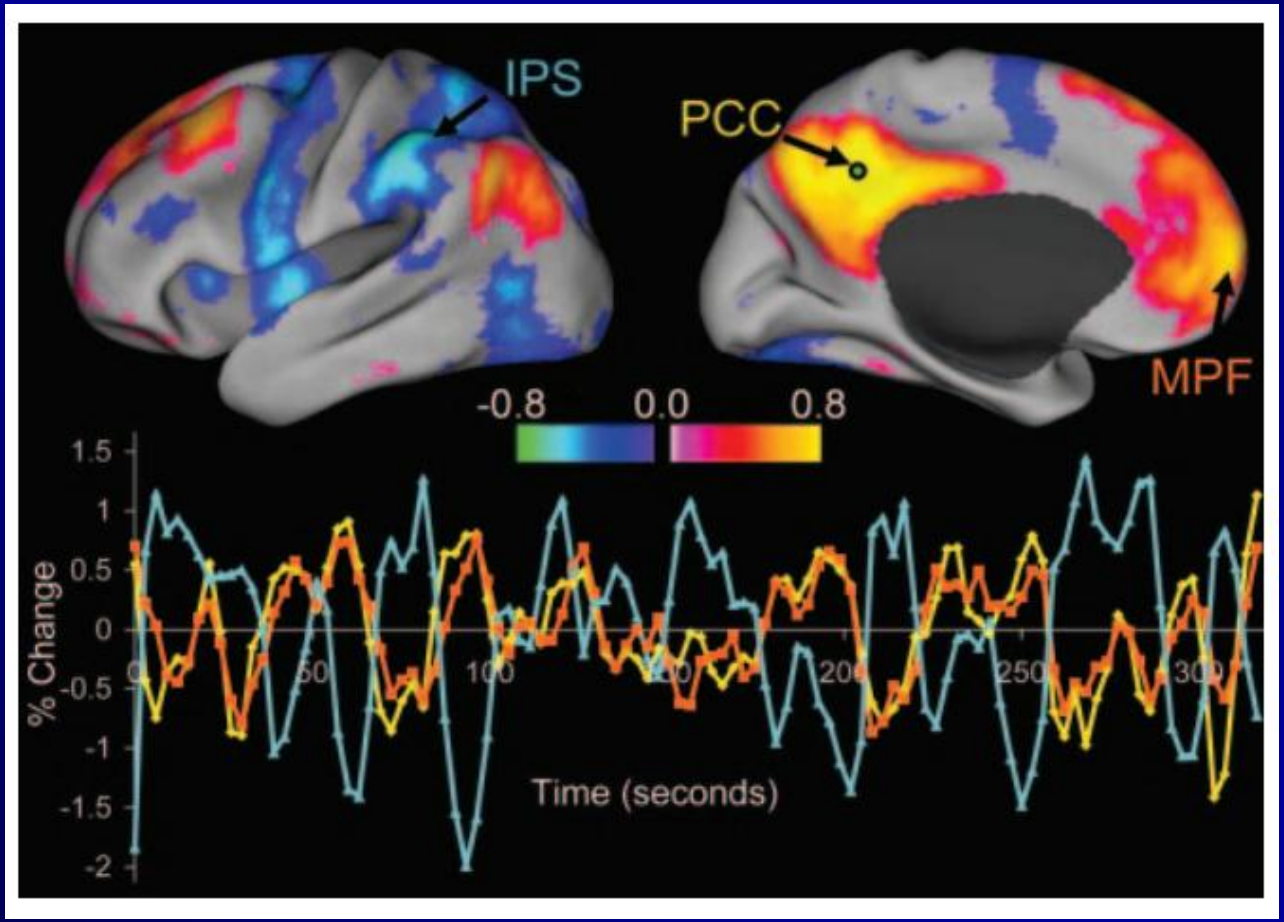
1 DICOM to NIFTI
2 Remove first n time points
3 Slice timing
4 Realign
5 Reorient
6 Normalize
7 Smooth
8 Detrend
9 fALFF


RESTplus
Work directory
C:\work_dir
...
TR(sec)
2
Starting EPI directory
rest_data
Starting T1 directory
t1_data
pipeline
flexible
Process list
DicomToNifti
RemoveFirstTimePoints
SliceTiming
Realign
Reorient
Normalize
Smooth
Detrend
fALFF
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9.Nuisance covariates regression
10. Filter
Postprocessing
Default mask
User defined mask
ALFF
fALFF
KCC-ReHo
Cohe-ReHo
Degree centrality
mfALFF
文件夹
Parameter
Band(Hz)
0.01
~
0.08
Parallel processing
Workers
load
save
Run

Functional connectivity

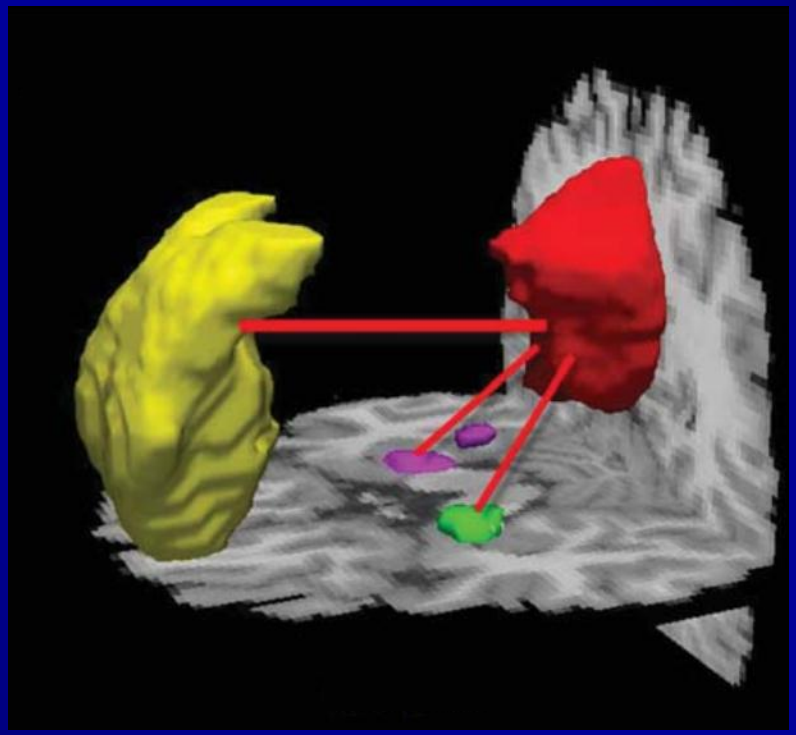


Voxel wise functional connectivity



(Fox et al., PNAS, 2005)

ROI wise functional connectivity



(Liao & Zhang et al., HBM, 2011)

Functional connectivity

1 DICOM to NIFTI

2 Remove first n time points

3 Slice timing

4 Realign

5 Reorient

6 Normalize

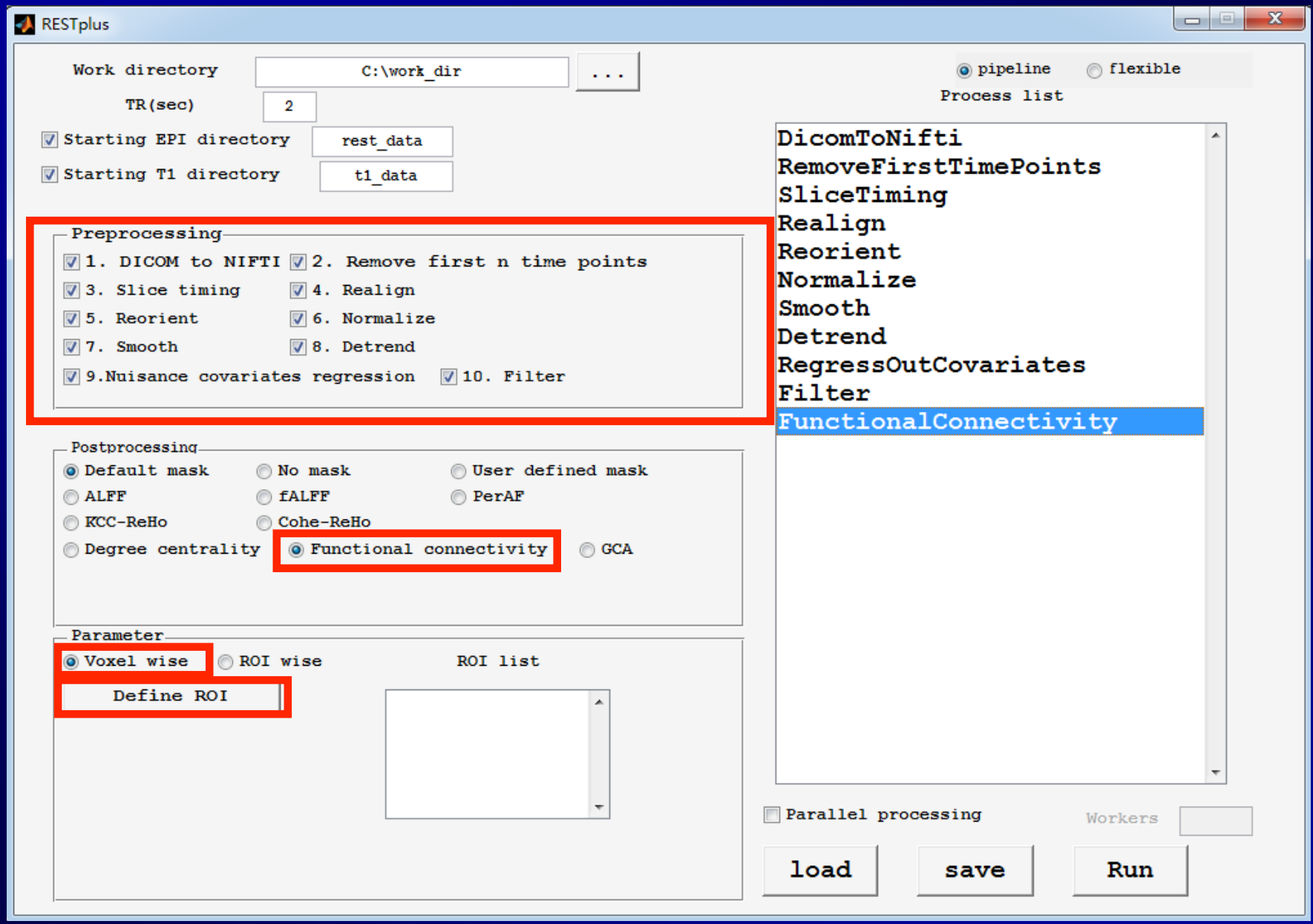
7 Smooth

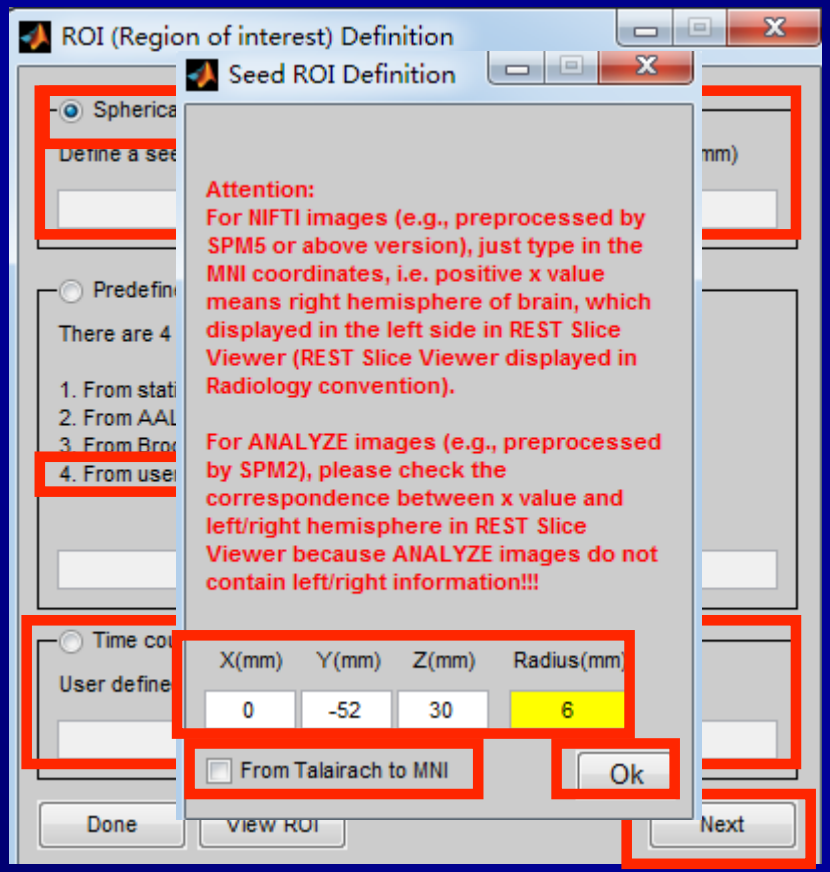
8 Detrend

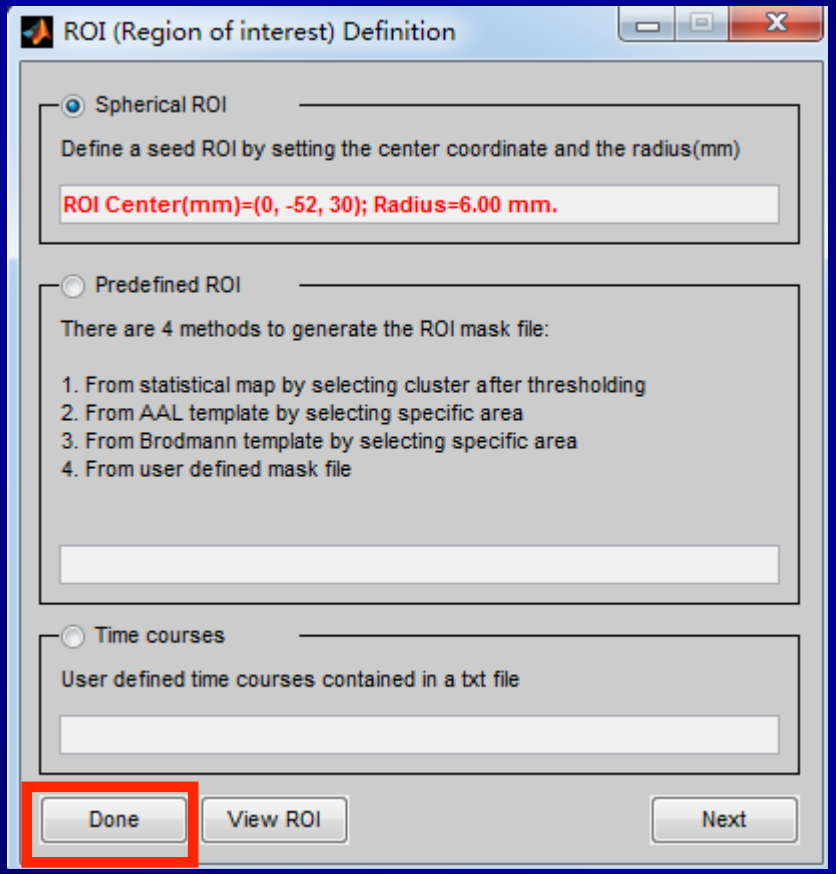
9 Nuisance covariates regression

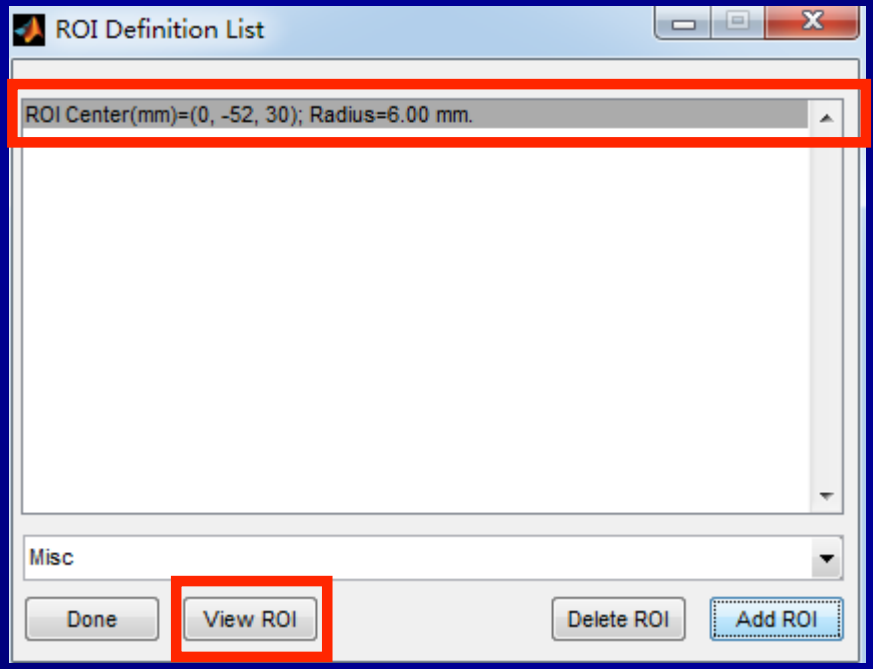
10 Filter

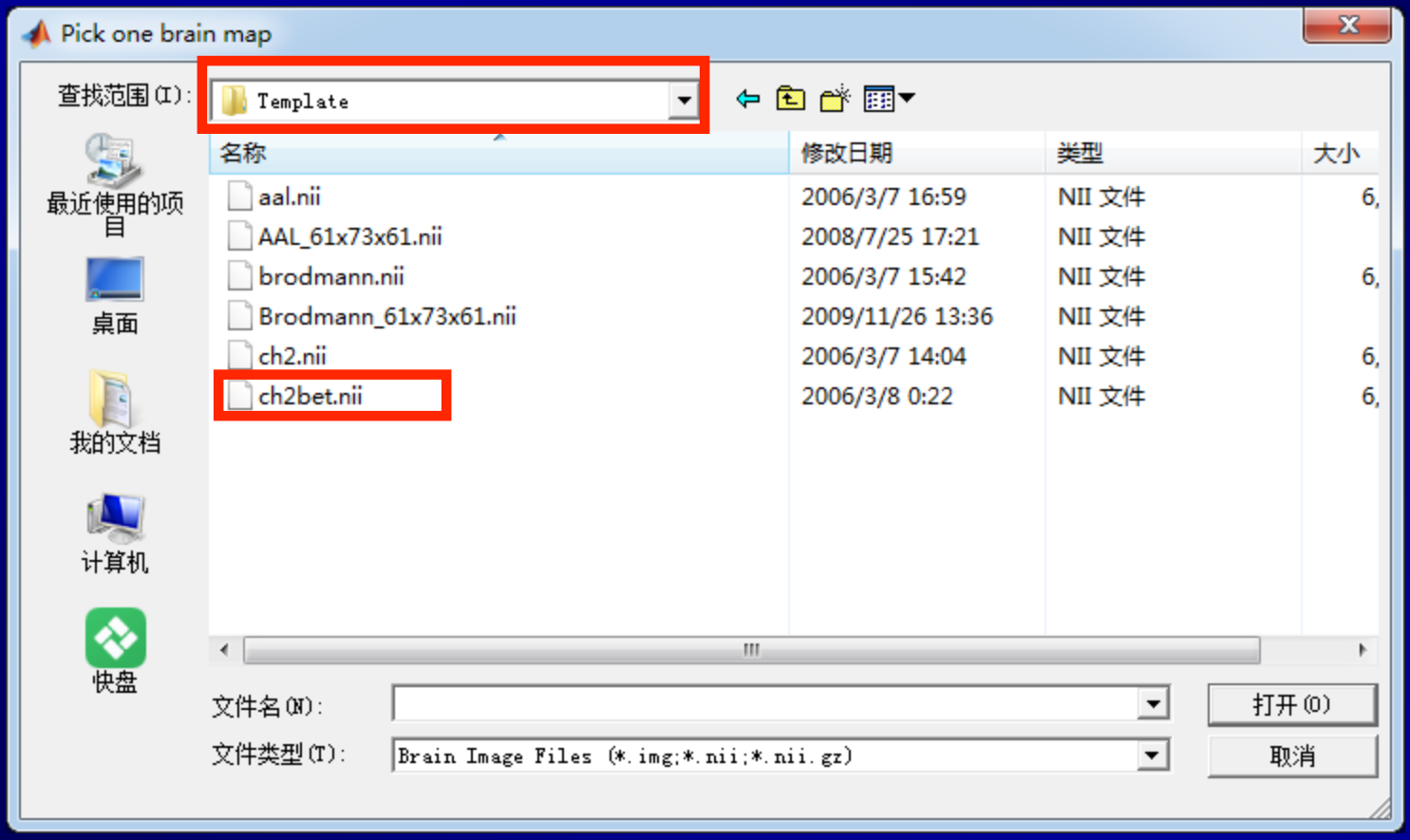
11 Functional connectivity

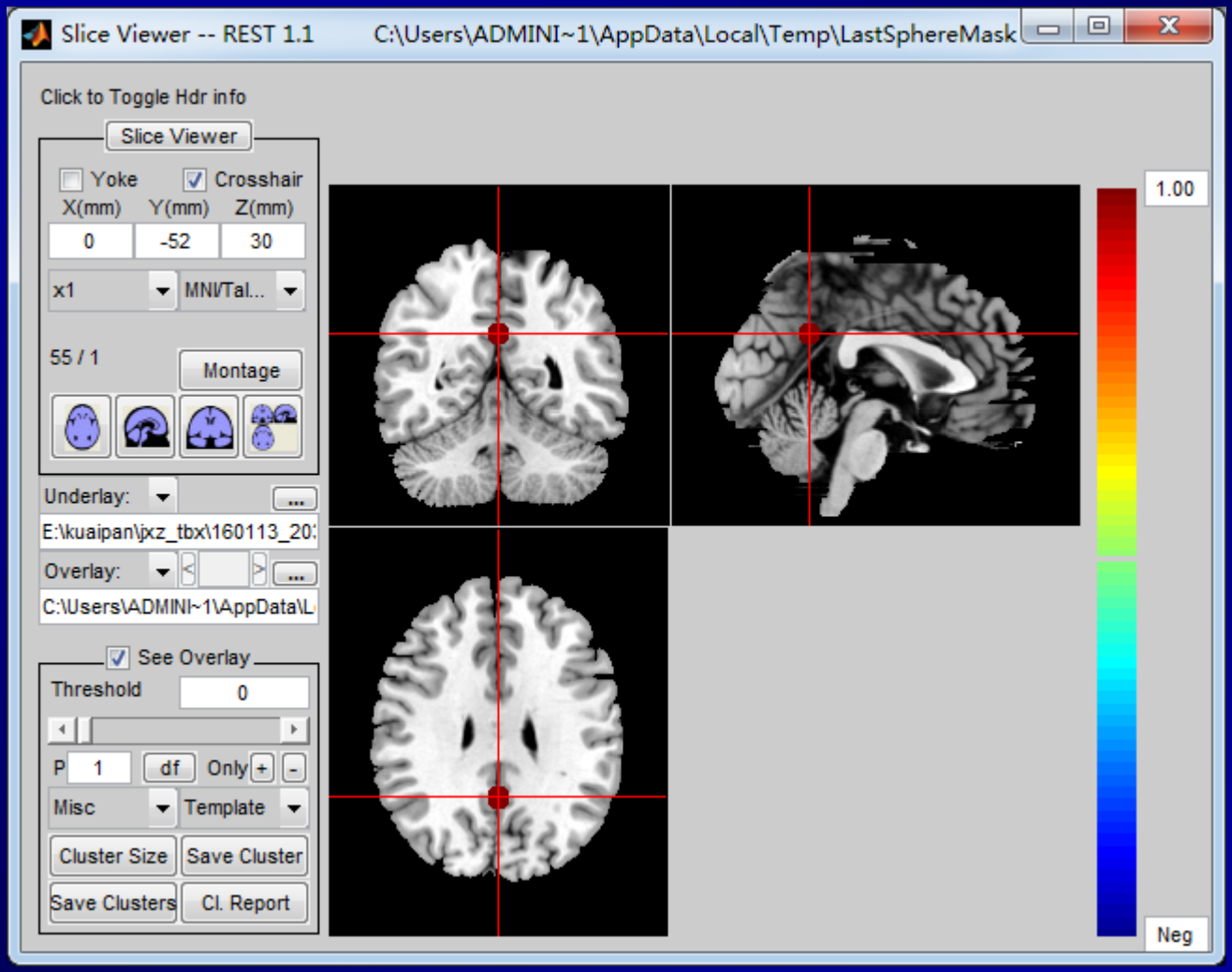

RESTplus
Work directory
C:\work_dir
...
TR(sec)
2
Starting EPI directory
rest_data
Starting T1 directory
t1_data
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9.Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Voxel wise
ROI wise
ROI list
Define ROI
pipeline
flexible
Process list
DicomToNifti
RemoveFirstTimePoints
SliceTiming
Realign
Reorient
Normalize
Smooth
Detrend
RegressOutCovariates
Filter
FunctionalConnectivity
Parallel processing
Workers
load
save
Run

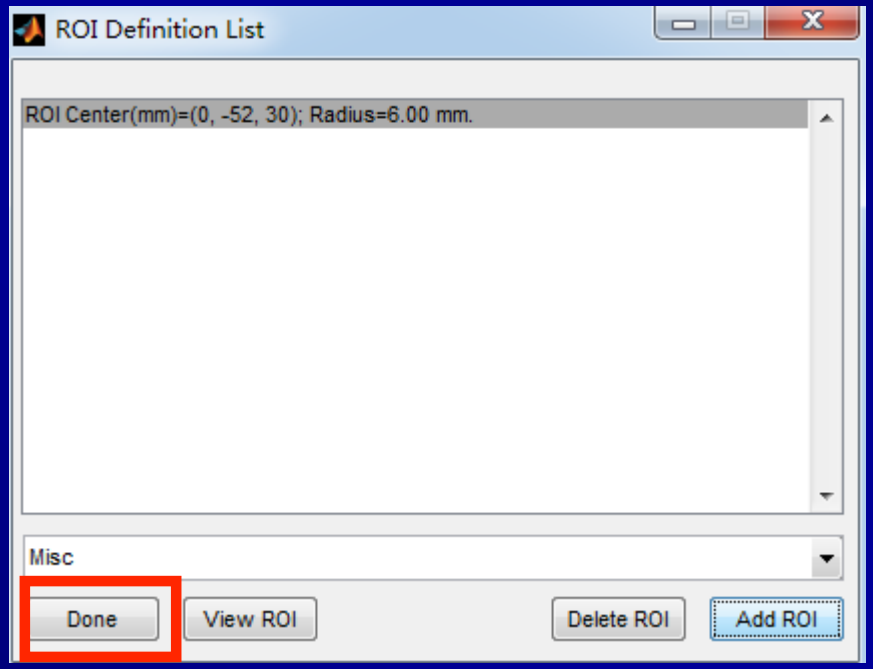

ROI (Region of interest) Definition
Seed ROI Definition
Spherica
Define a see
mm)
Predefin
There are 4
1. From stati
2. From AAL
3. From Broc
4. From user
Time cou
User define
Attention:
For NIFTI images (e.g., preprocessed by SPM5 or above version), just type in the MNI coordinates, i.e. positive x value means right hemisphere of brain, which displayed in the left side in REST Slice Viewer (REST Slice Viewer displayed in Radiology convention).
For ANALYZE images (e.g., preprocessed by SPM2), please check the correspondence between x value and left/right hemisphere in REST Slice Viewer because ANALYZE images do not contain left/right information!!!
X(mm)
Y(mm)
Z(mm)
Radius(mm)
0
-52
30
6
From Talairach to MNI
Ok
Done
View ROI
Next

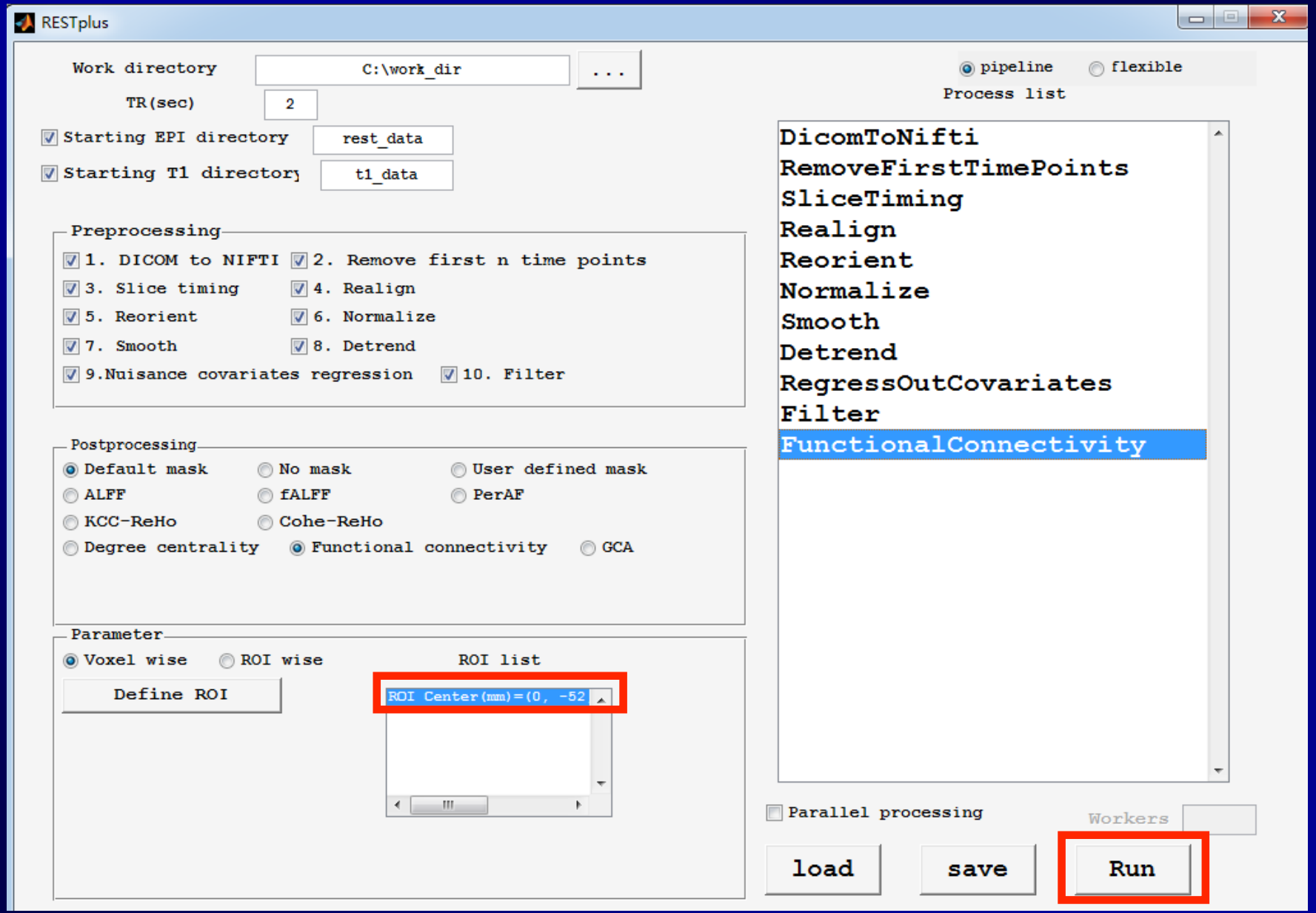

ROI (Region of interest) Definition
Spherical ROI
Define a seed ROI by setting the center coordinate and the radius(mm)
ROI Center(mm)=(0, -52, 30); Radius=6.00 mm.
Predefined ROI
There are 4 methods to generate the ROI mask file:
1. From statistical map by selecting cluster after thresholding
2. From AAL template by selecting specific area
3. From Brodmann template by selecting specific area
4. From user defined mask file
Time courses
User defined time courses contained in a txt file
Done
View ROI
Next

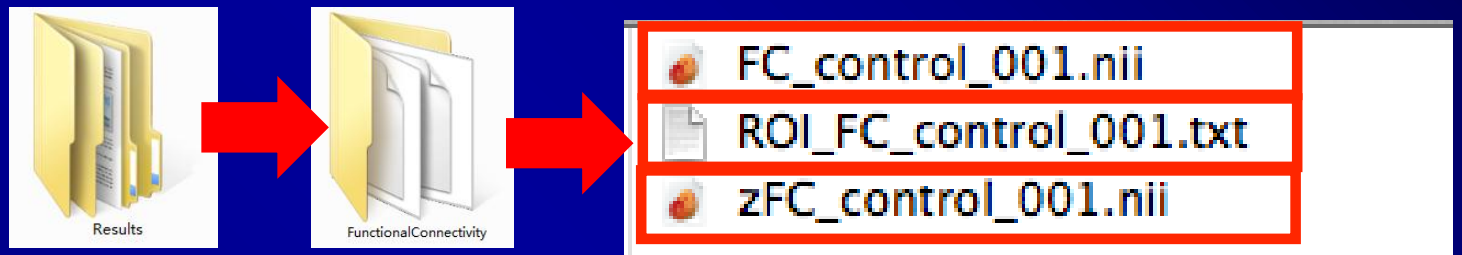

ROI Definition List
ROI Center(mm)=(0, -52, 30); Radius=6.00 mm.
Misc
Done
View ROI
Delete ROI
Add ROI


Pick one brain map
查找范围(I):
Template
最近使用的项目
桌面
我的文档
计算机
快盘
名称
修改日期
类型
大小
aal.nii
2006/3/7 16:59
NII 文件
6,
AAL_61x73x61.nii
2008/7/25 17:21
NII 文件
brodmann.nii
2006/3/7 15:42
NII 文件
6,
Brodmann_61x73x61.nii
2009/11/26 13:36
NII 文件
ch2.nii
2006/3/7 14:04
NII 文件
6,
ch2bet.nii
2006/3/8 0:22
NII 文件
6,
文件名(N):
打开(O)
文件类型(T):
Brain Image Files (*.img;*.nii;*.nii.gz)
取消


Slice Viewer -- REST 1.1
C:\Users\ADMINI~1\AppData\Local\Temp\LastSphereMask
Click to Toggle Hdr info
Slice Viewer
Yoke
Crosshair
X(mm)
Y(mm)
Z(mm)
0
-52
30
x1
MNI/Tal...
55 / 1
Montage
Underlay:
E:\kuaipan\jxz_tbx\160113_20:
Overlay:
C:\Users\ADMINI~1\AppData\L
See Overlay
Threshold
0
P
1
df
Only
+
-
Misc
Template
Cluster Size
Save Cluster
Save Clusters
Cl. Report
1.00
Neg

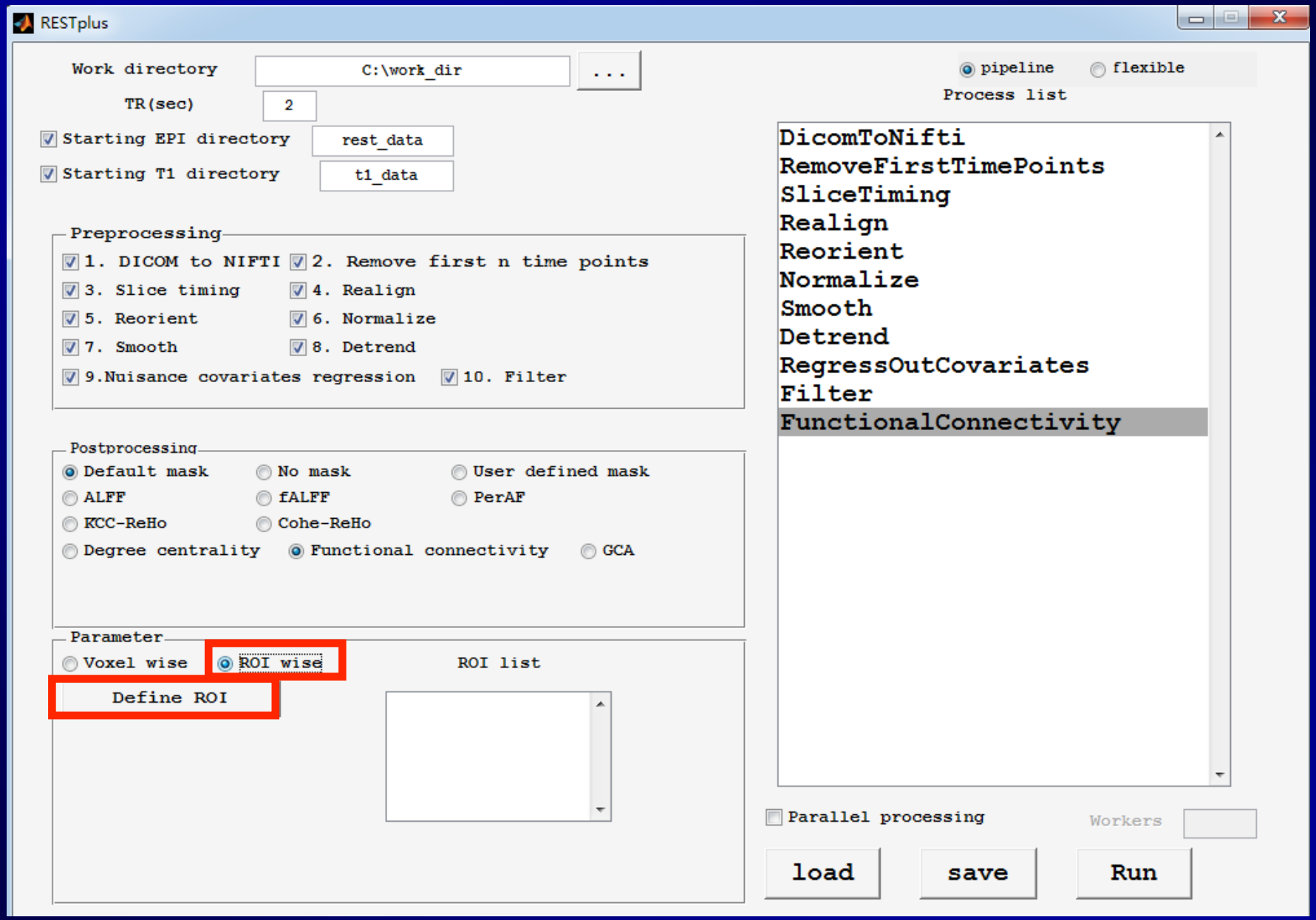

ROI Definition List
ROI Center(mm)=(0, -52, 30); Radius=6.00 mm.
Misc
Done
View ROI
Delete ROI
Add ROI

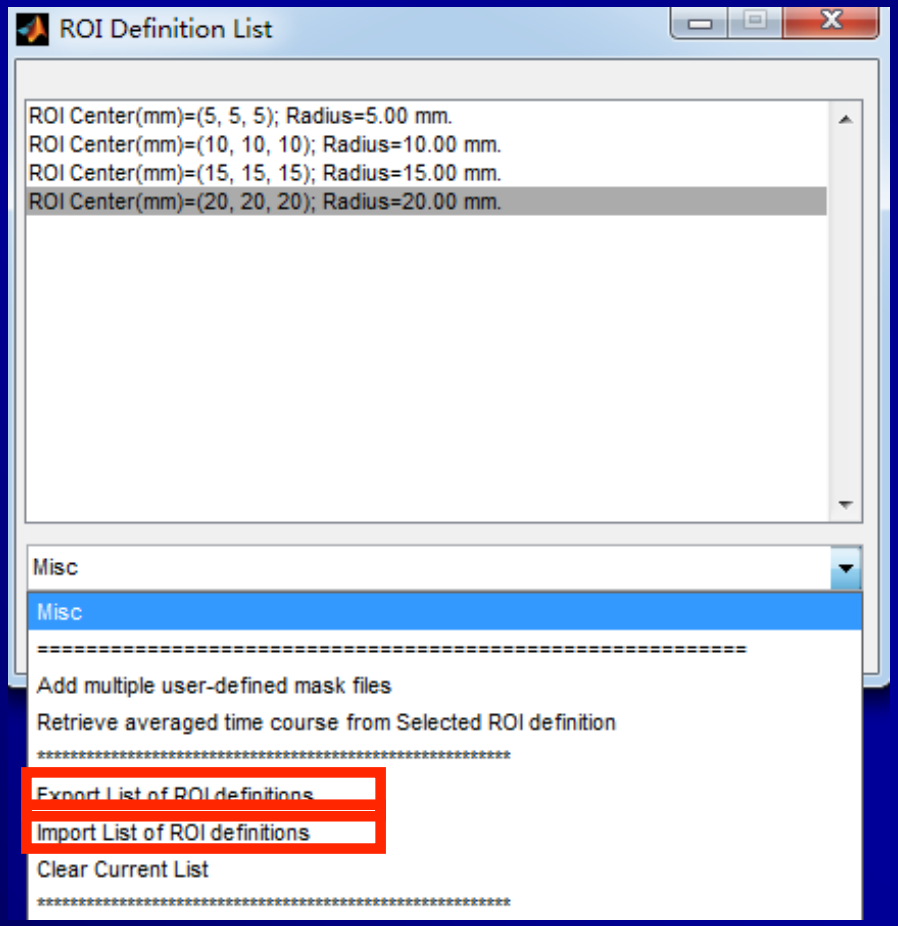

RESTplus
Work directory
C:\work_dir
...
TR(sec)
2
Starting EPI directory
rest_data
Starting T1 directory
t1_data
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9.Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Voxel wise
ROI wise
Define ROI
ROI list
ROI Center(mm)=(0, -52
pipeline
flexible
Process list
DicomToNifti
RemoveFirstTimePoints
SliceTiming
Realign
Reorient
Normalize
Smooth
Detrend
RegressOutCovariates
Filter
FunctionalConnectivity
Parallel processing
Workers
load
save
Run

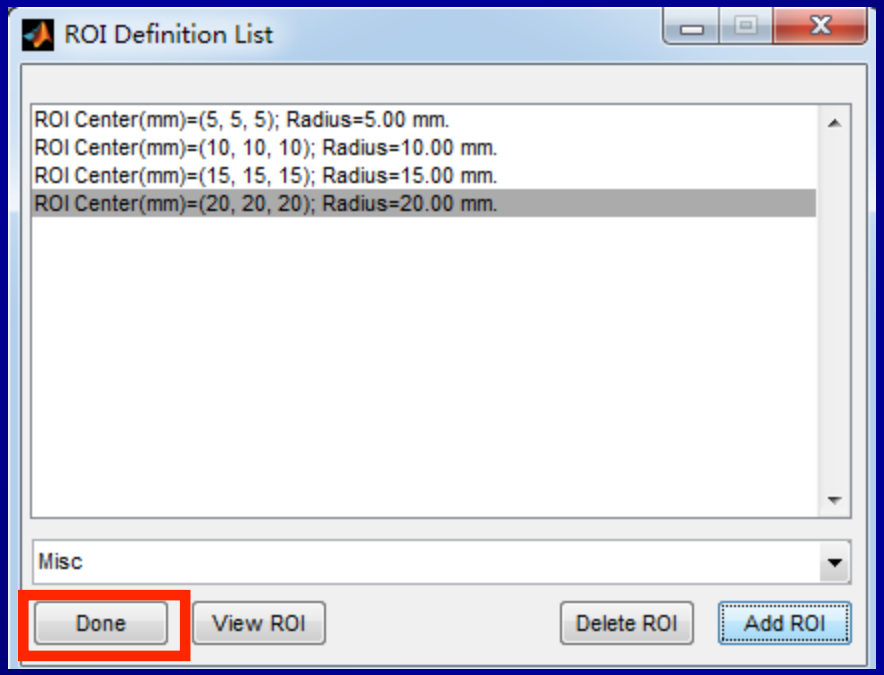


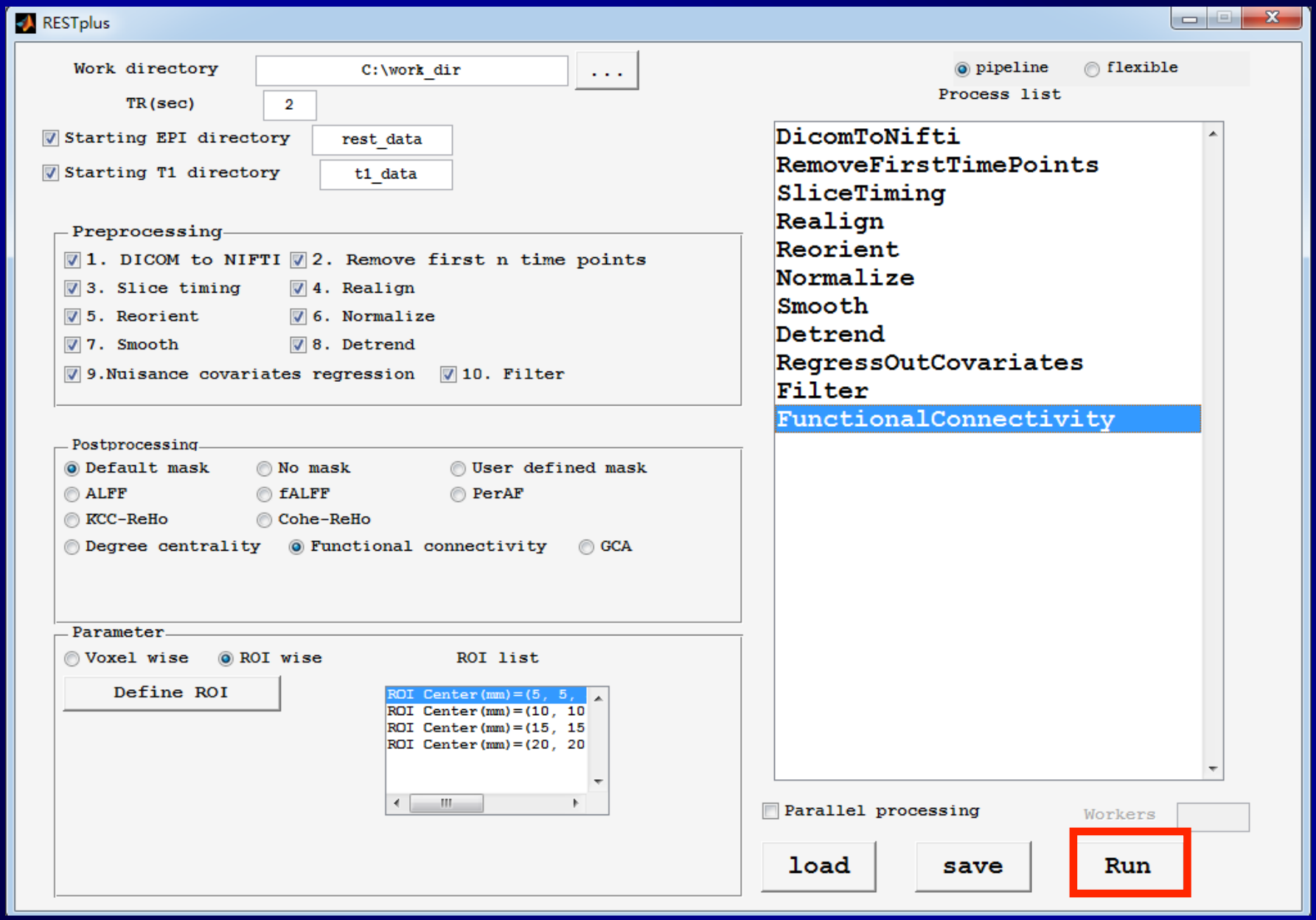
ROI_FC_control_001.txt

```
7.9273398659446025e+02
7.9583694550485325e+02
7.9833384750828600e+02
7.9564892948035038e+02
7.9090340724135888e+02
7.9012758382161462e+02
7.8759418464429450e+02
7.8278804894649625e+02
7.8446677468039775e+02
7.8763033410274625e+02
7.9197572650331438e+02
7.9610898289535987e+02
7.9399982984138262e+02
7.9143611838600850e+02
7.8844817375414300e+02
7.8846022912227750e+02
7.9144197961055875e+02
7.9439342521898675e+02
7.9555690388908613e+02
```


RESTplus
Work directory
C:\work_dir
...
TR(sec)
2
Starting EPI directory
rest_data
Starting T1 directory
t1_data
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9.Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Voxel wise
ROI wise
Define ROI
ROI list
pipeline
flexible
Process list
DicomToNifti
RemoveFirstTimePoints
SliceTiming
Realign
Reorient
Normalize
Smooth
Detrend
RegressOutCovariates
Filter
FunctionalConnectivity
Parallel processing
Workers
load
save
Run


ROI Definition List
ROI Center(mm)=(5, 5, 5); Radius=5.00 mm.
ROI Center(mm)=(10, 10, 10); Radius=10.00 mm.
ROI Center(mm)=(15, 15, 15); Radius=15.00 mm.
ROI Center(mm)=(20, 20, 20); Radius=20.00 mm.
Misc
Misc
==========
Add multiple user-defined mask files
Retrieve averaged time course from Selected ROI definition
****
Export List of ROI definitions
Import List of ROI definitions
Clear Current List
****


ROI Definition List
ROI Center(mm)=(5, 5, 5); Radius=5.00 mm.
ROI Center(mm)=(10, 10, 10); Radius=10.00 mm.
ROI Center(mm)=(15, 15, 15); Radius=15.00 mm.
ROI Center(mm)=(20, 20, 20); Radius=20.00 mm.
Misc
Done
View ROI
Delete ROI
Add ROI


RESTplus
Work directory
C:\work_dir
...
TR(sec)
2
Starting EPI directory
rest_data
Starting T1 directory
t1_data
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9.Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Voxel wise
ROI wise
ROI list
Define ROI
ROI Center(mm)=(5, 5,
ROI Center(mm)=(10, 10
ROI Center(mm)=(15, 15
ROI Center(mm)=(20, 20
pipeline
flexible
Process list
DicomToNifti
RemoveFirstTimePoints
SliceTiming
Realign
Reorient
Normalize
Smooth
Detrend
RegressOutCovariates
Filter
FunctionalConnectivity
Parallel processing
Workers
load
save
Run

FC_control_001.txt - 记事本

文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

1.0000000000000000e+000	7.7217526116325308e-001	3.0180939998031570e-001	1.7444495717194752e-001
7.7217526116325297e-001	1.0000000000000000e+000	7.6447111206914731e-001	5.5445036173444306e-001
3.0180939998			
1.7444495717			

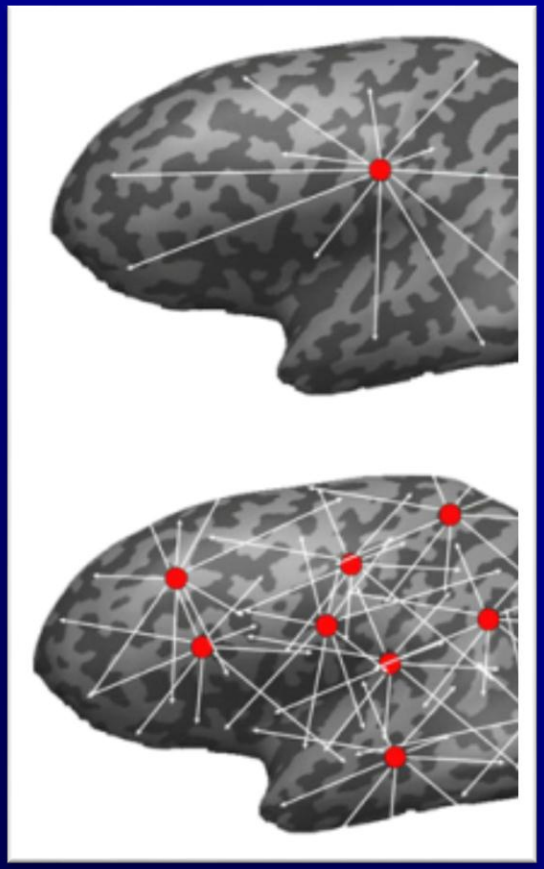
ROI_FC_control_001.txt - 记事本

文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

ROI1	ROI2	ROI3	ROI4
9.1529939992804282e+002	7.3308874877572759e+002	6.5259595310248221e+002	6.1993088181325288e+002
9.1472517796566615e+002	7.3239986892610966e+002	6.5226831863551467e+002	6.1961802111234795e+002
9.1422844174033719e+002	7.3170353417647516e+002	6.5181205491741889e+002	6.1932365862554184e+002
9.1414383416426813e+002	7.3130923381604646e+002	6.5140716432738077e+002	6.1914686099694632e+002
9.1449293277138156e+002	7.3144900695622312e+002	6.5128662873795884e+002	6.1915617090516639e+002
9.1493567215768917e+002	7.3209899906805379e+002	6.5157893664906328e+002	6.1934896025121839e+002
9.1500961785567438e+002	7.3294144734165127e+002	6.5218417922825495e+002	6.1963701212011040e+002
9.1452566046463812e+002	7.3353922869587507e+002	6.5279250150513883e+002	6.1987752934319417e+002
9.1382619757401312e+002	7.3363405390510786e+002	6.5306275882165414e+002	6.1994819226492382e+002
9.1365031031558385e+002	7.3335474940071333e+002	6.5285556142862561e+002	6.1983211829571735e+002
9.1461192883943261e+002	7.3315244819685734e+002	6.5235411120664730e+002	6.1965592206632698e+002
9.1662073396381584e+002	7.3347059470728823e+002	6.5196704252668951e+002	6.1963712512165091e+002
9.1870578163548521e+002	7.3437554043775413e+002	6.5205863400061151e+002	6.1995095216061861e+002
9.1948704127261510e+002	7.3543848472729064e+002	6.5268605940735461e+002	6.2059128473955673e+002
9.1807867110402958e+002	7.3599511593824241e+002	6.5353483745982351e+002	6.2132614865954497e+002
9.1482779091282896e+002	7.3562146567182936e+002	6.5411248075614856e+002	6.2180240667762541e+002
9.1130779386821541e+002	7.3447439655504729e+002	6.5407515983211181e+002	6.2175556763623547e+002
9.0945258210834709e+002	7.3321857184694522e+002	6.5345976867675779e+002	6.2119500120551527e+002
9.1033552952816615e+002	7.3256385642603823e+002	6.5265527685961672e+002	6.2043101401625859e+002
9.1341305702611021e+002	7.3274474954883954e+002	6.5213293040747783e+002	6.1990493632943378e+002
9.1679435007195718e+002	7.3334089058323912e+002	6.5212897667745938e+002	6.1991847432228280e+002
9.1841008557771386e+002	7.3359523733038657e+002	6.5250625559982745e+002	6.2043819018304589e+002
9.1731813129625823e+002	7.3300822604887662e+002	6.5288679621427957e+002	6.2111087569134213e+002
9.1427061382092927e+002	7.3176273841188663e+002	6.5294775189149732e+002	6.2148653142646901e+002
9.1117554032175167e+002	7.3064740208854448e+002	6.5265740236449005e+002	6.2130347713310096e+002
9.0984995309930093e+002	7.3051729146500077e+002	6.5228156796057249e+002	6.2064690148608759e+002
9.1092611854954771e+002	7.3167972105148942e+002	6.5216782128787736e+002	6.1987998223285479e+002
9.1360894775390625e+002	7.3365065872460082e+002	6.5247810510431680e+002	6.1940226137936838e+002
9.1633995939555916e+002	7.3545075560452642e+002	6.5306762533835990e+002	6.1940186661756513e+002
9.1780327084189969e+002	7.3621487707840765e+002	6.5358654511090617e+002	6.1976024531932637e+002
9.1756479684930093e+002	7.3567851400096515e+002	6.5371304958306473e+002	6.2015427307014807e+002
9.1602630615234375e+002	7.3423021207218278e+002	6.5334266621117456e+002	6.2026930194413751e+002
9.1393520315069907e+002	7.3256378258599170e+002	6.5261487736377899e+002	6.1997993384124584e+002
9.1195573987458886e+002	7.3124652648390384e+002	6.5179545787329812e+002	6.1940054925950960e+002
9.1059703626130761e+002	7.3052331587585093e+002	6.5113280688535815e+002	6.1880546568821978e+002
9.1035264507092927e+002	7.3042429258112327e+002	6.5079281711022827e+002	6.1849073468935330e+002
9.1167290938527958e+002	7.3097017678601003e+002	6.5087663877913099e+002	6.1865425186959021e+002
9.1459507028680093e+002	7.3221200838144762e+002	6.5144003629221504e+002	6.1932800924228673e+002
9.1831108334189969e+002	7.3404444729096713e+002	6.5244480898958966e+002	6.2035910671375984e+002

	ROI 4
ROI	OI4 and ROI1
ROI	OI4 and ROI2
ROI	OI4 and ROI3
ROI	1

Degree centrality (DC)

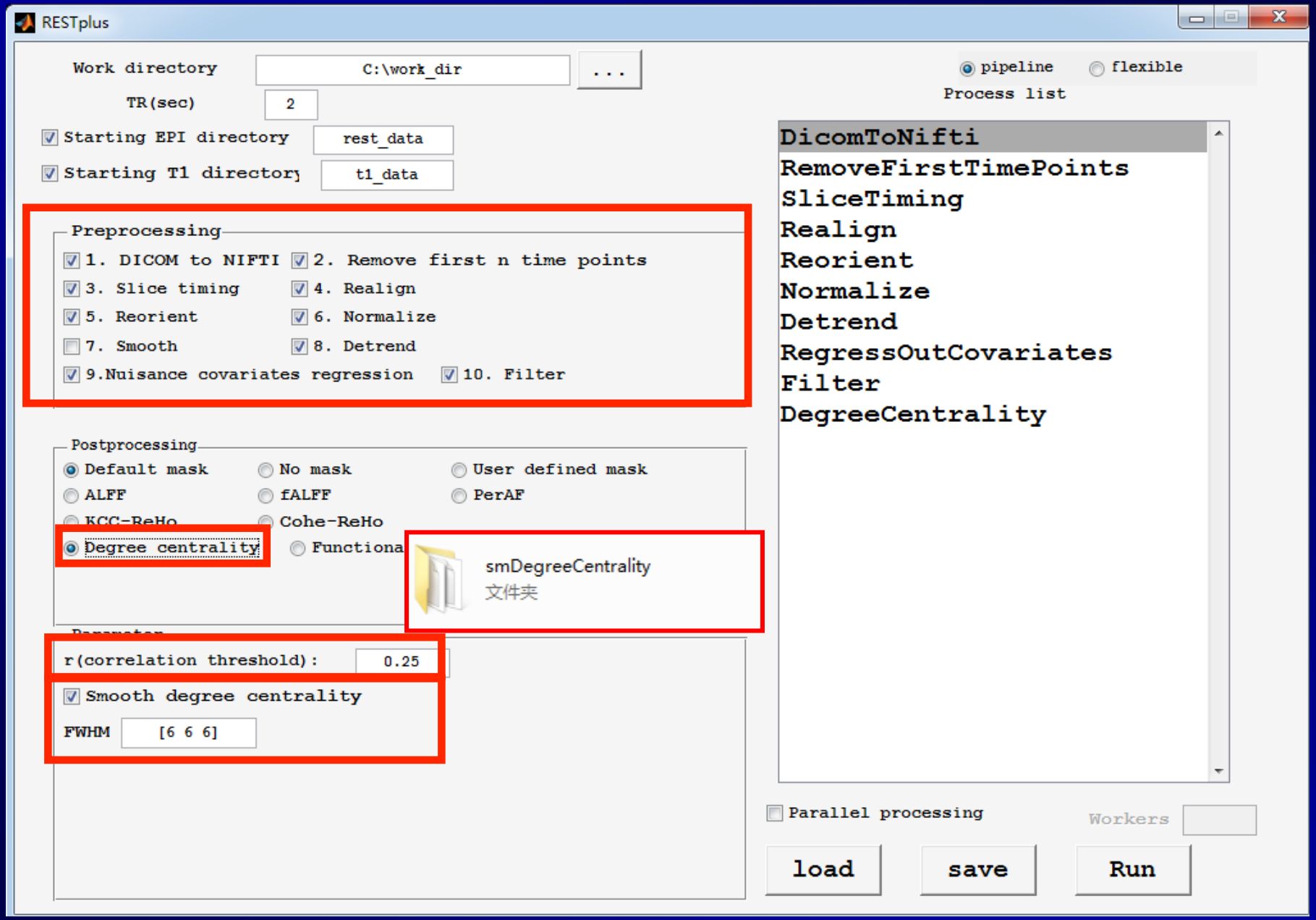


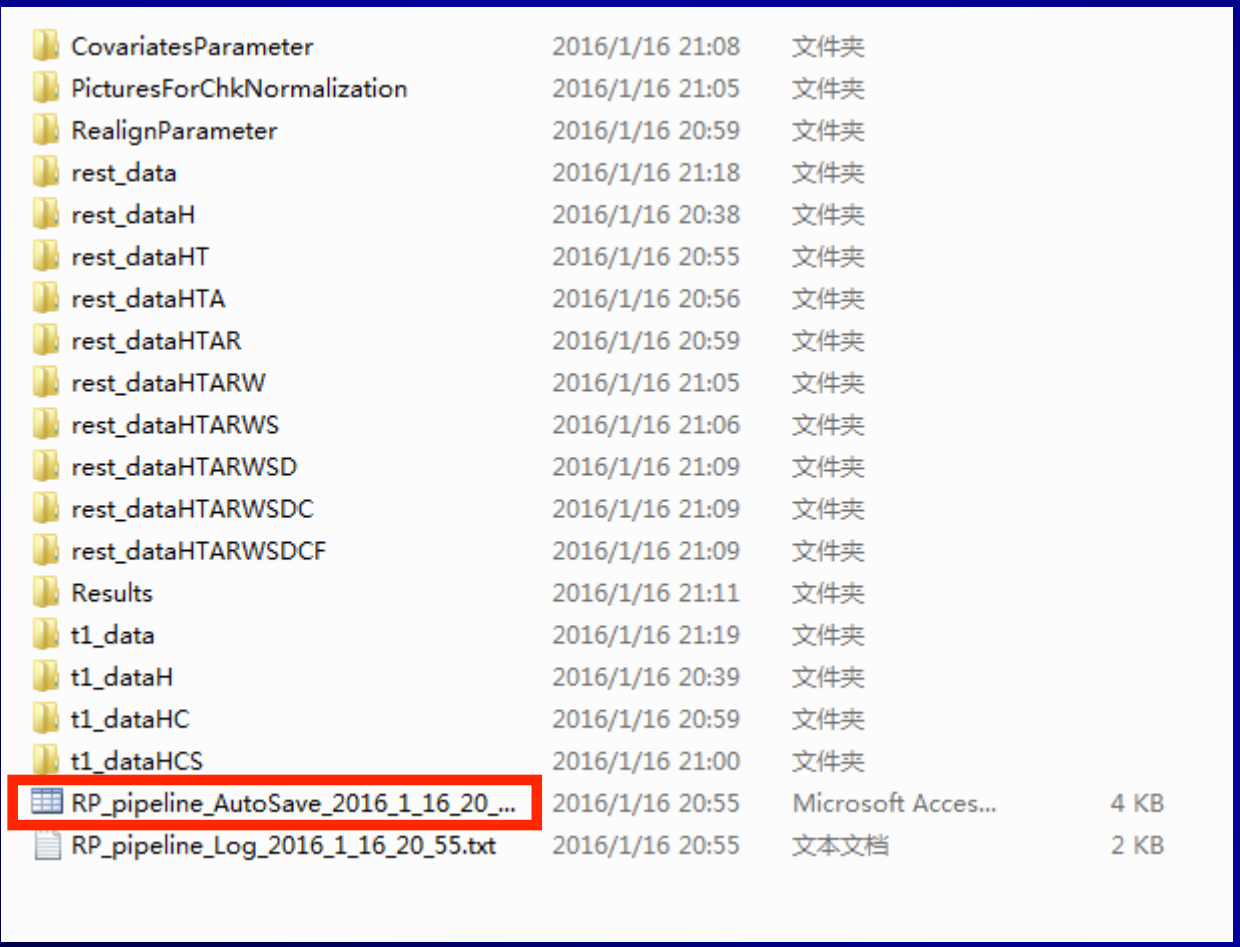
(Salomon et al., JN, 2011)

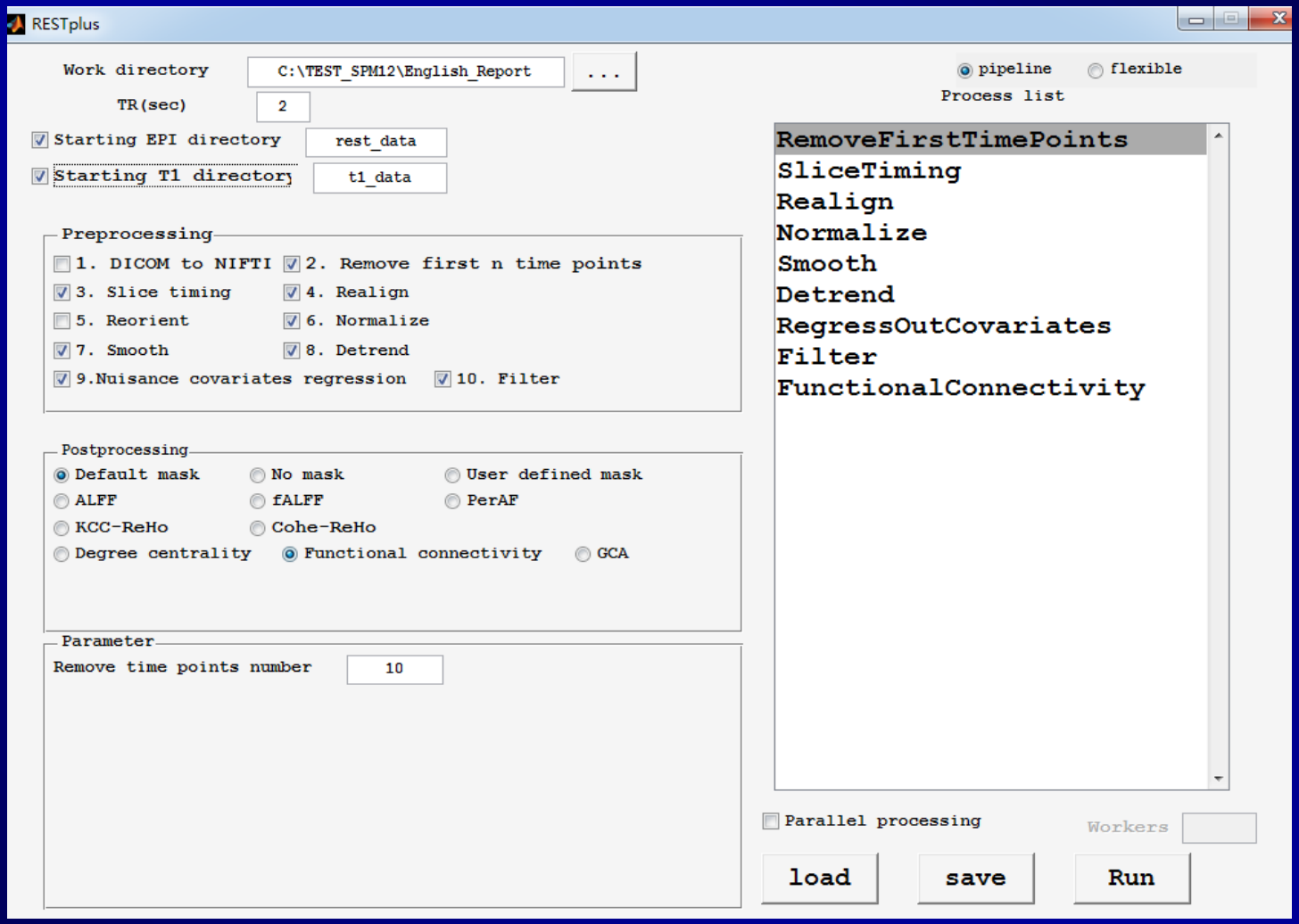
√ **Identify hubs in the human brain**
√ **Data-diven**
√ **Voxelwise**

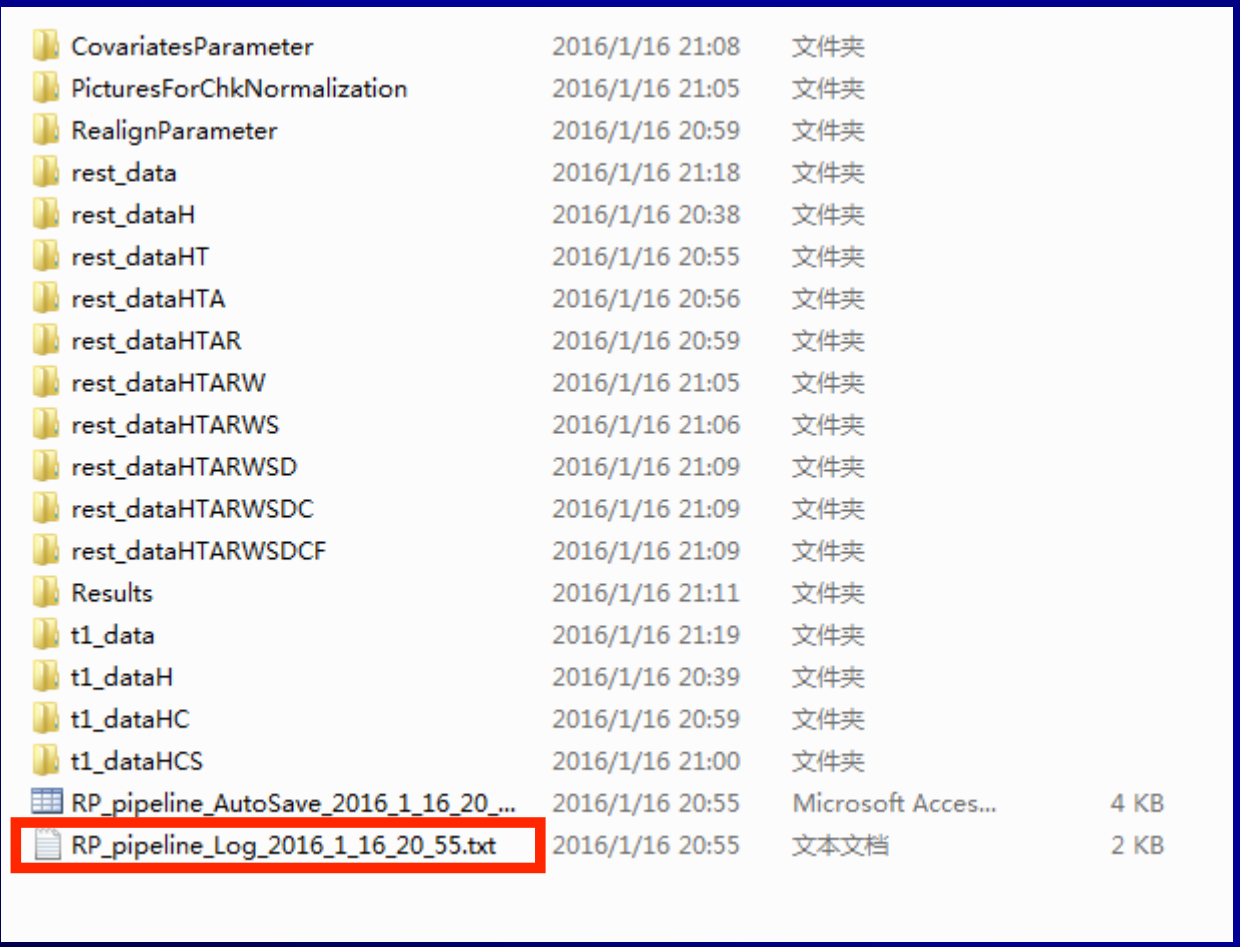
Degree centrality

1 DICOM to NIFTI
2 Remove first n time points
3 Slice timing
4 Realign
5 Reorient
6 Normalize
7 Detrend
8 Nuisance covariates regression
9 Filter
10 Degree centrality
11 Smooth


RESTplus
Work directory
C:\work_dir
...
pipeline
flexible
Process list
TR(sec)
2
Starting EPI directory
rest_data
Starting T1 directory
t1_data
DicomToNifti
RemoveFirstTimePoints
SliceTiming
Realign
Reorient
Normalize
Detrend
RegressOutCovariates
Filter
DegreeCentrality
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9.Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functiona
smDegreeCentrality
文件夹
r(correlation threshold):
0.25
Smooth degree centrality
FWHM
[6 6 6]
Parallel processing
Workers
load
save
Run


CovariatesParameter 2016/1/16 21:08 文件夹
PicturesForChkNormalization 2016/1/16 21:05 文件夹
RealignParameter 2016/1/16 20:59 文件夹
rest_data 2016/1/16 21:18 文件夹
rest_dataH 2016/1/16 20:38 文件夹
rest_dataHT 2016/1/16 20:55 文件夹
rest_dataHTA 2016/1/16 20:56 文件夹
rest_dataHTAR 2016/1/16 20:59 文件夹
rest_dataHTARW 2016/1/16 21:05 文件夹
rest_dataHTARWS 2016/1/16 21:06 文件夹
rest_dataHTARWSD 2016/1/16 21:09 文件夹
rest_dataHTARWSDC 2016/1/16 21:09 文件夹
rest_dataHTARWSDCF 2016/1/16 21:09 文件夹
Results 2016/1/16 21:11 文件夹
t1_data 2016/1/16 21:19 文件夹
t1_dataH 2016/1/16 20:39 文件夹
t1_dataHC 2016/1/16 20:59 文件夹
t1_dataHCS 2016/1/16 21:00 文件夹
RP_pipeline_AutoSave_2016_1_16_20_... 2016/1/16 20:55 Microsoft Acces... 4 KB
RP_pipeline_Log_2016_1_16_20_55.txt 2016/1/16 20:55 文本文档 2 KB


RESTplus
Work directory
C:\TEST_SPM12\English_Report
...
TR(sec)
2
Starting EPI directory
rest_data
Starting T1 directory
t1_data
Preprocessing
1. DICOM to NIFTI
2. Remove first n time points
3. Slice timing
4. Realign
5. Reorient
6. Normalize
7. Smooth
8. Detrend
9.Nuisance covariates regression
10. Filter
Postprocessing
Default mask
No mask
User defined mask
ALFF
fALFF
PerAF
KCC-ReHo
Cohe-ReHo
Degree centrality
Functional connectivity
GCA
Parameter
Remove time points number
10
pipeline
flexible
Process list
RemoveFirstTimePoints
SliceTiming
Realign
Normalize
Smooth
Detrend
RegressOutCovariates
Filter
FunctionalConnectivity
Parallel processing
Workers
load
save
Run


CovariatesParameter 2016/1/16 21:08 文件夹
PicturesForChkNormalization 2016/1/16 21:05 文件夹
RealignParameter 2016/1/16 20:59 文件夹
rest_data 2016/1/16 21:18 文件夹
rest_dataH 2016/1/16 20:38 文件夹
rest_dataHT 2016/1/16 20:55 文件夹
rest_dataHTA 2016/1/16 20:56 文件夹
rest_dataHTAR 2016/1/16 20:59 文件夹
rest_dataHTARW 2016/1/16 21:05 文件夹
rest_dataHTARWS 2016/1/16 21:06 文件夹
rest_dataHTARWSD 2016/1/16 21:09 文件夹
rest_dataHTARWSDC 2016/1/16 21:09 文件夹
rest_dataHTARWSDCF 2016/1/16 21:09 文件夹
Results 2016/1/16 21:11 文件夹
t1_data 2016/1/16 21:19 文件夹
t1_dataH 2016/1/16 20:39 文件夹
t1_dataHC 2016/1/16 20:59 文件夹
t1_dataHCS 2016/1/16 21:00 文件夹
RP_pipeline_AutoSave_2016_1_16_20_... 2016/1/16 20:55 Microsoft Acces... 4 KB
RP_pipeline_Log_2016_1_16_20_55.txt 2016/1/16 20:55 文本文档 2 KB

A	B	C	D	E
Parameter log				
**********				
[1][EpiDicomtoNifti]				
**********				
[2][T1DicomToNifti]				
**********				
[3][RemoveFirstTimePoints]				
Remove Time Points Amount:	10			
**********				
[4][SliceTiming]				
Slice Number:	33			
Slice Order:	1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32			
Reference Slice:	33			
TR:	2			
**********				
[5][Realign]				
**********				
[6][ReorientFunBeforeCoreg]				
**********				
[7][ReorientT1BeforeCoreg]				
**********				
[8][T1CoregisterFun]				
**********				
[9][T1Segment]				
Segment Template:	European			
**********				
[10][NormalizeSeg]				
BoundingBox:	[-90.-126.-72;90.90.108]			
VoxelSize:	[3 3 3]			
**********				
[11][Smooth]				
FWHM:	[6 6 6]			
**********				
[12][Detrend]				
**********				
[13][RegressOutCovariates]				
If remove global mean signal	Yes			
If remove CSF signal	Yes			
If remove WhiteMatter signal	Yes			
If remove head motion(Rigidbo	No			
If add mean back?	No			
Polynomial Trend	1			
OtherCovariatesList				
**********				
[14][Filter]				
Filter band:	0.01~0.08			
**********				
[15][FunctionalConnectivity]				
Functional connectivity type:	ROI wise			
ROI list:				
ROI1:ROI Center(mm)=(5, 5, 5); Radius=5.00 mm.				
ROI2:ROI Center(mm)=(10, 10, 10); Radius=10.00 mm.				
ROI3:ROI Center(mm)=(15, 15, 15); Radius=15.00 mm.				
ROI4:ROI Center(mm)=(20, 20, 20); Radius=20.00 mm.				
Input and Output log				
[PROCESS METHOD]	[EPI AND OTHER INPUT]	[EPI AND OTHER OUTPUT]	[T1 INPUT]	[T1 OUTPUT]
EpiDicomtoNifti	rest_data	rest_dataH		
T1DicomToNifti			t1_data	t1_dataH
RemoveFirstTimePoints	rest_dataH	rest_dataHT		
SliceTiming	rest_dataHT	rest_dataHTA		
Realign	rest_dataHTA	rest_dataHTAR|RealignParameter		
ReorientFunBeforeCoreg	RealignParameter	RealignParameter|ReorientMats		
ReorientT1BeforeCoreg			t1_dataH	t1_dataH|ReorientMats
T1CoregisterFun	RealignParameter		t1_dataH	t1_dataHC
T1Segment			t1_dataHC	t1_dataHCS

[2][RemoveFirstTimePoints]	
Remove Time Points Amount:	10
**********	
[4][SliceTiming]	
Slice Number:	33
Slice Order:	1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
Reference Slice:	33
TR:	2
**********	
[5][Realign]	
**********	
[6][ReorientFunBeforeCoreg]	
**********	
[7][ReorientT1BeforeCoreg]	
**********	
[8][T1CoregisterFun]	
**********	
[9][T1Segment]	
Segment Template:	European
**********	
[10][NormalizeSeg]	
BoundingBox:	[-90,-126,-72;90,90,108]
VoxelSize:	[3 3 3]
**********	
[11][Smooth]	
FWHM:	[6 6 6]
**********	
[12][Detrend]	
**********	
[13][RegressOutCovariates]	
If remove global mean signal	Yes
If remove CSF signal	Yes
If remove WhiteMatter signal	Yes
If remove head motion(Rigidbo	No
If add mean back?	No
Polynomial Trend	1
OtherCovariatesList	
**********	
[14][Filter]	
Filter band:	0.01-0.08
**********	
[15][FunctionalConnectivity]	
Functional connectivity type:	ROI wise
ROI list:	
ROI1:ROI Center(mm)=(5, 5, 5); Radius=5.00 mm.	
ROI2:ROI Center(mm)=(10, 10, 10); Radius=10.00 mm.	
ROI3:ROI Center(mm)=(15, 15, 15); Radius=15.00 mm.	
ROI4:ROI Center(mm)=(20, 20, 20); Radius=20.00 mm.	

Input and Output log				
[PROCESS METHOD]	[EPI AND OTHER INPUT]	[EPI AND OTHER OUTPUT]	[T1 INPUT]	[T1 OUTPUT]
EpiDicomtoNifti	rest_data	rest_dataH		
T1DicomToNifti			t1_data	t1_dataH
RemoveFirstTimePoints	rest_dataH	rest_dataHT		
SliceTiming	rest_dataHT	rest_dataHTA		
Realign	rest_dataHTA	rest_dataHTAR|RealignParameter		
ReorientFunBeforeCoreg	RealignParameter	RealignParameter|ReorientMats		
ReorientT1BeforeCoreg			t1_dataH	t1_dataH|ReorientMats
T1CoregisterFun	RealignParameter		t1_dataH	t1_dataHC
T1Segment			t1_dataHC	t1_dataHCS

Error message

error_2015_10_25_9_21.txt

```
Error message
-------------

Index exceeds matrix dimensions.

Error in dir_List (line 22)
      if strcmpi(DirStructlist(3).name,'.DS_Store')

Error in indir_Dicom2Nifti (line 20)
    DicomFileList=dir_List([InDir filesep SubFolderList{i}]);

Error in pipeline_kernel>run_EpiDicomToNifti (line 246)
indir_Dicom2Nifti(indir_FunRaw,outdir_FunImg);

Error in pipeline_kernel (line 181)
            run_EpiDicomToNifti(InputParameter);

Error in pipeline_batch (line 19)
    pipeline_kernel(OperationList{i},InputParameter);

Error in call_pipeline_batch (line 14)
   pipeline_batch(ProcessQueue,InputParameter);

Error in pipeline_run_pushbutton_callback (line 24)
   call_pipeline_batch(ProcessQueue,InputParameter,handles);

Error in run_BVersionCallback (line 62)
    pipeline_run_pushbutton_callback(CB_value);

Error in repipl>UIcontrolDisplaySet_callback (line 89)
[RunString,VisibleHandleArray,ProcessType]=...
```

http://www.restfmri.net/
jiaxize@foxmail.com