```
tasciseda@HHP-APK-385M container % sudo docker run --rm -v $(pwd)/INPUTS/:/
INPUTS/ -v $(pwd)/OUTPUTS:/OUTPUTS/ -v $(pwd)/license.txt:/extra/freesurfer/
license.txt --user $(id -u):$(id -g) leonyichencai/synb0-disco:v3.1
Password:
WARNING: The requested image's platform (linux/amd64) does not match the detected
host platform (linux/arm64/v8) and no specific platform was requested
-------
INPUTS:
Distorted b0 path: /INPUTS/b0.nii.gz
T1 path: /INPUTS/T1.nii.gz
T1 atlas path: /extra/atlases/mni_icbm152_t1_tal_nlin_asym_09c.nii.gz
T1 2.5 iso atlas path: /extra/atlases/mni_icbm152_t1_tal_nlin_asym_09c_2_5.nii.gz
Results path: /OUTPUTS
-------
Job directory path: /tmp/tmp.k08KaQFfrg
-------
Making results directory...
-------
Normalizing T1
normalize_T1.sh /INPUTS/T1.nii.gz /tmp/tmp.k08KaQFfrg/T1_N3.nii.gz /tmp/
tmp.k08KaQFfrg/T1_norm.nii.gz
-------
INPUTS:
T1 path: /INPUTS/T1.nii.gz
T1 N3 path: /tmp/tmp.k08KaQFfrg/T1_N3.nii.gz
T1 normalized path: /tmp/tmp.k08KaQFfrg/T1_norm.nii.gz
-------
Job directory path: /tmp/tmp.ktTQ0sLsY9
-------
mri_convert /tmp/tmp.ktTQ0sLsY9/T1.nii.gz /tmp/tmp.ktTQ0sLsY9/T1.mgz
mri_convert.bin /tmp/tmp.ktTQ0sLsY9/T1.nii.gz /tmp/tmp.ktTQ0sLsY9/T1.mgz
$Id: mri_convert.c,v 1.226 2016/02/26 16:15:24 mreuter Exp $
reading from /tmp/tmp.ktTQ0sLsY9/T1.nii.gz...
TR=2500.00, TE=0.00, TI=0.00, flip angle=0.00
i_ras = (1, 0, 0)
j_ras = (0, 1, 0)
k_ras = (0, 0, 1)
writing to /tmp/tmp.ktTQ0sLsY9/T1.mgz...
-------
mri_nu_correct.mni --i /tmp/tmp.ktTQ0sLsY9/T1.mgz --o /tmp/tmp.ktTQ0sLsY9/
T1_N3.mgz --n 2
/
/extra/freesurfer/bin/mri_nu_correct.mni
--i /tmp/tmp.ktTQ0sLsY9/T1.mgz --o /tmp/tmp.ktTQ0sLsY9/T1_N3.mgz --n 2
nIters 2
$Id: mri_nu_correct.mni,v 1.27 2016/02/26 16:19:49 mreuter Exp $
Linux d0b0db677433 6.6.32-linuxkit #1 SMP Thu Jun 13 14:13:01 UTC 2024 x86_64
```

x86_64 x86_64 GNU/Linux
Sun Jul 14 02:40:56 UTC 2024
Program nu_correct, built from:
Package MNI N3, version 1.12.0, compiled by nicks@terrier (x86_64-unknown-linux-gnu) on 2015-06-19 at 01:25:34
/usr/bin/bc
tmpdir is /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19
/
mri_convert /tmp/tmp.ktTQ0sLsY9/T1.mgz /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu0.mnc -odt float
mri_convert.bin /tmp/tmp.ktTQ0sLsY9/T1.mgz /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu0.mnc -odt float
$Id: mri_convert.c,v 1.226 2016/02/26 16:15:24 mreuter Exp $
reading from /tmp/tmp.ktTQ0sLsY9/T1.mgz...
TR=2500.00, TE=0.00, TI=0.00, flip angle=0.00
i_ras = (1, 0, 0)
j_ras = (0, 1, 0)
k_ras = (0, 0, 1)
writing to /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu0.mnc...

Iteration 1 Sun Jul 14 02:40:56 UTC 2024
nu_correct -clobber /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu0.mnc /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu1.mnc -tmpdir /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/0/
[@d0b0db677433:/] [2024-07-14 02:40:57] running:
  /extra/freesurfer/mni/bin/nu_estimate_np_and_em -parzen -log -sharpen 0.15 0.01 -iterations 50 -stop 0.001 -shrink 4 -auto_mask -nonotify -b_spline 1.0e-7 -distance 200 -quiet -execute -clobber -nokeeptmp -tmpdir /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/0/ /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu0.mnc /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu1.imp

Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done

Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Number of iterations: 23
CV of field change: 0.000999727

Iteration 2 Sun Jul 14 02:41:20 UTC 2024
nu_correct -clobber /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu1.mnc /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc -tmpdir /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/1/
[@d0b0db677433:/] [2024-07-14 02:41:20] running:
  /extra/freesurfer/mni/bin/nu_estimate_np_and_em -parzen -log -sharpen 0.15 0.01 -iterations 50 -stop 0.001 -shrink 4 -auto_mask -nonotify -b_spline 1.0e-7 -distance 200 -quiet -execute -clobber -nokeeptmp -tmpdir /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/1/ /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu1.mnc /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.imp

Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Processing:.....Done
Number of iterations: 16
CV of field change: 0.000998908

mri_binarize --i /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc --min -1 --o /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/ones.mgz

```
$Id: mri_binarize.c,v 1.43 2016/06/09 20:46:21 greve Exp $
cwd /
cmdline mri_binarize.bin --i /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc
--min -1 --o /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/ones.mgz
sysname  Linux
hostname d0b0db677433
machine  x86_64
user     UNKNOWN

input      /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc
frame      0
nErode3d   0
nErode2d   0
output     /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/ones.mgz
Binarizing based on threshold
min        -1
max        +infinity
binval        1
binvalnot     0
fstart = 0, fend = 0, nframes = 1
Found 11534336 values in range
Counting number of voxels in first frame
Found 11534336 voxels in final mask
Count: 11534336 11534336.000000 11534336 100.000000
mri_binarize done
mri_segstats --id 1 --seg /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/ones.mgz --
i /tmp/tmp.ktTQ0sLsY9/T1.mgz --sum /tmp/tmp.ktTQ0sLsY9/
tmp.mri_nu_correct.mni.19/sum.junk --avgwf /tmp/tmp.ktTQ0sLsY9/
tmp.mri_nu_correct.mni.19/input.mean.dat

$Id: mri_segstats.c,v 1.121 2016/05/31 17:27:11 greve Exp $
cwd
cmdline mri_segstats --id 1 --seg /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/
ones.mgz --i /tmp/tmp.ktTQ0sLsY9/T1.mgz --sum /tmp/tmp.ktTQ0sLsY9/
tmp.mri_nu_correct.mni.19/sum.junk --avgwf /tmp/tmp.ktTQ0sLsY9/
tmp.mri_nu_correct.mni.19/input.mean.dat
sysname  Linux
hostname d0b0db677433
machine  x86_64
user     UNKNOWN
UseRobust  0
Loading /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/ones.mgz
Loading /tmp/tmp.ktTQ0sLsY9/T1.mgz
Voxel Volume is 1 mm^3
Generating list of segmentation ids
Found   1 segmentations
```

```
Computing statistics for each segmentation

Reporting on   1 segmentations
Using PrintSegStat
Computing spatial average of each frame
  0
Writing to /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/input.mean.dat
mri_segstats done
mri_segstats --id 1 --seg /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/ones.mgz --
i /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc --sum /tmp/
tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/sum.junk --avgwf /tmp/tmp.ktTQ0sLsY9/
tmp.mri_nu_correct.mni.19/output.mean.dat

$Id: mri_segstats.c,v 1.121 2016/05/31 17:27:11 greve Exp $
cwd
cmdline mri_segstats --id 1 --seg /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/
ones.mgz --i /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc --sum /tmp/
tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/sum.junk --avgwf /tmp/tmp.ktTQ0sLsY9/
tmp.mri_nu_correct.mni.19/output.mean.dat
sysname  Linux
hostname d0b0db677433
machine  x86_64
user     UNKNOWN
UseRobust  0
Loading /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/ones.mgz
Loading /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc
Voxel Volume is 1 mm^3
Generating list of segmentation ids
Found   1 segmentations
Computing statistics for each segmentation

Reporting on   1 segmentations
Using PrintSegStat
Computing spatial average of each frame
  0
Writing to /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/output.mean.dat
mri_segstats done
mris_calc -o /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc /tmp/
tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc mul 1.05025253948625131999
Saving result to '/tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc' (type =
MINC )                    [ ok ]
mri_convert /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc /tmp/
tmp.ktTQ0sLsY9/T1_N3.mgz --like /tmp/tmp.ktTQ0sLsY9/T1.mgz --conform
mri_convert.bin /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc /tmp/
tmp.ktTQ0sLsY9/T1_N3.mgz --like /tmp/tmp.ktTQ0sLsY9/T1.mgz --conform
$Id: mri_convert.c,v 1.226 2016/02/26 16:15:24 mreuter Exp $
reading from /tmp/tmp.ktTQ0sLsY9/tmp.mri_nu_correct.mni.19/nu2.mnc...
```

TR=0.00, TE=0.00, TI=0.00, flip angle=0.00
i_ras = (1, 0, 0)
j_ras = (0, 1, 0)
k_ras = (0, 0, 1)
INFO: transform src into the like-volume: /tmp/tmp.ktTQ0sLsY9/T1.mgz
changing data type from float to uchar (noscale = 0)...
MRIchangeType: Building histogram
writing to /tmp/tmp.ktTQ0sLsY9/T1_N3.mgz...

Sun Jul 14 02:41:49 UTC 2024
mri_nu_correct.mni done
---
mri_convert /tmp/tmp.ktTQ0sLsY9/T1_N3.mgz /tmp/tmp.k08KaQFfrg/T1_N3.nii.gz
mri_convert.bin /tmp/tmp.ktTQ0sLsY9/T1_N3.mgz /tmp/tmp.k08KaQFfrg/T1_N3.nii.gz
$Id: mri_convert.c,v 1.226 2016/02/26 16:15:24 mreuter Exp $
reading from /tmp/tmp.ktTQ0sLsY9/T1_N3.mgz...
TR=2500.00, TE=0.00, TI=0.00, flip angle=0.00
i_ras = (1, 0, 0)
j_ras = (0, 1, 0)
k_ras = (0, 0, 1)
writing to /tmp/tmp.k08KaQFfrg/T1_N3.nii.gz...
---
mri_normalize -g 1 -mprage /tmp/tmp.ktTQ0sLsY9/T1_N3.mgz /tmp/tmp.ktTQ0sLsY9/
T1_norm.mgz
using max gradient = 1.000
assuming input volume is MGH (Van der Kouwe) MP-RAGE
reading from /tmp/tmp.ktTQ0sLsY9/T1_N3.mgz...
normalizing image...
processing without aseg, no1d=0
MRInormInit():
no Talairach xform detected - using skull bounding box to determine origin
MRInormalize():
MRIsplineNormalize(): npeaks = 20
Starting OpenSpline(): npoints = 20
building Voronoi diagram...
performing soap bubble smoothing, sigma = 8...

Iterating 2 times

3d normalization pass 1 of 2
white matter peak found at 110
white matter peak found at 109
gm peak at 71 (71), valley at 60 (60)
csf peak at 36, setting threshold to 59
building Voronoi diagram...
performing soap bubble smoothing, sigma = 8...

```
---------------------------------
3d normalization pass 2 of 2
white matter peak found at 110
white matter peak found at 110
gm peak at 70 (70), valley at 57 (57)
csf peak at 35, setting threshold to 58
building Voronoi diagram...
performing soap bubble smoothing, sigma = 8...
Done iterating ---------------------------------
writing output to /tmp/tmp.ktTQ0sLsY9/T1_norm.mgz
3D bias adjustment took 1 minutes and 3 seconds.
-------
mri_convert /tmp/tmp.ktTQ0sLsY9/T1_norm.mgz /tmp/tmp.k08KaQFfrg/T1_norm.nii.gz
mri_convert.bin /tmp/tmp.ktTQ0sLsY9/T1_norm.mgz /tmp/tmp.k08KaQFfrg/
T1_norm.nii.gz
$Id: mri_convert.c,v 1.226 2016/02/26 16:15:24 mreuter Exp $
reading from /tmp/tmp.ktTQ0sLsY9/T1_norm.mgz...
TR=2500.00, TE=0.00, TI=0.00, flip angle=0.00
i_ras = (1, 0, 0)
j_ras = (0, 1, 0)
k_ras = (0, 0, 1)
writing to /tmp/tmp.k08KaQFfrg/T1_norm.nii.gz...
-------
Removing job directory...
-------
Skull stripping T1
bet /INPUTS/T1.nii.gz /tmp/tmp.k08KaQFfrg/T1_mask.nii.gz -R
-------
epi_reg distorted b0 to T1
epi_reg --epi=/INPUTS/b0.nii.gz --t1=/INPUTS/T1.nii.gz --t1brain=/tmp/tmp.k08KaQFfrg/
T1_mask.nii.gz --out=/tmp/tmp.k08KaQFfrg/epi_reg_d
Running FAST segmentation
FLIRT pre-alignment
Running BBR
0.299732 0.999908 0.013490 -0.001409 0.000000 -0.013466 0.999787 0.015627
0.000000 0.001619 -0.015606 0.999877 0.000000 0.988964 1.841277 -0.749984
1.000000
-------
converting FSL transform to ANTS transform
c3d_affine_tool -ref /INPUTS/T1.nii.gz -src /INPUTS/b0.nii.gz /tmp/tmp.k08KaQFfrg/
epi_reg_d.mat -fsl2ras -oitk /tmp/tmp.k08KaQFfrg/epi_reg_d_ANTS.txt
-------
ANTS syn registration
antsRegistrationSyNQuick.sh -d 3 -f /extra/atlases/
mni_icbm152_t1_tal_nlin_asym_09c.nii.gz -m /INPUTS/T1.nii.gz -o /tmp/
tmp.k08KaQFfrg/ANTS
```

```
-------------------------------------------------------------------------------
 Mapping parameters
-------------------------------------------------------------------------------
 ANTSPATH is /extra/ANTS/bin/ants/bin/

 Dimensionality:           3
 Output name prefix:       /tmp/tmp.k08KaQFfrg/ANTS
 Fixed images:             /extra/atlases/mni_icbm152_t1_tal_nlin_asym_09c.nii.gz
 Moving images:            /INPUTS/T1.nii.gz
 Mask images:
 Initial transforms:
 Number of threads:        1
 Spline distance:          26
 Transform type:           s
 MI histogram bins:        32
 Precision:                d
 Use histogram matching    0
================================================================================
 antsRegistration call:
-------------------------------------------------------------------------------
/extra/ANTS/bin/ants/bin//antsRegistration --verbose 1 --dimensionality 3 --float 0 --
collapse-output-transforms 1 --output [/tmp/tmp.k08KaQFfrg/ANTS,/tmp/
tmp.k08KaQFfrg/ANTSWarped.nii.gz,/tmp/tmp.k08KaQFfrg/ANTSInverseWarped.nii.gz]
--interpolation Linear --use-histogram-matching 0 --winsorize-image-intensities
[0.005,0.995] --initial-moving-transform [/extra/atlases/
mni_icbm152_t1_tal_nlin_asym_09c.nii.gz,/INPUTS/T1.nii.gz,1] --transform Rigid[0.1] --
metric MI[/extra/atlases/mni_icbm152_t1_tal_nlin_asym_09c.nii.gz,/INPUTS/
T1.nii.gz,1,32,Regular,0.25] --convergence [1000x500x250x0,1e-6,10] --shrink-factors
8x4x2x1 --smoothing-sigmas 3x2x1x0vox --transform Affine[0.1] --metric MI[/extra/
atlases/mni_icbm152_t1_tal_nlin_asym_09c.nii.gz,/INPUTS/T1.nii.gz,1,32,Regular,0.25]
--convergence [1000x500x250x0,1e-6,10] --shrink-factors 8x4x2x1 --smoothing-sigmas
3x2x1x0vox --transform SyN[0.1,3,0] --metric MI[/extra/atlases/
mni_icbm152_t1_tal_nlin_asym_09c.nii.gz,/INPUTS/T1.nii.gz,1,32] --convergence
[100x70x50x0,1e-6,10] --shrink-factors 8x4x2x1 --smoothing-sigmas 3x2x1x0vox
-------------------------------------------------------------------------------
All_Command_lines_OK
Using double precision for computations.
================================================================================
The composite transform comprises the following transforms (in order):
  1. Center of mass alignment using fixed image: /extra/atlases/
mni_icbm152_t1_tal_nlin_asym_09c.nii.gz and moving image: /INPUTS/T1.nii.gz (type
= Euler3DTransform)
================================================================================
  number of levels = 4
```

```
  number of levels = 4
  number of levels = 4
  fixed image: /extra/atlases/mni_icbm152_t1_tal_nlin_asym_09c.nii.gz
  moving image: /INPUTS/T1.nii.gz
  fixed image: /extra/atlases/mni_icbm152_t1_tal_nlin_asym_09c.nii.gz
  moving image: /INPUTS/T1.nii.gz
  fixed image: /extra/atlases/mni_icbm152_t1_tal_nlin_asym_09c.nii.gz
  moving image: /INPUTS/T1.nii.gz
Dimension = 3
Number of stages = 3
Use Histogram Matching false
Winsorize image intensities true
Lower quantile = 0.005
Upper quantile = 0.995
Stage 1 State
   Image metric = Mattes
     Fixed image = Image (0x2ef15d0)
  RTTI typeinfo:   itk::Image<double, 3u>
  Reference Count: 2
  Modified Time: 1626
  Debug: Off
  Object Name:
  Observers:
    none
  Source: (none)
  Source output name: (none)
  Release Data: Off
  Data Released: False
  Global Release Data: Off
  PipelineMTime: 0
  UpdateMTime: 1429
  RealTimeStamp: 0 seconds
  LargestPossibleRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [193, 229, 193]
  BufferedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [193, 229, 193]
  RequestedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [193, 229, 193]
  Spacing: [1, 1, 1]
  Origin: [96, 132, -78]
  Direction:
```

-1 0 0
0 -1 0
0 0 1

IndexToPointMatrix:
-1 0 0
0 -1 0
0 0 1

PointToIndexMatrix:
-1 0 0
0 -1 0
0 0 1

Inverse Direction:
-1 0 0
0 -1 0
0 0 1

PixelContainer:
ImportImageContainer (0x2ee4c60)
RTTI typeinfo: itk::ImportImageContainer<unsigned long, double>
Reference Count: 1
Modified Time: 1426
Debug: Off
Object Name:
Observers:
none
Pointer: 0x7ffffa342010
Container manages memory: true
Size: 8530021
Capacity: 8530021

Moving image = Image (0x2f17c80)
RTTI typeinfo: itk::Image<double, 3u>
Reference Count: 2
Modified Time: 1627
Debug: Off
Object Name:
Observers:
none
Source: (none)
Source output name: (none)
Release Data: Off
Data Released: False
Global Release Data: Off
PipelineMTime: 0

```
  UpdateMTime: 1624
  RealTimeStamp: 0 seconds
  LargestPossibleRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  BufferedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  RequestedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  Spacing: [1, 1, 1]
  Origin: [86.2893, 141.682, -144.091]
  Direction:
-1 0 0
0 -1 0
0 0 1

  IndexToPointMatrix:
-1 0 0
0 -1 0
0 0 1

  PointToIndexMatrix:
-1 0 0
0 -1 0
0 0 1

  Inverse Direction:
-1 0 0
0 -1 0
0 0 1

  PixelContainer:
    ImportImageContainer (0x2ef0460)
      RTTI typeinfo:   itk::ImportImageContainer<unsigned long, double>
      Reference Count: 1
      Modified Time: 1621
      Debug: Off
      Object Name:
      Observers:
        none
      Pointer: 0x7ffff4b41010
      Container manages memory: true
```

Size: 11534336
Capacity: 11534336

Weighting = 1
Sampling strategy = regular
Number of bins = 32
Radius = 4
Sampling percentage = 0.25
Transform = Rigid
Gradient step = 0.1
Update field sigma (voxel space) = 0
Total field sigma (voxel space) = 0
Update field time sigma = 0
Total field time sigma = 0
Number of time indices = 0
Number of time point samples = 0
Stage 2 State
Image metric = Mattes
Fixed image = Image (0x2f0b650)
RTTI typeinfo: itk::Image<double, 3u>
Reference Count: 2
Modified Time: 2018
Debug: Off
Object Name:
Observers:
none
Source: (none)
Source output name: (none)
Release Data: Off
Data Released: False
Global Release Data: Off
PipelineMTime: 0
UpdateMTime: 1821
RealTimeStamp: 0 seconds
LargestPossibleRegion:
Dimension: 3
Index: [0, 0, 0]
Size: [193, 229, 193]
BufferedRegion:
Dimension: 3
Index: [0, 0, 0]
Size: [193, 229, 193]
RequestedRegion:
Dimension: 3
Index: [0, 0, 0]
Size: [193, 229, 193]
Spacing: [1, 1, 1]

```
  Origin: [96, 132, -78]
  Direction:
-1 0 0
0 -1 0
0 0 1

  IndexToPointMatrix:
-1 0 0
0 -1 0
0 0 1

  PointToIndexMatrix:
-1 0 0
0 -1 0
0 0 1

  Inverse Direction:
-1 0 0
0 -1 0
0 0 1

  PixelContainer:
    ImportImageContainer (0x2ef0ba0)
      RTTI typeinfo:   itk::ImportImageContainer<unsigned long, double>
      Reference Count: 1
      Modified Time: 1818
      Debug: Off
      Object Name:
      Observers:
        none
      Pointer: 0x7ffff0a2c010
      Container manages memory: true
      Size: 8530021
      Capacity: 8530021

    Moving image = Image (0x2f0b390)
  RTTI typeinfo:   itk::Image<double, 3u>
  Reference Count: 2
  Modified Time: 2019
  Debug: Off
  Object Name:
  Observers:
    none
  Source: (none)
  Source output name: (none)
  Release Data: Off
  Data Released: False
```

```
  Global Release Data: Off
  PipelineMTime: 0
  UpdateMTime: 2016
  RealTimeStamp: 0 seconds
  LargestPossibleRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  BufferedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  RequestedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  Spacing: [1, 1, 1]
  Origin: [86.2893, 141.682, -144.091]
  Direction:
-1 0 0
0 -1 0
0 0 1

  IndexToPointMatrix:
-1 0 0
0 -1 0
0 0 1

  PointToIndexMatrix:
-1 0 0
0 -1 0
0 0 1

  Inverse Direction:
-1 0 0
0 -1 0
0 0 1

  PixelContainer:
    ImportImageContainer (0x2f0ba90)
      RTTI typeinfo:   itk::ImportImageContainer<unsigned long, double>
      Reference Count: 1
      Modified Time: 2013
      Debug: Off
      Object Name:
      Observers:
        none
```

```
      Pointer: 0x7fffeb22b010
      Container manages memory: true
      Size: 11534336
      Capacity: 11534336

    Weighting = 1
    Sampling strategy = regular
    Number of bins = 32
    Radius = 4
    Sampling percentage  = 0.25
  Transform = Affine
    Gradient step = 0.1
    Update field sigma (voxel space) = 0
    Total field sigma (voxel space) = 0
    Update field time sigma = 0
    Total field time sigma  = 0
    Number of time indices = 0
    Number of time point samples = 0
Stage 3 State
  Image metric = Mattes
    Fixed image = Image (0x2f0c330)
  RTTI typeinfo:   itk::Image<double, 3u>
  Reference Count: 2
  Modified Time: 2410
  Debug: Off
  Object Name:
  Observers:
    none
  Source: (none)
  Source output name: (none)
  Release Data: Off
  Data Released: False
  Global Release Data: Off
  PipelineMTime: 0
  UpdateMTime: 2213
  RealTimeStamp: 0 seconds
  LargestPossibleRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [193, 229, 193]
  BufferedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [193, 229, 193]
  RequestedRegion:
    Dimension: 3
    Index: [0, 0, 0]
```

```
    Size: [193, 229, 193]
  Spacing: [1, 1, 1]
  Origin: [96, 132, -78]
  Direction:
-1 0 0
0 -1 0
0 0 1

  IndexToPointMatrix:
-1 0 0
0 -1 0
0 0 1

  PointToIndexMatrix:
-1 0 0
0 -1 0
0 0 1

  Inverse Direction:
-1 0 0
0 -1 0
0 0 1

  PixelContainer:
    ImportImageContainer (0x2f0d690)
      RTTI typeinfo:   itk::ImportImageContainer<unsigned long, double>
      Reference Count: 1
      Modified Time: 2210
      Debug: Off
      Object Name:
      Observers:
        none
      Pointer: 0x7fffe7116010
      Container manages memory: true
      Size: 8530021
      Capacity: 8530021

    Moving image = Image (0x2f0cdf0)
  RTTI typeinfo:   itk::Image<double, 3u>
  Reference Count: 2
  Modified Time: 2411
  Debug: Off
  Object Name:
  Observers:
    none
  Source: (none)
  Source output name: (none)
```

```
  Release Data: Off
  Data Released: False
  Global Release Data: Off
  PipelineMTime: 0
  UpdateMTime: 2408
  RealTimeStamp: 0 seconds
  LargestPossibleRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  BufferedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  RequestedRegion:
    Dimension: 3
    Index: [0, 0, 0]
    Size: [176, 256, 256]
  Spacing: [1, 1, 1]
  Origin: [86.2893, 141.682, -144.091]
  Direction:
-1 0 0
0 -1 0
0 0 1

  IndexToPointMatrix:
-1 0 0
0 -1 0
0 0 1

  PointToIndexMatrix:
-1 0 0
0 -1 0
0 0 1

  Inverse Direction:
-1 0 0
0 -1 0
0 0 1

  PixelContainer:
    ImportImageContainer (0x2f10130)
      RTTI typeinfo:   itk::ImportImageContainer<unsigned long, double>
      Reference Count: 1
      Modified Time: 2405
      Debug: Off
      Object Name:
```

```
      Observers:
        none
      Pointer: 0x7fffe1915010
      Container manages memory: true
      Size: 11534336
      Capacity: 11534336

     Weighting = 1
     Sampling strategy = none
     Number of bins = 32
     Radius = 4
     Sampling percentage  = 1
   Transform = SyN
     Gradient step = 0.1
     Update field sigma (voxel space) = 3
     Total field sigma (voxel space) = 0
     Update field time sigma = 0
     Total field time sigma  = 0
     Number of time indices = 0
     Number of time point samples = 0
Registration using 3 total stages.

Stage 0
  iterations = 1000x500x250x0
  convergence threshold = 1e-06
  convergence window size = 10
  number of levels = 4
  using the Mattes MI metric (number of bins = 32, weight = 1)
  preprocessing:  winsorizing the image intensities
  Shrink factors (level 1 out of 4): [8, 8, 8]
  Shrink factors (level 2 out of 4): [4, 4, 4]
  Shrink factors (level 3 out of 4): [2, 2, 2]
  Shrink factors (level 4 out of 4): [1, 1, 1]
  smoothing sigmas per level: [3, 2, 1, 0]
  regular sampling (percentage = 0.25)

*** Running Euler3DTransform registration ***

DIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINC
E_LAST
 2DIAGNOSTIC,     1, -4.830052767814e-01, 1.797693134862e+308, 1.4353e+00,
1.4352e+00,
 2DIAGNOSTIC,     2, -4.852173621121e-01, 1.797693134862e+308, 1.4402e+00,
4.9469e-03,
 2DIAGNOSTIC,     3, -4.898257884532e-01, 1.797693134862e+308, 1.4452e+00,
4.9269e-03,
 2DIAGNOSTIC,     4, -4.968029241515e-01, 1.797693134862e+308, 1.4502e+00,
```

5.0230e-03,
 2DIAGNOSTIC, 5, -5.033009552552e-01, 1.797693134862e+308, 1.4565e+00,
6.3419e-03,
 2DIAGNOSTIC, 6, -5.148822055627e-01, 1.797693134862e+308, 1.4631e+00,
6.5379e-03,
 2DIAGNOSTIC, 7, -5.401732789993e-01, 1.797693134862e+308, 1.4702e+00,
7.1611e-03,
 2DIAGNOSTIC, 8, -5.959124851362e-01, 1.797693134862e+308, 1.4773e+00,
7.0932e-03,
 2DIAGNOSTIC, 9, -6.225882816168e-01, 1.797693134862e+308, 1.4848e+00,
7.5078e-03,
 2DIAGNOSTIC, 10, -6.235236483313e-01, 1.895896493371e-02, 1.4963e+00,
1.1491e-02,
 2DIAGNOSTIC, 11, -6.245681665719e-01, 1.862836465631e-02, 1.5036e+00,
7.2501e-03,
 2DIAGNOSTIC, 12, -6.246102684904e-01, 1.679879933485e-02, 1.5096e+00,
6.0480e-03,
 2DIAGNOSTIC, 13, -6.243889614664e-01, 1.391640690057e-02, 1.5147e+00,
5.0418e-03,
 2DIAGNOSTIC, 14, -6.246599164463e-01, 1.049165602239e-02, 1.5206e+00,
5.9211e-03,
 2DIAGNOSTIC, 15, -6.248445982465e-01, 6.870257849702e-03, 1.5263e+00,
5.7249e-03,
 2DIAGNOSTIC, 16, -6.250471594354e-01, 3.499241478168e-03, 1.5320e+00,
5.7011e-03,
 2DIAGNOSTIC, 17, -6.254563480835e-01, 9.551446431974e-04, 1.5374e+00,
5.4250e-03,
 2DIAGNOSTIC, 18, -6.254750409207e-01, 1.409612680739e-04, 1.5437e+00,
6.2451e-03,
 2DIAGNOSTIC, 19, -6.265270559940e-01, 1.241681542514e-04, 1.5497e+00,
6.0060e-03,
 2DIAGNOSTIC, 20, -6.268842265377e-01, 1.280125507935e-04, 1.5580e+00,
8.3411e-03,
 2DIAGNOSTIC, 21, -6.266443776016e-01, 1.383832380622e-04, 1.5630e+00,
5.0120e-03,
 2DIAGNOSTIC, 22, -6.269659124269e-01, 1.437841171290e-04, 1.5679e+00,
4.8871e-03,
 2DIAGNOSTIC, 23, -6.273377544525e-01, 1.382829665753e-04, 1.5729e+00,
4.9281e-03,
 2DIAGNOSTIC, 24, -6.272696664165e-01, 1.240454792239e-04, 1.5778e+00,
4.9529e-03,
 2DIAGNOSTIC, 25, -6.273738825982e-01, 1.051418714136e-04, 1.5831e+00,
5.3420e-03,
 2DIAGNOSTIC, 26, -6.275225646637e-01, 8.471119761365e-05, 1.5885e+00,
5.3101e-03,
 2DIAGNOSTIC, 27, -6.276890764925e-01, 6.841193946703e-05, 1.5935e+00,
5.0480e-03,

2DIAGNOSTIC, 28, -6.279542722540e-01, 5.121928791085e-05, 1.6018e+00, 8.2691e-03,
2DIAGNOSTIC, 29, -6.279935630090e-01, 4.834660703122e-05, 1.6067e+00, 4.9438e-03,
2DIAGNOSTIC, 30, -6.279998859473e-01, 4.730967173176e-05, 1.6124e+00, 5.7080e-03,
2DIAGNOSTIC, 31, -6.280047805090e-01, 3.829743002098e-05, 1.6180e+00, 5.5742e-03,
2DIAGNOSTIC, 32, -6.279306503418e-01, 2.982816387365e-05, 1.6228e+00, 4.8392e-03,
2DIAGNOSTIC, 33, -6.277760882971e-01, 2.233371448930e-05, 1.6277e+00, 4.8618e-03,
2DIAGNOSTIC, 34, -6.277796079922e-01, 1.242727746992e-05, 1.6349e+00, 7.1869e-03,
2DIAGNOSTIC, 35, -6.277796537275e-01, 3.417201741372e-06, 1.6526e+00, 1.7695e-02,
DIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINCE_LAST
2DIAGNOSTIC, 1, -5.222733516712e-01, 1.797693134862e+308, 3.1249e+00, 1.4723e+00,
2DIAGNOSTIC, 2, -5.225636035679e-01, 1.797693134862e+308, 3.1776e+00, 5.2664e-02,
2DIAGNOSTIC, 3, -5.230533040676e-01, 1.797693134862e+308, 3.2315e+00, 5.3947e-02,
2DIAGNOSTIC, 4, -5.235150198714e-01, 1.797693134862e+308, 3.2868e+00, 5.5299e-02,
2DIAGNOSTIC, 5, -5.240808365319e-01, 1.797693134862e+308, 3.3395e+00, 5.2696e-02,
2DIAGNOSTIC, 6, -5.246116069313e-01, 1.797693134862e+308, 3.4050e+00, 6.5484e-02,
2DIAGNOSTIC, 7, -5.248355836412e-01, 1.797693134862e+308, 3.4594e+00, 5.4389e-02,
2DIAGNOSTIC, 8, -5.251967449522e-01, 1.797693134862e+308, 3.5196e+00, 6.0194e-02,
2DIAGNOSTIC, 9, -5.252300570013e-01, 1.797693134862e+308, 3.6086e+00, 8.8966e-02,
2DIAGNOSTIC, 10, -5.252297537333e-01, 4.096541115582e-04, 3.6681e+00, 5.9522e-02,
2DIAGNOSTIC, 11, -5.252317932540e-01, 3.149952960809e-04, 3.7282e+00, 6.0088e-02,
2DIAGNOSTIC, 12, -5.252325885529e-01, 2.210451616772e-04, 3.7895e+00, 6.1282e-02,
2DIAGNOSTIC, 13, -5.252281832612e-01, 1.418917637656e-04, 3.8496e+00, 6.0127e-02,
2DIAGNOSTIC, 14, -5.252009002996e-01, 7.791203596288e-05, 3.9026e+00, 5.3067e-02,
2DIAGNOSTIC, 15, -5.251871612059e-01, 3.529907222730e-05, 3.9644e+00,

6.1708e-02,
 2DIAGNOSTIC,   16, -5.251962893646e-01, 1.320962617309e-05, 4.0248e+00,
6.0455e-02,
DIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINC
E_LAST
 2DIAGNOSTIC,   1, -4.638425583832e-01, 1.797693134862e+308, 5.8199e+00,
1.7951e+00,
 2DIAGNOSTIC,   2, -4.639565521045e-01, 1.797693134862e+308, 6.1164e+00,
2.9648e-01,
 2DIAGNOSTIC,   3, -4.641509058789e-01, 1.797693134862e+308, 6.4105e+00,
2.9410e-01,
 2DIAGNOSTIC,   4, -4.643142995979e-01, 1.797693134862e+308, 6.7035e+00,
2.9302e-01,
 2DIAGNOSTIC,   5, -4.644155289255e-01, 1.797693134862e+308, 7.0014e+00,
2.9794e-01,
 2DIAGNOSTIC,   6, -4.644989093048e-01, 1.797693134862e+308, 7.3385e+00,
3.3706e-01,
 2DIAGNOSTIC,   7, -4.645902429078e-01, 1.797693134862e+308, 7.7624e+00,
4.2389e-01,
 2DIAGNOSTIC,   8, -4.646257400073e-01, 1.797693134862e+308, 8.0610e+00,
2.9859e-01,
 2DIAGNOSTIC,   9, -4.646481384282e-01, 1.797693134862e+308, 8.3982e+00,
3.3722e-01,
 2DIAGNOSTIC,   10, -4.647981565598e-01, 1.277722493723e-04, 8.8598e+00,
4.6163e-01,
 2DIAGNOSTIC,   11, -4.647932699150e-01, 1.002374197544e-04, 9.1950e+00,
3.3516e-01,
 2DIAGNOSTIC,   12, -4.647867189119e-01, 7.396342701833e-05, 9.5721e+00,
3.7707e-01,
 2DIAGNOSTIC,   13, -4.647816904253e-01, 5.418097614426e-05, 9.9104e+00,
3.3833e-01,
 2DIAGNOSTIC,   14, -4.647768043618e-01, 3.938977756456e-05, 1.0246e+01,
3.3513e-01,
 2DIAGNOSTIC,   15, -4.647745972789e-01, 2.708654013600e-05, 1.0538e+01,
2.9268e-01,
 2DIAGNOSTIC,   16, -4.647773045439e-01, 1.723437454150e-05, 1.0910e+01,
3.7194e-01,
 2DIAGNOSTIC,   17, -4.647779585947e-01, 1.050873634697e-05, 1.1245e+01,
3.3533e-01,
 2DIAGNOSTIC,   18, -4.647771147573e-01, 4.951232895054e-06, 1.1580e+01,
3.3426e-01,
DIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINC
E_LAST
 2DIAGNOSTIC,   1, -4.258790286381e-01, 1.797693134862e+308, 1.4425e+01,
2.8452e+00,
  Elapsed time (stage 0): 1.5329e+01

Stage 1
 iterations = 1000x500x250x0
 convergence threshold = 1.0000e-06
 convergence window size = 10
 number of levels = 4
 using the Mattes MI metric (number of bins = 32, weight = 1.0000e+00)
 preprocessing: winsorizing the image intensities
 Shrink factors (level 1 out of 4): [8, 8, 8]
 Shrink factors (level 2 out of 4): [4, 4, 4]
 Shrink factors (level 3 out of 4): [2, 2, 2]
 Shrink factors (level 4 out of 4): [1, 1, 1]
 smoothing sigmas per level: [3, 2, 1, 0]
 regular sampling (percentage = 2.5000e-01)

*** Running AffineTransform registration ***

DIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINCE_LAST
 2DIAGNOSTIC,   1, -6.208777761984e-01, 1.797693134862e+308, 1.4226e+00, 1.4226e+00,
 2DIAGNOSTIC,   2, -6.223337563064e-01, 1.797693134862e+308, 1.4288e+00, 6.1622e-03,
 2DIAGNOSTIC,   3, -6.249657083696e-01, 1.797693134862e+308, 1.4342e+00, 5.4562e-03,
 2DIAGNOSTIC,   4, -6.295120285182e-01, 1.797693134862e+308, 1.4396e+00, 5.4040e-03,
 2DIAGNOSTIC,   5, -6.368303998866e-01, 1.797693134862e+308, 1.4454e+00, 5.7840e-03,
 2DIAGNOSTIC,   6, -6.460562906214e-01, 1.797693134862e+308, 1.4513e+00, 5.8339e-03,
 2DIAGNOSTIC,   7, -6.673633987003e-01, 1.797693134862e+308, 1.4574e+00, 6.1321e-03,
 2DIAGNOSTIC,   8, -6.784809619447e-01, 1.797693134862e+308, 1.4665e+00, 9.1031e-03,
 2DIAGNOSTIC,   9, -6.959901769668e-01, 1.797693134862e+308, 1.4805e+00, 1.4015e-02,
 2DIAGNOSTIC,   10, -6.977773725220e-01, 8.634449186202e-03, 1.4869e+00, 6.3961e-03,
 2DIAGNOSTIC,   11, -7.010801867349e-01, 8.346564142001e-03, 1.4928e+00, 5.8861e-03,
 2DIAGNOSTIC,   12, -7.061115334969e-01, 7.589158699633e-03, 1.4989e+00, 6.1169e-03,
 2DIAGNOSTIC,   13, -7.141395146197e-01, 6.609156614652e-03, 1.5053e+00, 6.3920e-03,
 2DIAGNOSTIC,   14, -7.236956578262e-01, 5.598171345905e-03, 1.5116e+00, 6.3438e-03,

2DIAGNOSTIC, 15, -7.306864044036e-01, 4.623196370610e-03, 1.5183e+00, 6.6450e-03,
2DIAGNOSTIC, 16, -7.556201851732e-01, 4.239318156094e-03, 1.5263e+00, 8.0318e-03,
2DIAGNOSTIC, 17, -7.805708973590e-01, 4.624008318302e-03, 1.5392e+00, 1.2920e-02,
2DIAGNOSTIC, 18, -7.817597040558e-01, 4.796984977321e-03, 1.5459e+00, 6.6199e-03,
2DIAGNOSTIC, 19, -7.863953458073e-01, 4.994755811151e-03, 1.5518e+00, 5.9741e-03,
2DIAGNOSTIC, 20, -7.917681640795e-01, 4.855783689095e-03, 1.5580e+00, 6.1910e-03,
2DIAGNOSTIC, 21, -7.986891575445e-01, 4.466960339160e-03, 1.5644e+00, 6.4261e-03,
2DIAGNOSTIC, 22, -8.047417703571e-01, 3.893609101909e-03, 1.5718e+00, 7.3631e-03,
2DIAGNOSTIC, 23, -8.083948284174e-01, 3.217665720212e-03, 1.5779e+00, 6.1281e-03,
2DIAGNOSTIC, 24, -8.167945434433e-01, 2.608632376017e-03, 1.5853e+00, 7.3700e-03,
2DIAGNOSTIC, 25, -8.204875387972e-01, 1.969350180942e-03, 1.5932e+00, 7.8800e-03,
2DIAGNOSTIC, 26, -8.226213190676e-01, 1.598240750789e-03, 1.5992e+00, 6.0141e-03,
2DIAGNOSTIC, 27, -8.236961633984e-01, 1.485392327971e-03, 1.6054e+00, 6.2449e-03,
2DIAGNOSTIC, 28, -8.268314812793e-01, 1.301765192281e-03, 1.6133e+00, 7.8659e-03,
2DIAGNOSTIC, 29, -8.341689388150e-01, 1.166695251815e-03, 1.6211e+00, 7.7941e-03,
2DIAGNOSTIC, 30, -8.487582303494e-01, 1.182915207591e-03, 1.6289e+00, 7.7679e-03,
2DIAGNOSTIC, 31, -8.650901638026e-01, 1.368394258707e-03, 1.6422e+00, 1.3372e-02,
2DIAGNOSTIC, 32, -8.670482381189e-01, 1.504771798472e-03, 1.6480e+00, 5.7960e-03,
2DIAGNOSTIC, 33, -8.725053587044e-01, 1.595258773841e-03, 1.6548e+00, 6.7070e-03,
2DIAGNOSTIC, 34, -8.778114103229e-01, 1.679011431371e-03, 1.6609e+00, 6.1932e-03,
2DIAGNOSTIC, 35, -8.820018474276e-01, 1.678489955736e-03, 1.6671e+00, 6.1681e-03,
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7.7810e-03,
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7.4890e-03,
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7.0710e-03,
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6.4270e-03,
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1.0351e-02,
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2DIAGNOSTIC, 57, -9.540400839878e-01, 6.354334182465e-05, 1.8219e+00,
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2DIAGNOSTIC, 66, -9.551529706918e-01, 1.161770006084e-05, 1.8815e+00, 5.4269e-03,
2DIAGNOSTIC, 67, -9.551631490237e-01, 7.276317139138e-06, 1.8870e+00, 5.4300e-03,
2DIAGNOSTIC, 68, -9.551739330843e-01, 4.136819994310e-06, 1.8928e+00, 5.8630e-03,
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2DIAGNOSTIC, 77, -9.552893977900e-01, 1.536387200537e-06, 1.9530e+00, 6.5999e-03,
2DIAGNOSTIC, 78, -9.552923146685e-01, 1.397215835490e-06, 1.9611e+00, 8.0659e-03,
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2DIAGNOSTIC, 4, -8.364388577510e-01, 1.797693134862e+308, 3.6242e+00,

5.6303e-02,
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6.5682e-02,
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 2DIAGNOSTIC, 8, -8.378061850851e-01, 1.797693134862e+308, 3.8754e+00,
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7.0710e-02,
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5.7993e-02,
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5.4816e-02,
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7.0568e-02,
 2DIAGNOSTIC, 17, -8.397712470948e-01, 7.646986856296e-05, 4.4485e+00,
6.2061e-02,
 2DIAGNOSTIC, 18, -8.397780810050e-01, 4.968306422203e-05, 4.5116e+00,
6.3039e-02,
 2DIAGNOSTIC, 19, -8.397949748428e-01, 3.061252146799e-05, 4.5890e+00,
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 2DIAGNOSTIC, 20, -8.397961306512e-01, 2.280947816019e-05, 4.6533e+00,
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5.5557e-02,
 2DIAGNOSTIC, 26, -8.397964595814e-01, 1.736217716999e-06, 4.9957e+00,
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2DIAGNOSTIC, 29, -8.398077117376e-01, 1.337445761737e-06, 5.2057e+00, 9.2151e-02,
2DIAGNOSTIC, 30, -8.398047125930e-01, 1.367148990142e-06, 5.3474e+00, 1.4174e-01,
2DIAGNOSTIC, 31, -8.398047125922e-01, 1.359706299199e-06, 5.4287e+00, 8.1246e-02,
2DIAGNOSTIC, 32, -8.398047125924e-01, 1.320776867715e-06, 5.5001e+00, 7.1382e-02,
2DIAGNOSTIC, 33, -8.398047125924e-01, 1.245066165820e-06, 5.5782e+00, 7.8167e-02,
2DIAGNOSTIC, 34, -8.398047125924e-01, 1.155899946956e-06, 5.6406e+00, 6.2407e-02,
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DIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINCE_LAST
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2DIAGNOSTIC, 2, -7.435069944236e-01, 1.797693134862e+308, 7.8309e+00, 3.1266e-01,
2DIAGNOSTIC, 3, -7.439368850931e-01, 1.797693134862e+308, 8.1435e+00, 3.1260e-01,
2DIAGNOSTIC, 4, -7.444430514816e-01, 1.797693134862e+308, 8.4591e+00, 3.1568e-01,
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2DIAGNOSTIC, 7, -7.456725861809e-01, 1.797693134862e+308, 9.5642e+00, 4.1642e-01,
2DIAGNOSTIC, 8, -7.457397799210e-01, 1.797693134862e+308, 9.8869e+00, 3.2269e-01,
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2DIAGNOSTIC, 14, -7.460534532515e-01, 5.718087406410e-05, 1.2128e+01, 3.7592e-01,
2DIAGNOSTIC, 15, -7.460756634970e-01, 3.130940430644e-05, 1.2644e+01,

5.1580e-01,
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3.2682e-01,
 2DIAGNOSTIC,   17, -7.460828508668e-01, 1.860483012093e-05, 1.3300e+01,
3.2926e-01,
 2DIAGNOSTIC,   18, -7.460855573773e-01, 1.355173684264e-05, 1.3723e+01,
4.2269e-01,
 2DIAGNOSTIC,   19, -7.460857033237e-01, 9.150147714736e-06, 1.4051e+01,
3.2769e-01,
 2DIAGNOSTIC,   20, -7.460863790108e-01, 6.400935451553e-06, 1.4378e+01,
3.2744e-01,
 2DIAGNOSTIC,   21, -7.460873935663e-01, 4.659939581673e-06, 1.4705e+01,
3.2686e-01,
 2DIAGNOSTIC,   22, -7.460929393001e-01, 3.528505704245e-06, 1.5173e+01,
4.6797e-01,
 2DIAGNOSTIC,   23, -7.460936822555e-01, 2.440158174487e-06, 1.5551e+01,
3.7811e-01,
 2DIAGNOSTIC,   24, -7.460937128582e-01, 1.961118674197e-06, 1.5926e+01,
3.7477e-01,
 2DIAGNOSTIC,   25, -7.460936700886e-01, 1.800750005193e-06, 1.6256e+01,
3.3028e-01,
 2DIAGNOSTIC,   26, -7.460936644647e-01, 1.632581416389e-06, 1.6585e+01,
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3.7486e-01,
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3.7357e-01,
 2DIAGNOSTIC,   36, -7.461015678406e-01, 1.125537705940e-06, 2.0479e+01,
4.2057e-01,
 2DIAGNOSTIC,   37, -7.461013833687e-01, 1.088440922458e-06, 2.0805e+01,
3.2537e-01,
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3.7383e-01,

DIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINCE_LAST
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  Elapsed time (stage 1): 2.5215e+01

Stage 2
  iterations = 100x70x50x0
  convergence threshold = 1.0000e-06
  convergence window size = 10
  number of levels = 4
  using the Mattes MI metric (number of bins = 32, weight = 1.0000e+00)
  preprocessing: winsorizing the image intensities
  Shrink factors (level 1 out of 4): [8, 8, 8]
  Shrink factors (level 2 out of 4): [4, 4, 4]
  Shrink factors (level 3 out of 4): [2, 2, 2]
  Shrink factors (level 4 out of 4): [1, 1, 1]
  smoothing sigmas per level: [3, 2, 1, 0]
  Using default NONE metricSamplingStrategy

*** Running SyN registration (varianceForUpdateField = 3.0000e+00, varianceForTotalField = 0.0000e+00) ***

XXDIAGNOSTIC,Iteration,metricValue,convergenceValue,ITERATION_TIME_INDEX,SINCE_LAST
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 1DIAGNOSTIC,   3, -1.002621544126e+00, 1.797693134862e+308, 1.4592e+00, 4.5256e-02,
 1DIAGNOSTIC,   4, -1.026714108156e+00, 1.797693134862e+308, 1.5037e+00, 4.4558e-02,
 1DIAGNOSTIC,   5, -1.044255899256e+00, 1.797693134862e+308, 1.5471e+00, 4.3344e-02,
 1DIAGNOSTIC,   6, -1.060282209852e+00, 1.797693134862e+308, 1.5916e+00, 4.4492e-02,
 1DIAGNOSTIC,   7, -1.074403121344e+00, 1.797693134862e+308, 1.6375e+00, 4.5931e-02,
 1DIAGNOSTIC,   8, -1.086608045494e+00, 1.797693134862e+308, 1.6835e+00, 4.6042e-02,
 1DIAGNOSTIC,   9, -1.096724856281e+00, 1.797693134862e+308, 1.7295e+00, 4.6019e-02,
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4.6190e-02,
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4.6080e-02,
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4.6548e-02,
 1DIAGNOSTIC,   15, -1.141784787402e+00, 3.160189201336e-03, 2.0074e+00,
4.6620e-02,
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4.6534e-02,
 1DIAGNOSTIC,   18, -1.154786114202e+00, 1.890319137915e-03, 2.1471e+00,
4.6668e-02,
 1DIAGNOSTIC,   19, -1.157941233730e+00, 1.592045948338e-03, 2.1935e+00,
4.6445e-02,
 1DIAGNOSTIC,   20, -1.160104299088e+00, 1.334467206047e-03, 2.2398e+00,
4.6334e-02,
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4.6351e-02,
 1DIAGNOSTIC,   22, -1.164860442486e+00, 9.124410754129e-04, 2.3325e+00,
4.6304e-02,
 1DIAGNOSTIC,   23, -1.166619052580e+00, 7.454113673664e-04, 2.3787e+00,
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 1DIAGNOSTIC,   24, -1.167612813332e+00, 6.094066123801e-04, 2.4249e+00,
4.6139e-02,
 1DIAGNOSTIC,   25, -1.168301424035e+00, 4.919062876254e-04, 2.4716e+00,
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 1DIAGNOSTIC,   28, -1.170815363140e+00, 2.593896005819e-04, 2.6104e+00,
4.6188e-02,
 1DIAGNOSTIC,   29, -1.171957170638e+00, 2.145642786026e-04, 2.6567e+00,
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Total elapsed time: 200.1

Apply linear transform to T1
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ANTS0GenericAffine.mat -o /tmp/tmp.k08KaQFfrg/T1_norm_lin_atlas_2_5.nii.gz
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Apply linear transform to distorted b0
antsApplyTransforms -d 3 -i /INPUTS/b0.nii.gz -r /extra/atlases/
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ANTS0GenericAffine.mat -t /tmp/tmp.k08KaQFfrg/epi_reg_d_ANTS.txt -o /tmp/
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Apply nonlinear transform to T1
antsApplyTransforms -d 3 -i /tmp/tmp.k08KaQFfrg/T1_norm.nii.gz -r /extra/atlases/

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Apply nonlinear transform to distorted b0
antsApplyTransforms -d 3 -i /INPUTS/b0.nii.gz -r /extra/atlases/
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Copying results to results path...

Removing job directory...
Performing inference on FOLD: 1
/extra/pipeline.sh: line 42: 1294 Killed   python3.6 /extra/inference.py /
OUTPUTS/T1_norm_lin_atlas_2_5.nii.gz /OUTPUTS/b0_d_lin_atlas_2_5.nii.gz /
OUTPUTS/b0_u_lin_atlas_2_5_FOLD_"$i".nii.gz /extra/dual_channel_unet/
num_fold_"$i"_total_folds_"$NUM_FOLDS"_seed_1_num_epochs_100_lr_0.0001_beta
s_\(0.9\,\ 0.999\)_weight_decay_1e-05_num_epoch_*.pth
Performing inference on FOLD: 2
/extra/pipeline.sh: line 42: 1306 Killed   python3.6 /extra/inference.py /
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OUTPUTS/b0_u_lin_atlas_2_5_FOLD_"$i".nii.gz /extra/dual_channel_unet/
num_fold_"$i"_total_folds_"$NUM_FOLDS"_seed_1_num_epochs_100_lr_0.0001_beta
s_\(0.9\,\ 0.999\)_weight_decay_1e-05_num_epoch_*.pth
Performing inference on FOLD: 3
/extra/pipeline.sh: line 42: 1318 Killed   python3.6 /extra/inference.py /
OUTPUTS/T1_norm_lin_atlas_2_5.nii.gz /OUTPUTS/b0_d_lin_atlas_2_5.nii.gz /
OUTPUTS/b0_u_lin_atlas_2_5_FOLD_"$i".nii.gz /extra/dual_channel_unet/
num_fold_"$i"_total_folds_"$NUM_FOLDS"_seed_1_num_epochs_100_lr_0.0001_beta
s_\(0.9\,\ 0.999\)_weight_decay_1e-05_num_epoch_*.pth
Performing inference on FOLD: 4
/extra/pipeline.sh: line 42: 1330 Killed   python3.6 /extra/inference.py /
OUTPUTS/T1_norm_lin_atlas_2_5.nii.gz /OUTPUTS/b0_d_lin_atlas_2_5.nii.gz /
OUTPUTS/b0_u_lin_atlas_2_5_FOLD_"$i".nii.gz /extra/dual_channel_unet/
num_fold_"$i"_total_folds_"$NUM_FOLDS"_seed_1_num_epochs_100_lr_0.0001_beta
s_\(0.9\,\ 0.999\)_weight_decay_1e-05_num_epoch_*.pth
Performing inference on FOLD: 5
/extra/pipeline.sh: line 42: 1342 Killed   python3.6 /extra/inference.py /
OUTPUTS/T1_norm_lin_atlas_2_5.nii.gz /OUTPUTS/b0_d_lin_atlas_2_5.nii.gz /
OUTPUTS/b0_u_lin_atlas_2_5_FOLD_"$i".nii.gz /extra/dual_channel_unet/
num_fold_"$i"_total_folds_"$NUM_FOLDS"_seed_1_num_epochs_100_lr_0.0001_beta
s_\(0.9\,\ 0.999\)_weight_decay_1e-05_num_epoch_*.pth
Taking ensemble average
Image Exception : #63 :: No image files match: /OUTPUTS/
b0_u_lin_atlas_2_5_FOLD_*

```
terminate called after throwing an instance of 'std::runtime_error'
  what():  No image files match: /OUTPUTS/b0_u_lin_atlas_2_5_FOLD_*
/extra/pipeline.sh: line 49:  1354 Aborted                 fslmerge -t /OUTPUTS/
b0_u_lin_atlas_2_5_merged.nii.gz /OUTPUTS/b0_u_lin_atlas_2_5_FOLD_*.nii.gz
Image Exception : #63 :: No image files match: /OUTPUTS/b0_u_lin_atlas_2_5_merged
terminate called after throwing an instance of 'std::runtime_error'
  what():  No image files match: /OUTPUTS/b0_u_lin_atlas_2_5_merged
/extra/pipeline.sh: line 50:  1355 Aborted                 fslmaths /OUTPUTS/
b0_u_lin_atlas_2_5_merged.nii.gz -Tmean /OUTPUTS/b0_u_lin_atlas_2_5.nii.gz
Applying inverse xform to undistorted b0
 file /OUTPUTS/b0_u_lin_atlas_2_5.nii.gz does not exist .
terminate called after throwing an instance of 'itk::ExceptionObject'
  what():  /home/local/VANDERBILT/blaberj/ANTS_13_FEB_2019/bin/ants/ITKv5/
Modules/Core/Common/src/itkProcessObject.cxx:1412:
itk::ERROR: ResampleImageFilter(0x1fe6890): Input Primary is required but not set.
/extra/pipeline.sh: line 54:  1356 Aborted                 antsApplyTransforms -d 3 -i /
OUTPUTS/b0_u_lin_atlas_2_5.nii.gz -r /INPUTS/b0.nii.gz -n BSpline -t [/OUTPUTS/
epi_reg_d_ANTS.txt,1] -t [/OUTPUTS/ANTS0GenericAffine.mat,1] -o /OUTPUTS/
b0_u.nii.gz
Applying slight smoothing to distorted b0
Running topup
Image Exception : #63 :: No image files match: /OUTPUTS/b0_u
terminate called after throwing an instance of 'std::runtime_error'
  what():  No image files match: /OUTPUTS/b0_u
/extra/pipeline.sh: line 65:  1368 Aborted                 fslmerge -t /OUTPUTS/b0_all.nii.gz /
OUTPUTS/b0_d_smooth.nii.gz /OUTPUTS/b0_u.nii.gz
Image Exception : #63 :: No image files match: /OUTPUTS/b0_all
Image Exception : #22 :: Failed to read volume /OUTPUTS/b0_all.nii.gz
Error : No image files match: /OUTPUTS/b0_all

Part of FSL (ID: 6.0.1)
topup

Usage:
topup --imain=<some 4D image> --datain=<text file> --config=<text file with
parameters> --out=my_topup_results


Compulsory arguments (You MUST set one or more of):
        --imain         name of 4D file with images
        --datain        name of text file with PE directions/times

Optional arguments (You may optionally specify one or more of):
        --out           base-name of output files (spline coefficients (Hz) and movement
parameters)
        --fout          name of image file with field (Hz)
        --iout          name of 4D image file with unwarped images
```

```
	--logout	Name of log-file
	--warpres	(approximate) resolution (in mm) of warp basis for the different sub-sampling levels, default 10
	--subsamp	sub-sampling scheme, default 1
	--fwhm	FWHM (in mm) of gaussian smoothing kernel, default 8
	--config	Name of config file specifying command line arguments
	--miter	Max # of non-linear iterations, default 5
	--lambda	Weight of regularisation, default depending on --ssqlambda and --regmod switches. See user documetation.
	--ssqlambda	If set (=1), lambda is weighted by current ssq, default 1
	--regmod	Model for regularisation of warp-field [membrane_energy bending_energy], default bending_energy
	--estmov	Estimate movements if set, default 1 (true)
	--minmet	Minimisation method 0=Levenberg-Marquardt, 1=Scaled Conjugate Gradient, default 0 (LM)
	--splineorder	Order of spline, 2->Qadratic spline, 3->Cubic spline. Default=3
	--numprec	Precision for representing Hessian, double or float. Default double
	--interp	Image interpolation model, linear or spline. Default spline
	--scale	If set (=1), the images are individually scaled to a common mean, default 0 (false)
	--regrid	If set (=1), the calculations are done in a different grid, default 1 (true)
	-h,--help	display help info
	-v,--verbose	Print diagonostic information while running
	-h,--help	display help info



Failed to read volume /OUTPUTS/b0_all.nii.gz
Error : No image files match: /OUTPUTS/b0_all
FINISHED!!!
tasciseda@HHP-APK-385M container %
```