

# ROAST: TES modeling made easy

Yu (Andy) Huang, Ph.D.

Research Associate,  
Memorial Sloan Kettering Cancer Center,  
CCNY-MSK AI Partnership

Co-host: Zeinab Esmailpour

Co-host: Lucas Parra



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# Agenda

- Talk & Demo (30 min)
- Q & A (30 min)

# Quick links

- To get ROAST:

<https://www.parralab.org/roast/>

- Documentation:

<https://github.com/andypotatohy/roast>

- Mailing list:

[roast-users@googlegroups.com](mailto:roast-users@googlegroups.com)

# Overview

- `roast()` --- simulation
- `roast_target()` --- optimization / targeting
- `reviewRes()` --- review results
- Outputs of ROAST package
- Other issues

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# Synopsis of roast()

- `roast(subj,recipe,varargin)`
- `subj` --- `path/to/your/mri.nii`  
can be T1 or T2  
use 'T2' option for T1+T2
- `recipe` --- montage for stimulation  
{elec, current}
- `varargin` --- all the options  
'Name', 'Value'

# Examples – basic

- `roast('example/subject1.nii',  
{'F1',0.3,'P2',0.7,'C5',-0.6,'O2',-  
0.4},'simulationTag','basicDemo')`
- See `capInfo.xls` for all electrode layouts

# Examples – cap type

- 'capType'

'1020' | '1010' (default) | '1005' | 'BioSemi' |  
'EGI'



# Examples – customized locations

- Use MRICro to click for customized locations
- Record the voxel coordinates into a text file
- Call `roast()`

# Examples – electrode shape

- 'elecType' -- the shape of electrode.

'disc' (default) | 'pad' | 'ring'

# Examples – electrode size

- 'elecSize'
- disc: [radius height], default [6mm 2mm]
- pad: [length width height], default [50mm 30mm 3mm]
- ring: [innerRadius outerRadius height], default [4mm 6mm 2mm]

# Examples – pad orientation

- 'elecOri' -- the orientation of pad electrode

'lr' (default) | 'ap' | 'si' | direction vector of the long axis

# Examples – add T2

- 'T2'

[ ] (default) | file path to the T2 MRI

# Examples – resampling and zero-padding

- 'resampling'  
'on' | 'off' (default)
- 'zeroPadding'

# Examples – mesh and conductivity control

- 'meshOptions'

meshOpt.distbound: default 0.3;

meshOpt.maxvol: default 10

- 'conductivities'

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# Synopsis of `roast_target()`

- Generate lead field first:  
`roast('example/MNI152_T1_1mm.nii','leadField','zeropadding',20,'simulationTag','MNI152leadField')`
- 74 electrodes placed (`elec72.loc`)
- Options frozen: 1010 system; disc electrode; 6mm radius, 2mm thick;
  
- `roast_target(subj,simTag,targetCoord,varargin)`
  
- `subj` --- same MRI file used for `roast()`
- `simTag` --- 'simulationTag' used when generating the lead field
- `TargetCoord` --- target locations in the brain
- `varargin` --- all the options  
    'Name', 'Value'
  
- `roast_target('example/MNI152_T1_1mm.nii','MNI152leadField',[-48 -8 50],'targetingTag','basicDemo')`

# Examples – split electrodes

- 'optType'

Max intensity: 'max-l1' (default) | 'max-l1per'

- 'elecNum'

# Examples – intensity vs. focality

- 'optType'

Max intensity: 'max-l1' (default) | 'max-l1per'

Max focality: 'unconstrained-wls' | 'wls-l1' | 'wls-l1per' | 'unconstrained-lcmv' | 'lcmv-l1' | 'lcmv-l1per'

- 'k'

reduce 'k' to get more focality

increase 'k' to get more intensity

# Examples – multi-focal targeting

- N-by-3 matrix
- Use 'wls-l1' with lower 'k' value

# Examples – voxel coordinates

- Use MRICro to click for voxel coordinates
- Call `roast_target()` with `'coordType','voxel'`

# Examples – define orientations

- 'orient'

'radial-in' (default) | 'radial-out' | 'right' | 'left' |  
'anterior' | 'posterior' | 'right-anterior' | 'right-  
posterior' | 'left-anterior' | 'left-posterior' |  
'optimal' | orientation vector of your choice

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# Synopsis of reviewRes()

- reviewRes(subj,simTag,tissue,fastRender,tarTag)
- subj --- path/to/your/mri.nii
- simTag --- tag of the simulation run in roast()
- tissue --- which tissue you want to visualize
- fastRender --- fast rendering or not
- tarTag --- tag of the targeting run in roast\_target()



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# Outputs of roast()

- subjName\_roastLog
- Figures
- NifTI images: subjName\_simulationTag\_v.nii,  
subjName\_simulationTag\_e.nii,  
subjName\_simulationTag\_emag.nii
- Matlab file:  
subjName\_simulationTag\_roastResult.mat
- Text files: subjName\_simulationTag\_v.pos,  
subjName\_simulationTag\_e.pos

# Outputs of roast\_target()

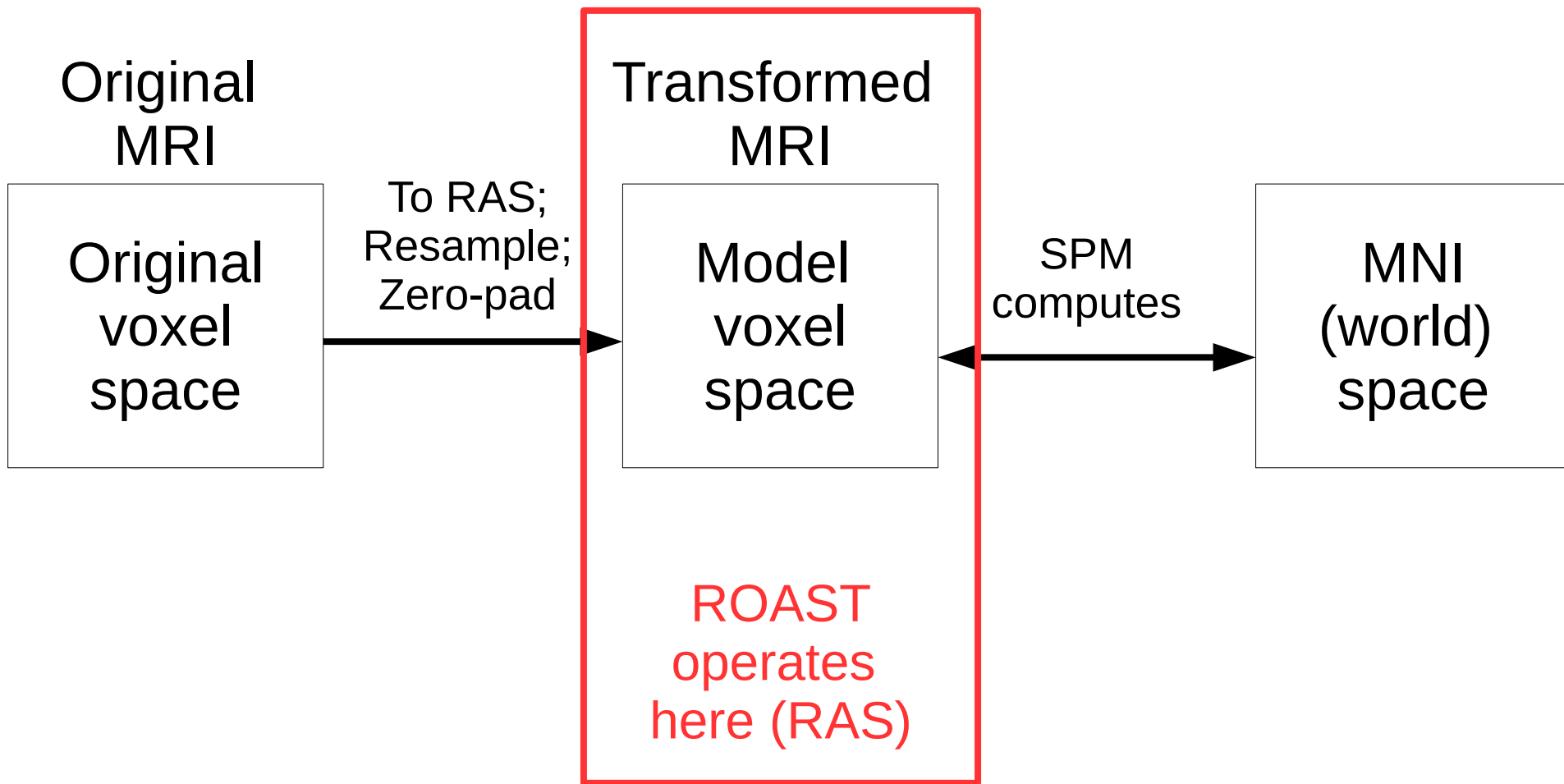
- subjName\_targetLog
- Figures
- Matlab file:  
subjName\_targetingTag\_targetResult.mat

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# Other issues

- Use of 'New York Head': memory hungry
- Use of RAS heads recommended
- Use of MNI coordinates recommended
- Use MRicro instead of MRicron (my code showHeader() also good)



Q & A