Lecture 3 exercise 3 - Display image overlays

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The objective is to visualize image overlays: 1) load NIfTI file of a 3D structural MRI AD_002_S_0619.nii and segmented tissues: - c1AD_002_S_0619.nii is the segmented gray matter (GM); - c2AD_002_S_0619.nii is the segmented white matter (WM); - c3AD_002_S_0619.nii is the segmented cerebrospinal fluid (CSF); 2) display a set of slices for each volume; 3) overlay the segmented tissues to the structural MRI;

Sample NIfTI images for this exercise are available at INFN Pandora or on drive Google drive folder in the /IMAGES/NIfTI_Examples/Brain_segment/ folder. Choose the following NIfTI volumes: AD_002_S_0619.nii c1AD_002_S_0619.nii c2AD_002_S_0619.nii c3AD_002_S_0619.nii

Complete the lines starting with %c

1) Read the images (T1w MRI and the segmented tissues)

Use strcat to build the filenames of the tissue files

```
%c dirname=...
%c filename=...
%c Im=niftiread ...
%c Im_c1=niftiread((strcat(dirname,'c1',filename)));
%c Im_c2=...
%c Im_c3=...
```

2) Display a set of slices for each volume

Use montage to display a multiple images, montage(filename,Name,Value). The following "Name, Value" pairs could be useful: 'Indices', values - to select some images to display 'DisplayRange', Value - to adjust the contrast of the images

```
%c figure; montage ...
```

repeat for Im, Im_c1, Im_c2, Im_c3

```
%c
```

3) Overlay the segmented tissues to the structural MRI

a) explore the possibility to view image overlays with imshowpair work at a fixed k position, e.g. k_slice=110, and select 2D images from each volume

```
%c k_slice=...
%c Im1=...
%c Im1_c1=...
%c Im1_c2=...
%c Im1_c3=...
%c figure; imshowpair... % explore 'blend', 'falsecolor','montage'
```

b) Make an overlay with imoverlay, which overlays binary mask into 2-D image generate binary masks for GM with imbinarize

```
%c c1=imbinarize(Im1_c1);
```

Make the samefor WM and CSF

```
%c Im1_c2=...
%c Im1_c3=...
%c c2=...
%c c3=...
```

Rescale the grey levels of Im1 with rescale to correctly display it with imoverlay. rescale scales the entries of an array to the interval [0,1]

```
%c Im1_scaled=rescale(...);
%c B1 = imoverlay(...,'red');
%c figure; imshow(...)
```

c) overlay more than two images iterating the imoverlay procedure

```
%c B2 = imoverlay(B1,c2,'yellow');
%c figure; imshow(B2)
%c ... = imoverlay(...,c3,'green');
%c figure; imshow(..)
```

Change the selected slice and run it again

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