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Using showM

Repo location

This function belongs to the package "plotting tools".

<https://gitlab.com/ascario/plotting-tools>

Intro

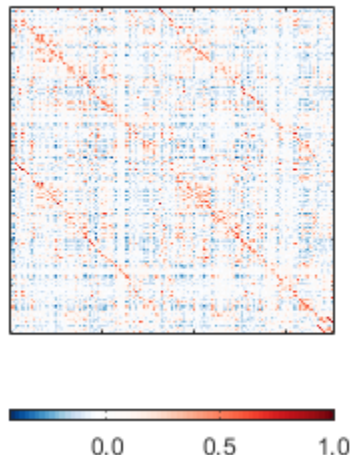
This code visualize connectivity matrices. The most basic functionality is to only display a 2d matrices. If you provide extra (optional) arguments, you can group connectivity values per functional system and mess with coloring schema and visualization ranges.

For the expert/impatient

Example 1

Using the most basic functionality

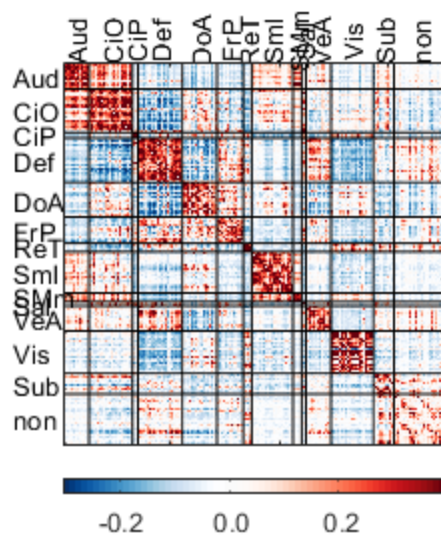
```
showM(M) ;
```



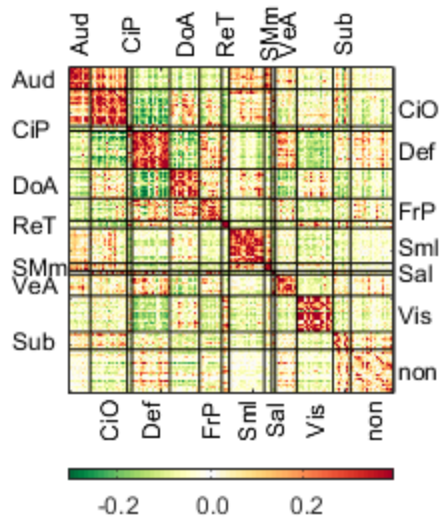
Example 2

Using a lot of options

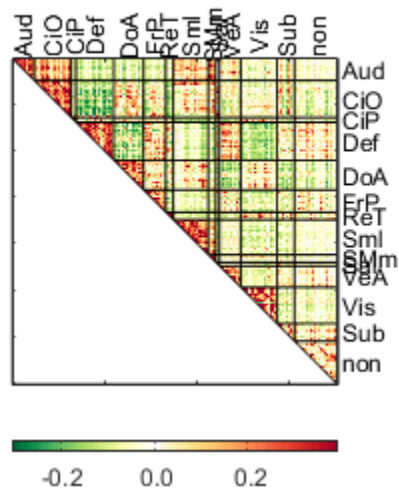
```
showM(M,...  
      'parcel',parcel,...  
      'line_color',[0 0 0],...  
      'line_width',0.5,...  
      'clims',[-.3 .39],...  
      'fs_axis',10,...  
      'fig_wide',7,...  
      'one_side_labels',1,...  
      'fig_tall',8);
```



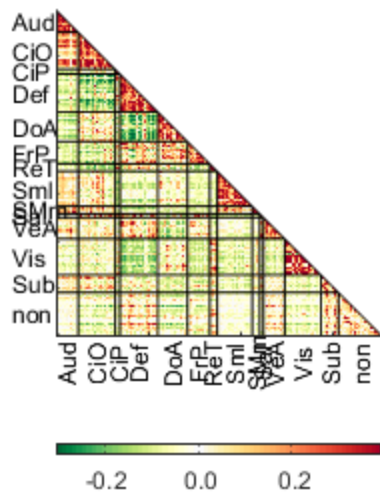
```
showM(M,...  
      'parcel',parcel,...  
      'line_color',[0 0 0],...  
      'line_width',0.5,...  
      'my_color','RG',...  
      'clims',[-.3 .39],...  
      'half','both');
```



```
showM(M,...
      'parcel',parcel,...
      'line_color',[0 0 0],...
      'line_width',0.5,...
      'my_color','RG',...
      'clims',[-.3 .39],...
      'half','up');
```



```
showM(M,...
      'parcel',parcel,...
      'line_color',[0 0 0],...
      'line_width',0.5,...
      'my_color','RG',...
      'clims',[-.3 .39],...
      'one_side_labels',1,...
      'half','low');
```

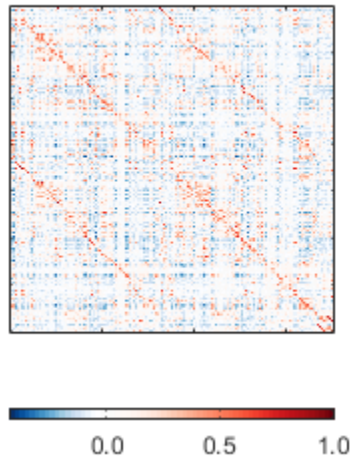


Inputs and examples

MANDATORY

M: A connectivity matrix size ROIxROI.

```
showM(M) ;
```



OPTIONAL (provided as paired arguments 'Name,Value')

- **'clims',Value**, clims define the limots to be used vor visualization. 'Value' is a vector with the minimum and maximum value to be used for visualization. If not provided, the code will use as limits the minimum and maximum of M.

Example 1

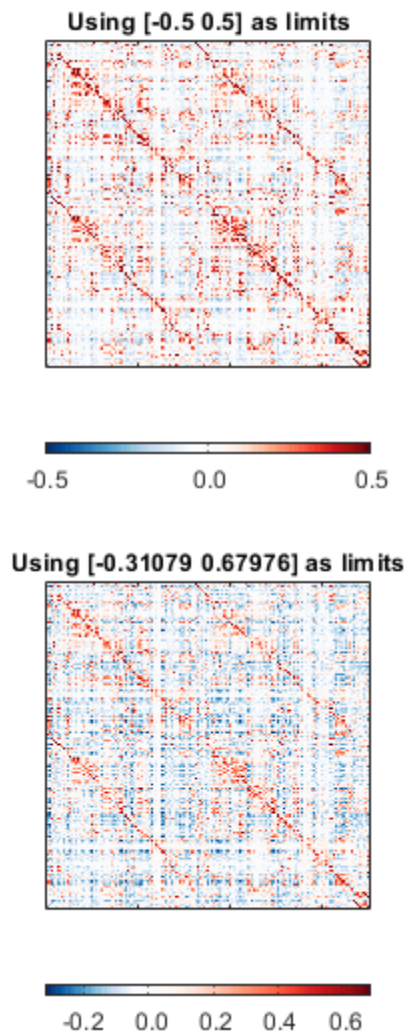
Lets use [-.5 .5] as limits of visualization

```
minmax=[ -.5 .5] ;
```

```

showM(M,...
    'clims',[-.5 .5]);
title(['Using [' , num2str(minmax(1) ), ' ' num2str(minmax(2)), '] as
    limits'])
%
% Example 2
%
% Let's remove extreme values from the connectivity matrices
delta=.1;% how much (percentile) of the data to exclude
values=M(tril(M)==0); %excluding values of the diagonal
ptiles=[delta 100-delta]; %percentiles to include
minmax=prctile(values,ptiles);
showM(M,...
    'clims',minmax);
title(['Using [' , num2str(minmax(1) ), ' ' num2str(minmax(2)), '] as
    limits'])

```

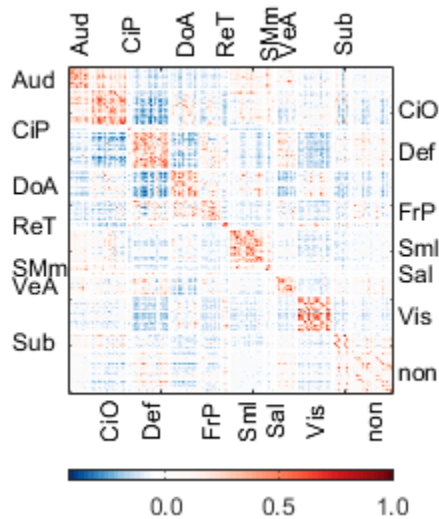


- **'parcel',Value**, Here you can define the assignment of each ROI to a functional system. Value must be an structure whos size equals the number of functional systems and it must contain as fields the

name and indices assigned to each functional system. You can inspect the included structure parcel that defines the Gordon parcelation schema

Example

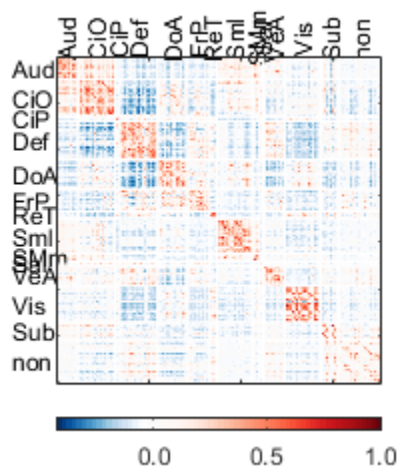
```
showM(M, 'parcel', parcel);
%
```



- **'one_side_labels', Value.** Value is 1 or 0 and indicates if you like the labels with the names of the functional system in one side or both sides of the matrix. Default is 0.

Example

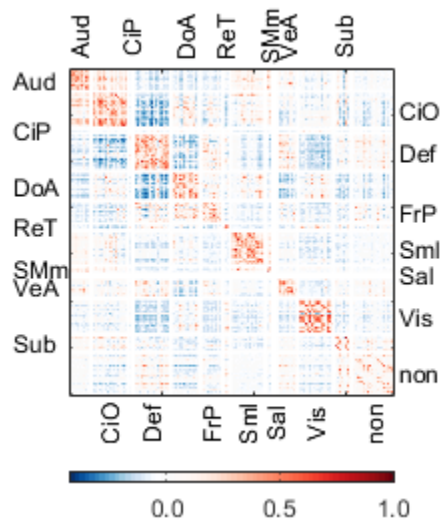
```
showM(M, ...
    'parcel', parcel, ...
    'one_side_labels', 1);
```



'line_width', Value. Line width for dividers. Default is 1.

Example

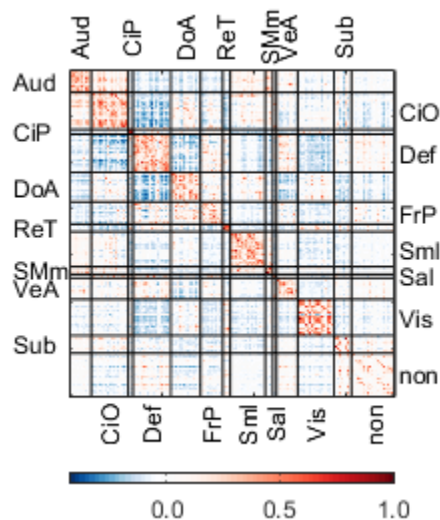
```
showM(M,...
      'parcel',parcel,...
      'line_width',1.5);
```



*'line_color','Value'. Color to be used for the divider lines. If provided, must be a 3 elements vector with the RGB values of the color to be used. Default is white ([1 1 1])

Example

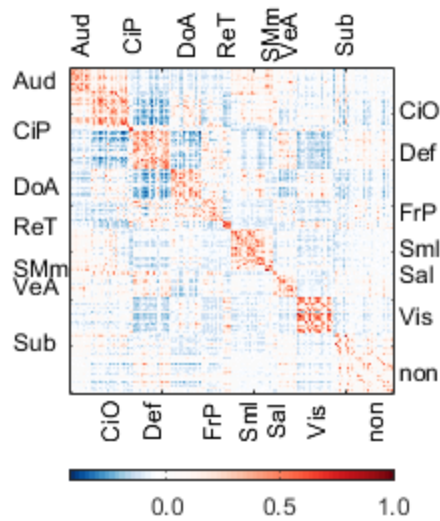
```
showM(M,...
      'parcel',parcel,...
      'line_color',[0 0 0],...
      'line_width',0.5);
```



- *'show_dividers','Value'*Value is 1 or 0 and indicates whether you want lines to be displayed to separate functional systems. Default is 1

```
showM(M,...
      'parcel',parcel,...
```

```
'show_dividers',0);
```

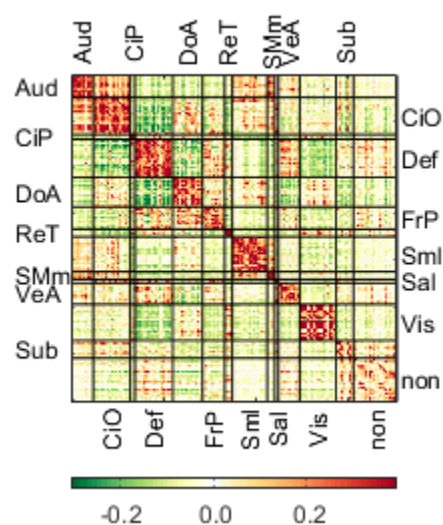
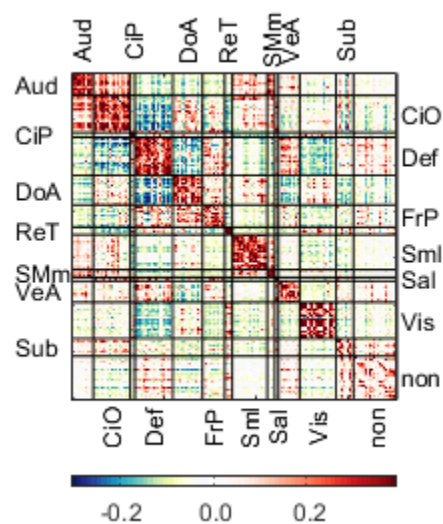
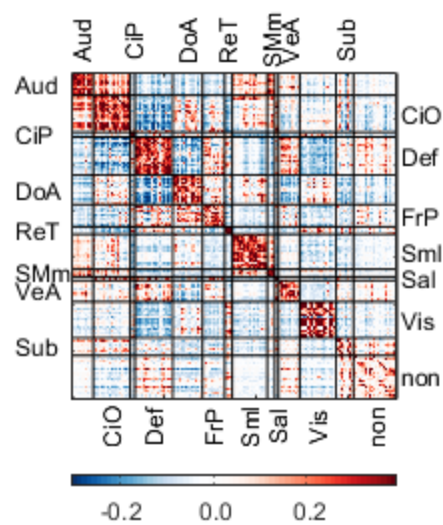


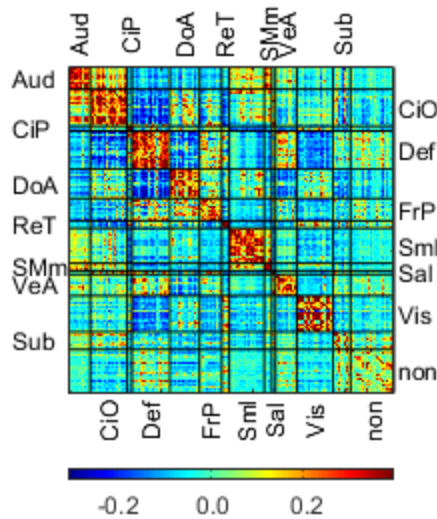
- **'my_color',Value.** Predefined coloring schemas. Only available options are red-blue (**RB**, default), red-yellow-blue ('RYB'), and red-green ('RG'). If unhappy, you can always force jet, parula or any other matlab schema

Example

```
my_color=cell(3,1);
my_color{1}='RB';
my_color{2}='RYB';
my_color{3}='RG';
for i=1:3
    showM(M,...
        'parcel',parcel,...
        'line_color',[0 0 0],...
        'line_width',0.5,...
        'my_color',my_color{i},...
        'clims',[-.3 .39]);
end

showM(M,...
    'parcel',parcel,...
    'line_color',[0 0 0],...
    'line_width',0.5,...
    'my_color',my_color{i},...
    'clims',[-.3 .39]);
colormap jet
```



Showing data from only a few networks

If you want to show data from only a few networks, you need to make a new parcel object that only includes the networks you care. For example, if you just care about motor, subcortical and default, those systems in the provided structure **parcel** has the following indices: 8, 9 13, and 4.

The companion function and the following lines of code might help to get this thing done

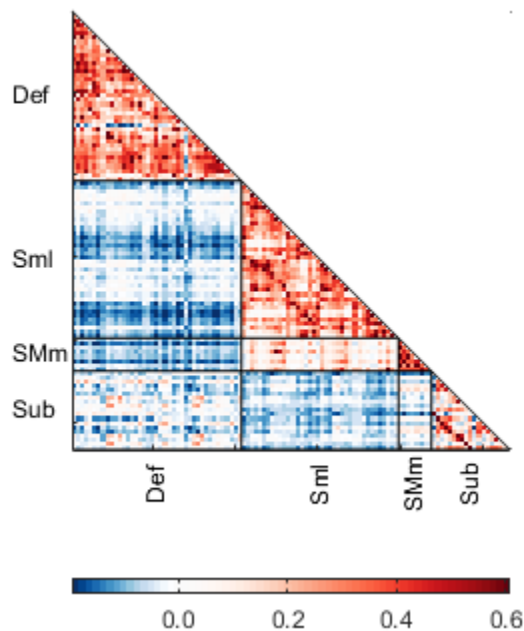
```
n_systems=size(parcel,2); % count the number of functional systems in
    the object parcel
ix_networks_to_keep=[8 9 13 4];% indices to keep
ix_networks_to_remove=get_ix_networks_to_remove(ix_networks_to_keep,n_systems); %
    get the indices of the systems to remove

% calculate the new truncated parcel abject and the corresponding
    truncated
% matrix with the indices properly sorted
[newM,
    newParcel]=truncate_parcel_resort_matrix(M,parcel,ix_networks_to_remove);
%
% Calculate color limits excluding a delta of one on each tale
delta=1;
clims=get_ptiles_M(newM,delta);
%
% Define options for plotting
fig_wide=8;
fig_tall=9;
line_color=[1 1 1]*0;
one_side_labels=1;
half='low';
line_width=.01;
my_color='RB';
%
% Display the new matrix
showM(newM,'parcel',newParcel,...
    'clims',clims,...
```

```

'fig_tall',fig_tall,...
'fig_wide',fig_wide,...
'line_color',line_color,...
'one_side_labels',one_side_labels,...
'half',half,...
'my_color',my_color,...
'line_width',line_width);

```



Showing data from only specific systems

If you want to only show data from particular systems, you need to provide the list of the pairs you care. Building on the previous example, if you only like to show data from the Def-Def, Def-Sml and Sub-SMm on the truncated parcel, you need to identify the indices:

count systems in the new parcel

```

n_systems=size(newParcel,2);
%
% Display the indices
[num2str([1:n_systems]') repmat(' ',n_systems,1)
 cat(1,char(newParcel.name)) repmat(' ',n_systems,1)
 num2str(cat(1,newParcel.n)) ]
%
% Report the indices
ix_parcel_pairs_on=[1 1; 2 3; 3 4];

showM(newM,'parcel',newParcel,...
'clims',clims,...
'fig_tall',fig_tall,...
'fig_wide',fig_wide,...
'line_color',line_color,...

```

```

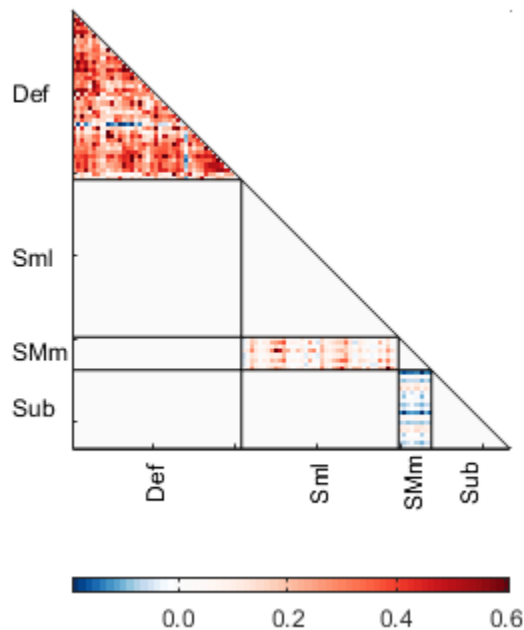
'one_side_labels',one_side_labels,...
'half',half,...
'my_color',my_color,...
'line_width',line_width,...
'IX_parcel_pairs_ON',ix_parcel_pairs_on);

ans =

4x22 char array

'1) Def          , n = 41'
'2) Sml          , n = 38'
'3) SMm          , n = 8'
'4) Subcortical, n = 19'

```



Get color limits based on the systems you care

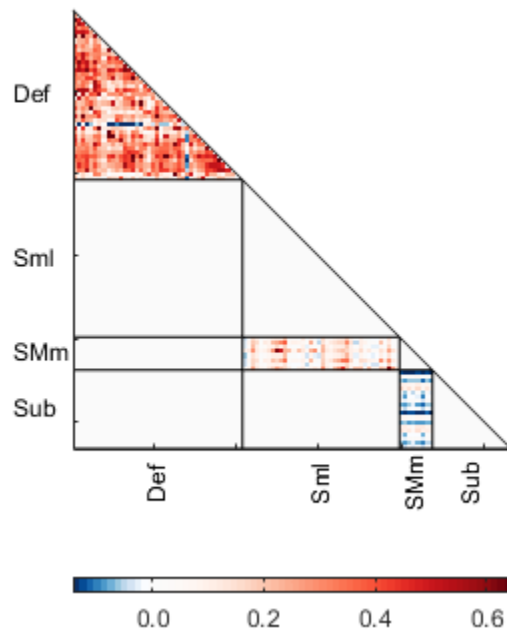
This function calculate color limits based

```

clims=get_ptiles_M_from_pairs(newM,delta,newParcel,ix_parcel_pairs_on);
showM(newM,'parcel',newParcel,...
'clims',clims,...
'fig_tall',fig_tall,...
'fig_wide',fig_wide,...
'line_color',line_color,...
'one_side_labels',one_side_labels,...
'half',half,...
'my_color',my_color,...
'line_width',line_width,...

```

```
'IX_parcel_pairs_ON',ix_parcel_pairs_on);
```



Credits and date

Code developed by Oscar Miranda-Dominguez.

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