

Calculating Different Measures

The BRAPH 2 Developers

September 22, 2023

This is the developer tutorial for adapting a script for calculating different graph measures. In this tutorial, we will explain how to edit an example script to calculate different graph measures in braph2genesis. Here, we use EXAMPLE_ST_MP_WU as an example to show how to edit this script to calculate different graph measures for structural data using a multiplex weighted undirected graph.

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Atlas Loading

We started with implementing the `ImporterBrainAtlasXLS`. The function allows users to import the atlas.

Code 1: Brain Atlas Importer. The header section of the pipeline `EXAMPLE_ST_MP_WU`. It defines the importer for Atlas loading.

```

1 %% iheader!
2 % EXAMPLE_ST_MP_WU
3 % Script example pipeline ST MP WU
4
5 clear variables %#ok<*NASGU>
6
7 %% Load BrainAtlas
8 im_ba = ImporterBrainAtlasXLS( ... ①
9     'FILE', [fileparts(which('example_ST_MP_WU')) filesep 'Example data
10     ST_MP_XLS' filesep 'atlas.xlsx'], ...
11     'WAITBAR', true ...
12 );
13 ba = im_ba.get('BA');
```

① First, the script loads the brain atlas from the excel file `atlas.xlsx`

Data Loading

The next step is to load the data of two groups.

Code 2: Group Subject Data Importer. The group data importer section provides the code for loading group subject data.

```

1 im_gr1 = ImporterGroupSubjectST_MP_XLS( ... ①
2     'DIRECTORY', [fileparts(which('SubjectST_MP')) filesep 'Example data
3     ST_MP_XLS' filesep 'ST_MP_Group_1_XLS'], ...
4     'BA', ba, ...
5     'WAITBAR', true ...
6 );
7 gr1 = im_gr1.get('GR');
8
9 im_gr2 = ImporterGroupSubjectST_MP_XLS( ... ①
10    'DIRECTORY', [fileparts(which('SubjectST_MP')) filesep 'Example data
11    ST_MP_XLS' filesep 'ST_MP_Group_2_XLS'], ...
12    'BA', ba, ...
13    'WAITBAR', true ...
14 );
15 gr2 = im_gr2.get('GR');
```

① `ImporterGroupSubjectST_MP_XLS` imports a group of subjects with structural data and their covariates (optional) from another XLS/XLSX file.

Group Analysis

This section is to initialize the group data analysis.

Code 3: Group Subject Data Analysis. The group data analysis provides code for initialization of group data analysis.

```

1 a_WU1 = AnalyzeGroup_ST_MP_WU( ... ①
2     'GR', gr1, ...
3     'CORRELATION_RULE', Correlation.PEARSON ...
4 );
5
6 a_WU2 = AnalyzeGroup_ST_MP_WU( ... ①
7     'TEMPLATE', a_WU1, ...
8     'GR', gr2 ...
9 );

```

① The script initialize the group analysis with the loaded atlas and group data.

Measure Calculation

The last step is to calculate graph measures with data loaded in previous step. Here we use degree as an example.

Code 4: Group Subject Data Analysis. The group data analysis provides code for initialization of group data analysis.

```

1
2 g_WU1 = a_WU1.memorize('G'); ①
3 degree_WU1 = g_WU1.get('MEASURE', 'Degree').get('M'); ②
4
5 g_WU2 = a_WU2.get('G');
6 degree_WU2 = g_WU2.get('MEASURE', 'Degree').get('M'); ②

```

① memorize in case there are measures with non-default rules.

② The function calculates graph measure. In this case, Degree is calculated.

Other measures can also be calculated by changing the measure names