

User Manual for FuzzyTC

Implemented in Python 2.7.3

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1 Introduction

We hereby explain how to use FuzzyTC, a Python implementation of an algorithm to compute the fuzzy transitive closure a bipolar weighted digraph, which is used to model a fuzzy cognitive map (FCM). In order to test the code in this early stage, two different algorithms are being used: the generalized Roy-Warshall algorithm and the method of matrix powers. We recommend that the user compare the outputs and report any errors to the authors.

2 Getting Started

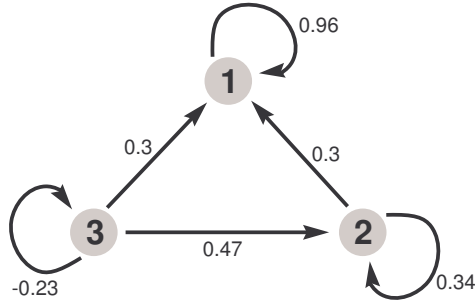
1. Install Python 2.7.3 on your computer. It can be downloaded from <https://www.python.org/>.
2. Double click on the file FuzzyTC.py; a user interface window will open up.
3. Enter the format of the input data: 1 if the input comprises of a single matrix, and 2 if it comprises of 2 matrices. (See Section 3 for more explanation.)
4. Enter the complete/absolute file path of the input file.
5. Enter the complete/absolute file path of the output files.
6. When the program is finished, the window will close, and the outputs will be stored in the corresponding files.

3 Input data format

The program takes as input an FCM stored in one of two different ways:

- as a single matrix $W = (w_{st})_{s,t=1}^n$ with the entry w_{st} in the interval $[-1, 1]$ representing the weight of the arc from s to t together with the appropriate sign;
- as a pair of matrices $A = (a_{st})_{s,t=1}^n$ and $B = (b_{st})_{s,t=1}^n$ representing the positive and negative arcs, respectively; note that each a_{st} and b_{st} lies in the interval $[0, 1]$ and represents the absolute value of the weight of the positive and negative arc, respectively, from s to t .

Note that, when the FCM contains parallel arcs (in the same direction) of which one is positive and the other negative, the second input format is mandatory.



The input data should be in a comma-separated values (CSV) file. Each row of the input matrix/matrices should be in a separate line, and the entries of a row should be separated by commas.

Example: the input CSV file for the FCM in the figure above is either

```
0.96, 0, 0
0.3, 0.34, 0
0.04, 0.47, -0.23
```

or

```
0.96, 0, 0
0.3, 0.34, 0
0.04, 0.47, 0
0, 0, 0
0, 0, 0
0, 0, 0.23
```

Note that when the second input format is used, the two matrices should appear in the same file, matrix *A* above, followed by matrix *B* below.

4 Output data format

The output of FuzzyTC is written in the file specified by the user in the form of the matrices *A* and *B* representing the absolute values of the weights of the negative and positive arcs, respectively. The example in the above figure results in the following output:

```
Matrix A:
0.96,0.0,0.0
0.3,0.34,0.0
0.3,0.47,0.23
Matrix B:
0.0,0.0,0.0
0.0,0.0,0.0
0.23,0.23,0.23
```

5 File paths

The program expects the user to enter the absolute path of the input and output files.

- For Windows: If the input file `input1.csv` file resides in the folder named `FuzzyTCInputs` in the C drive, then enter

```
C:\FuzzyTCInputs\input1.csv
```

If you would like to have the output of the program saved in a file called `output1.csv` in the folder `FuzzyTCOutputs` in the C drive, then enter:

```
C:\FuzzyTCOutputs\output1.csv
```

- For Linux: If the input file `input1.csv` resides in a directory named `FuzzyTCInputs` in the home directory, then enter:

```
/home/FuzzyTCInputs/input1.csv
```

To save the output of the program in a file called `output1.csv` in a directory named `FuzzyTCOutputs` in the home directory, enter:

```
/home/FuzzTCOutputs/output1.csv
```