Quick Start Instructions
for the
Community Detection Toolbox v. 0.9

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January 2014

1 Installation

Installation of the CDTB is extremely simple. You can download the file CDTB.zip from http://mathworks.com. When the download is complete, unzip the file in a folder of your choice. From now on we will assume that it is the folder `c:\CDTB`. When unzipped, the folder will contain several subfolders, e.g., `c:\CDTB\Algorithms`, `c:\CDTB\Auxiliary` etc. Now you are ready to go.

2 A Simple Demo

Start Matlab, go to `c:\CDTB` and in the command line type

```
>> PathAdd
```

and hit `[Enter]`. This will add to the *Matlab Path* the subdirectories which contain the Matlab *.m files which do the actual community detection work[1]. In the command line type

```
>> CDTBDemo01
```

and hit `[Enter]`. The *Matlab script* `CDTBDemo01.m` will run and in the command window you will get a message which says

```
The NMI metric between V0 and Vest is 1
```

NMI is the *normalized mutual information* index of partition (i.e., clustering) similarity. It takes values in the interval [0,1]. The maximum value 1 indicates maximum similarity, i.e., identity. The partitions compared are V_0, the true partition, and V_{est}, the partition estimated by a *modularity maximization algorithm*. Hence in this experiment V_{est} is identical to V_0, This can also be seen in the plot which Matlab presented. It looks like this

[1] Note that the new path is not saved, so you must retype `PathAdd` every time you start a new Matlab session. Or, you can go to the Matlab menu `File/Set Path` and click the button `Save`, which will make Matlab memorize the path for all future sessions.

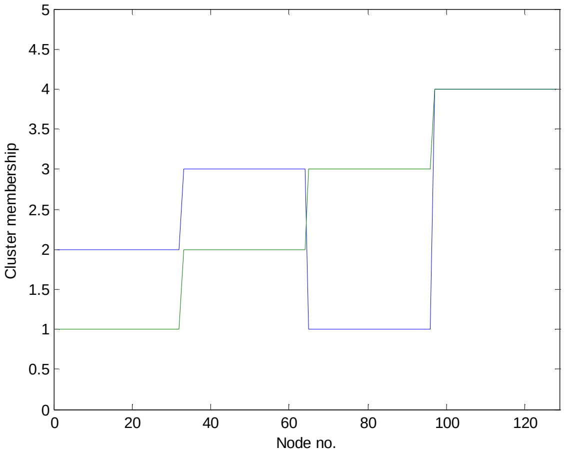


Figure 2.1

The horizontal axis gives the node id. numbers. The demo utilized a *Girvan-Newman* graph [NewmanGirvan2004] with 128 nodes. These nodes originally were partitioned (by their edge patterns) into four *communities* (i.e., clusters) as follows: nodes 1, 2, …, 32 go into community no.1, nodes 33, 34, …, 64 go into community no.2 and so on; this partition is V_0 and is plotted by the green line in Fig.1. V_{est}, on the other hand, assigns nodes 1, 2, …, 32 to community no.2, nodes 33, 34, …, 64 to community no.3 and so on. While the community *labels* are different between V_0 and V_{est}, the actual division into clusters is the same. In short, the modularity maximization algorithm obtained the correct solution, modulo a relabeling of clusters.

3 The GUI

Let us also run a simple demo of the Graphical User Interface (GUI). In the Matlab command line type

```
>> gui
```

and hit `[Enter]`. You will get the following standard Matlab GUI.

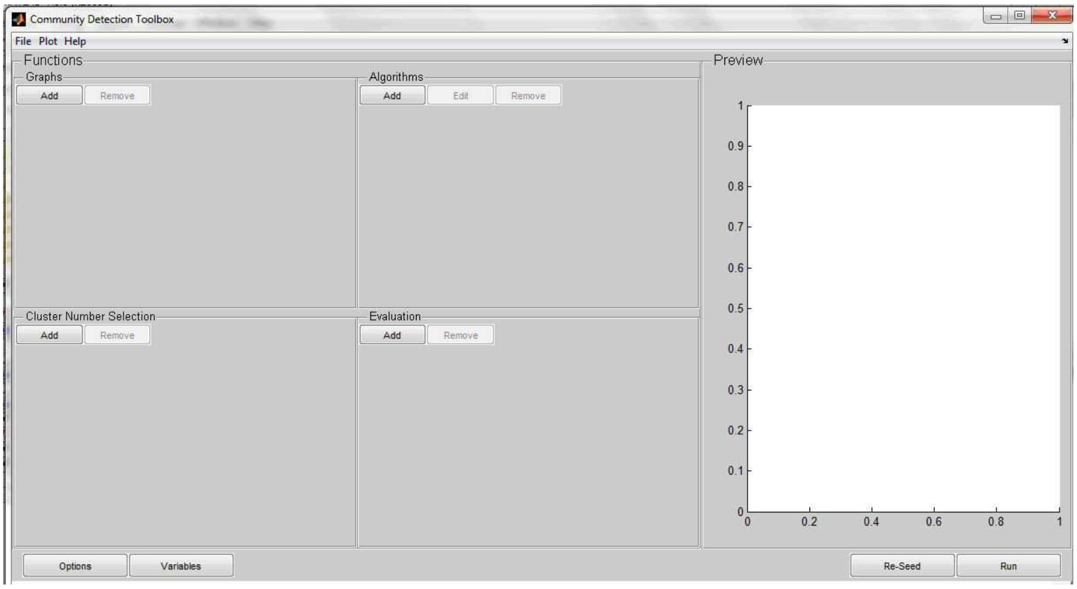
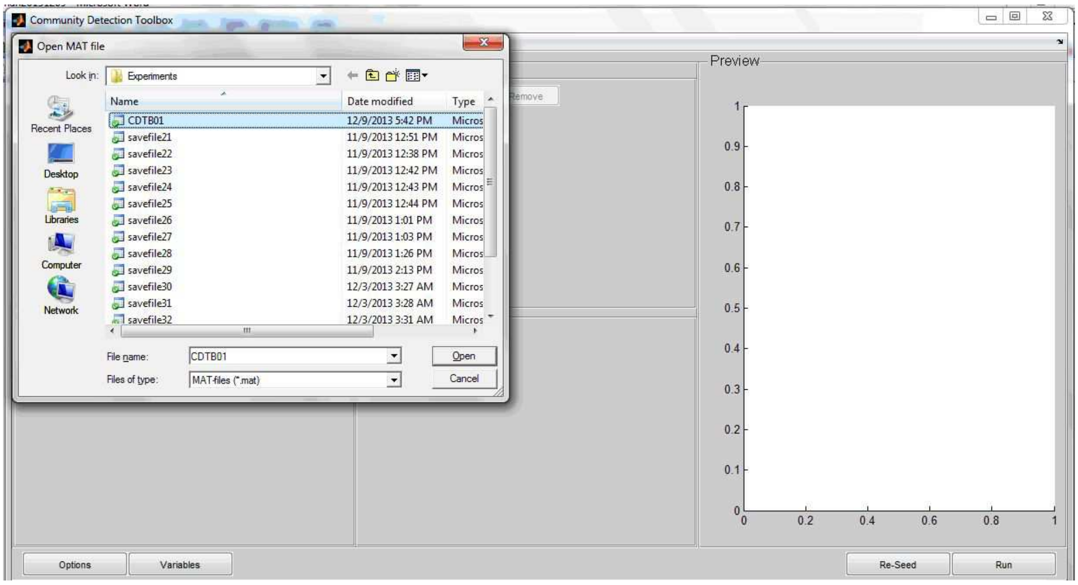


Figure 2.2

The GUI, makes it easy to design and perform community detection experiments. To perform exactly the same experiment that `CDTBDemo01` performed, do the following. Go to the GUI menu `File/Import Data`. A standard *File Dialog* will open, like this



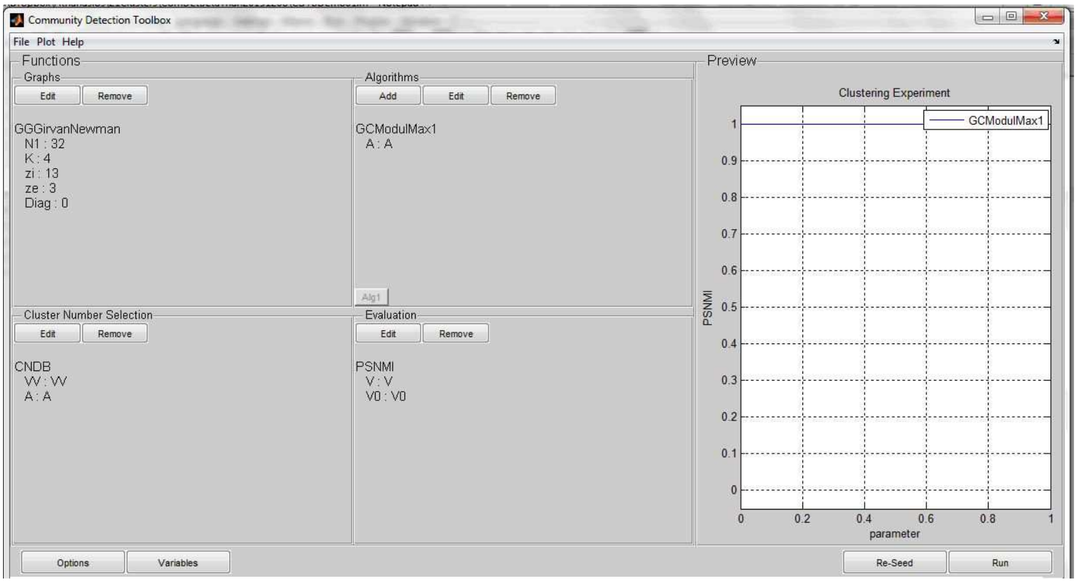
Name	Date modified	Type
CDTB01	12/9/2013 5:42 PM	Micros
savefile21	11/9/2013 12:51 PM	Micros
savefile22	11/9/2013 12:38 PM	Micros
savefile23	11/9/2013 12:42 PM	Micros
savefile24	11/9/2013 12:43 PM	Micros
savefile25	11/9/2013 12:44 PM	Micros
savefile26	11/9/2013 1:01 PM	Micros
savefile27	11/9/2013 1:03 PM	Micros
savefile28	11/9/2013 1:26 PM	Micros
savefile29	11/9/2013 2:13 PM	Micros
savefile30	12/3/2013 3:27 AM	Micros
savefile31	12/3/2013 3:28 AM	Micros
savefile32	12/3/2013 3:31 AM	Micros

File name: CDTB01

Files of type: MAT-files (*.mat)

Figure 2.3

Select the file `CDTB01` and click on the `Open` button. The GUI will change and now look like this:



GGGirvanNewman
N1 : 32
K : 4
zi : 13
ze : 3
Diag : 0

GCModulMax1
A : A

CNDB
W : W
A : A

PSNMI
V : V
V0 : V0

Figure 2.4

Now click on the `Run` button. A *progress bar* will flash for a while and then you will get a plot (actually a straight line). The GUI has run the experiment specified by the choices appearing in Fig. 2.4. You can access these results by selecting the menu option `Plot/Results to CLI`: if you switch to the Matlab command line (it is always available, e.g. by `[Alt]-[Tab]`-ing) you will see that a new variable has been loaded in your *Matlab workspace*, called `Results`. We will later discuss which results are contained in `Results`. We can now take a break.