

Converting a network with dates into a dynamic network

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Goals of this tutorial

- We take a normal network, where nodes have attributes which can serve as time indication (a date, a number...)
- We convert this network into a dynamic network: nodes will appear and disappear according to their attributes.

download a network file for practice

[download this zip file](#) and unzip it on your computer.

or use this direct link: <https://tinyurl.com/gephi-tuto-4>

You should find the file `miserables-with-dates.gexf` in the zip file. Save it in a folder you will remember (or create a folder specially for this small project).

This file contains a network representing "who appears next to whom" in the 19th century novel *Les Misérables* by Victor Hugo^[1].

A link between characters A and B means they appeared on the same page or paragraph in the novel.

The file name ends with ".gexf", which just means this is a text file where the network information is stored (name of the characters, their relations, etc.), following some conventions.

This file has been modified to add some dates to each character in the novel:

- a "start date", which is a day (example: 22/09/1835). This is the date when the character **enters** the action in the novel
- an "end date", also a day (example: 22/09/1840). This is the date when the character **leaves** the action in the novel
- a "peak moment". This is a number (example: 14263). This is an instant when the character is at the center of the plot. This number has no historical meaning, this is just a chronological moment in time.

NOTE

Values for start date, end date and peak moment have no real significance in the novel. They are made up for this exercise.

open the network in Gephi

- open Gephi. On the Welcome screen that appears, click on **Open Graph File**
- find **miserables-with-dates.gexf** on your computer and open it

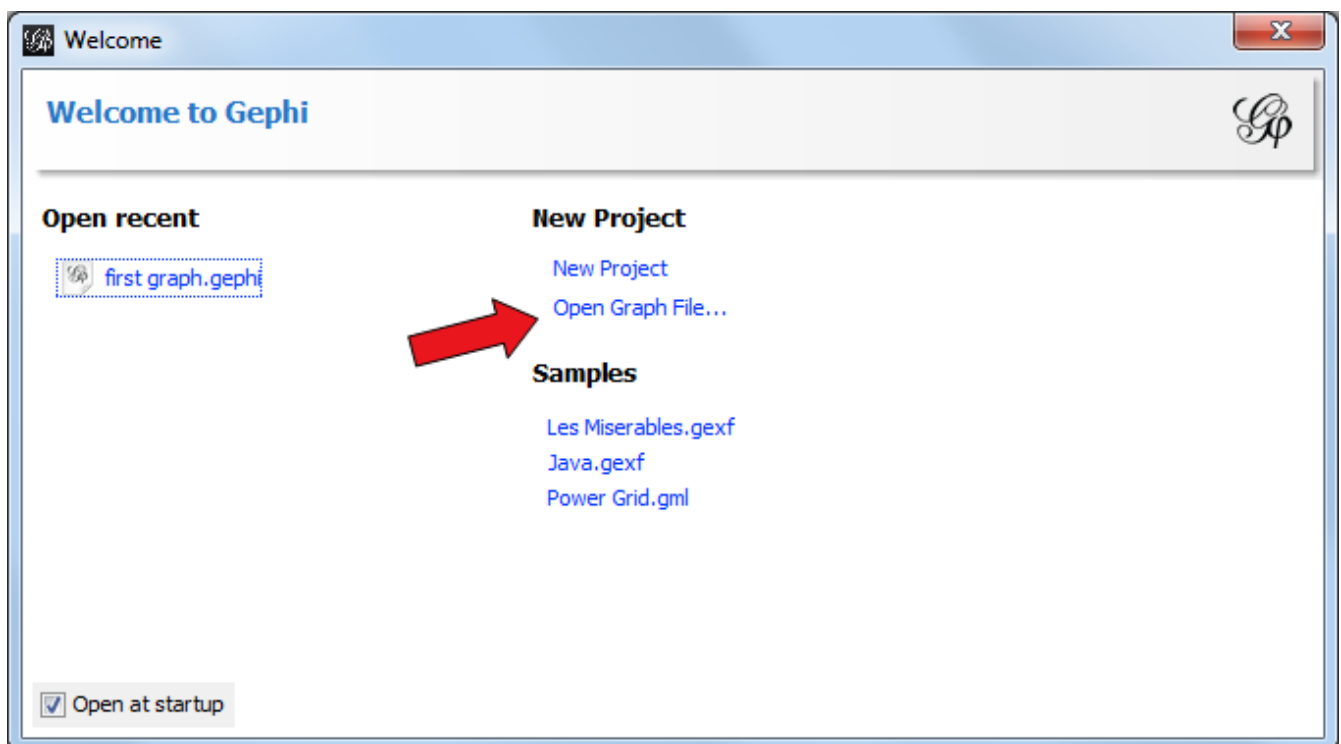


Figure 1. welcome screen

A report window will open, giving you basic info on the network you opened:

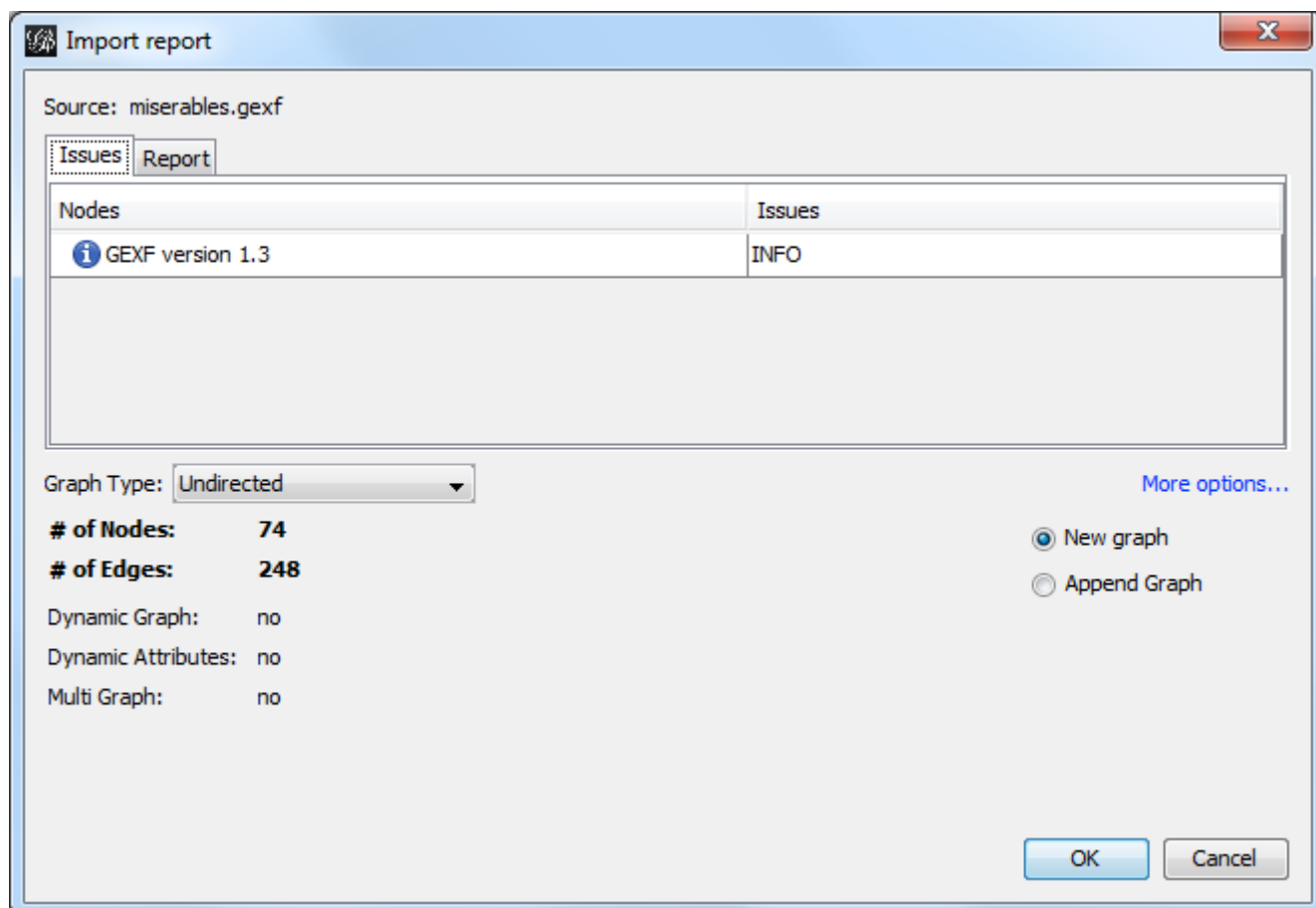


Figure 2. report window

This tells you that the network comprises 74 characters, connected by 248 links.

Links are undirected, meaning that if A is connected to B, then it is the same as B connected to A.

The report also tells us the graph is not dynamic: it means there is no evolution or chronology, it won't "move in time".

Click on **OK** to see the graph in Gephi.

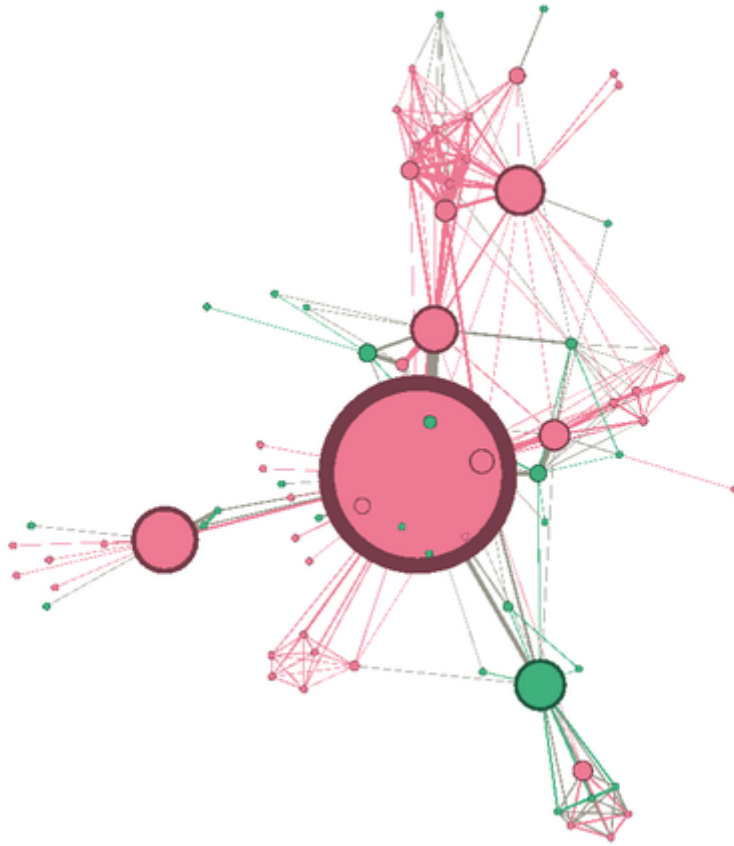


Figure 3. The network we will use

getting a sense of the attributes in the data laboratory

We can switch to the data laboratory to see the underlying data:

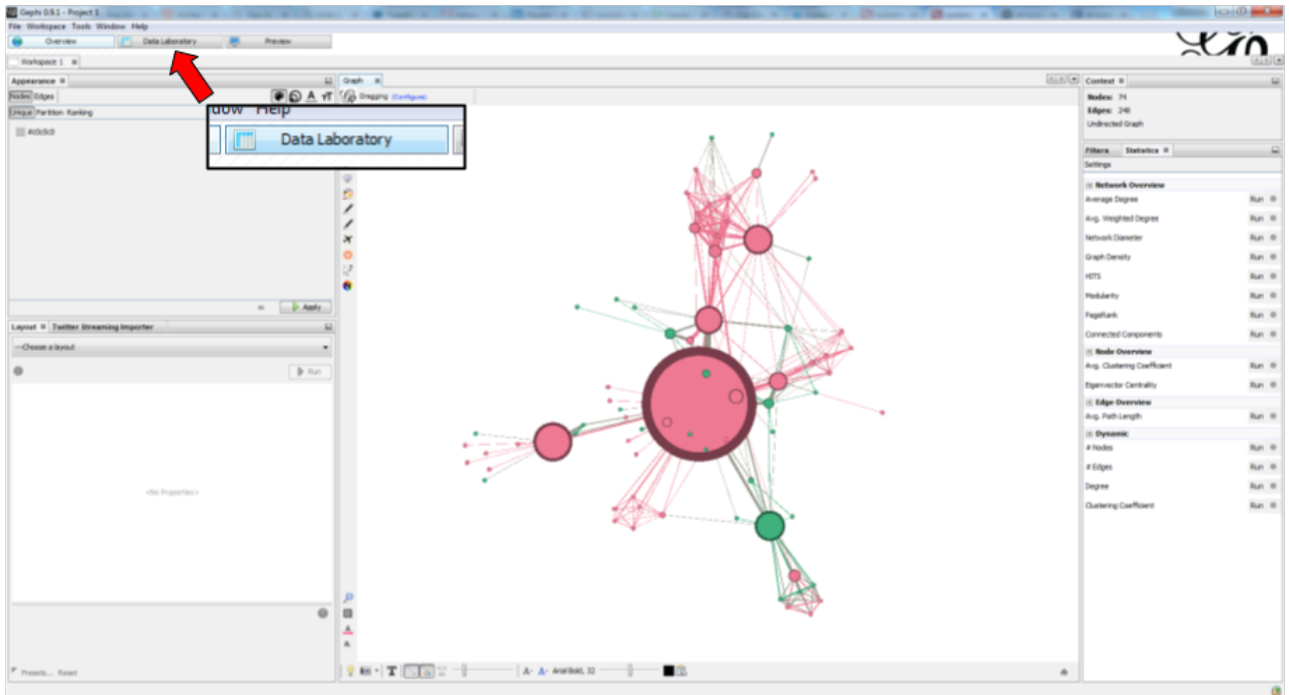


Figure 4. Switching to the data laboratory

File

Workspace Tools

Window

Help

Overview

Data Laboratory

Preview

Workspace 2

Nodes

Edges

Configuration

Add node

Add edge

Search/Replace

Import Spreadsheet

Export table

More actions

Label

Interval

Gender

Eccentricity

Betweenness Centrality

Harmonic Closeness Centrality

Closeness Centrality

Modularity Class

start date

end date

peak moment

11	Volcan	M	3.0	1532.151142	0.744292	0.657658	2	04/04/1833	04/04/1838	13061
0	Myriel	M	4.0	483.0	0.498858	0.437126	0	01/01/1818	01/01/1823	44013
23	Fantine	F	4.0	359.370275	0.549087	0.470968	4	30/10/1850	30/10/1855	19479
48	Gervais	M	3.0	251.388886	0.618772	0.517773	3	12/09/1845	12/09/1850	17604
55	Marius	M	3.0	331.391799	0.60274	0.532847	2	06/11/1840	06/11/1840	14006
25	Thenardier, Jondrette	M	3.0	196.859155	0.586758	0.521429	1	03/03/1835	03/03/1833	47729
27	Javert	M	3.0	141.49812	0.591324	0.521429	2	18/07/1837	18/07/1842	14628
38	Eponine	M	3.0	120.417545	0.559361	0.488867	3	14/02/1836	14/02/1843	14868
16	Thouvenin	M	4.0	106.279576	0.461187	0.394595	4	31/01/1848	31/01/1853	18475
51	MicGlenomand	F	3.0	90.502381	0.484018	0.442424	2	18/07/1836	18/07/1841	14263
64	Bossuet	M	3.0	86.795324	0.545662	0.483263	3	17/06/1840	17/06/1845	13652
24	Mme Thenardier	F	3.0	81.011855	0.53					
17	Mabeuf	M	4.0	75.584024	0.47					
28	Fauchelevent	M	4.0	72.5	0.44					
54	Uglenomand	M	3.0	47.301265	0.49					
26	Colette	F	3.0	47.2837	0.53					
41	Eponine	F	4.0	33.428468	0.47					
31	Simplice	F	4.0	23.491508	0.46					
29	Barnabas	M	4.0	22.916667	0.48					
82	Courfeyrac	M	4.0	14.070956	0.48					
70	Choucroute	M	3.0	13.891142	0.51					
68	Gauvain	M	3.0	12.95138	0.52					
69	Babette	M	3.0	12.95138	0.52					
71	Mortparnisse	M	3.0	10.540415	0.51					
43	Bahart	M	4.0	5.53962	0.47627	0.394995	3	04/04/1840	04/04/1845	12745
65	Joly	M	4.0	5.53962	0.47627	0.394995	3	22/04/1844	22/04/1849	17097
59	Combeffere	M	4.0	3.140693	0.469178	0.392473	3	18/02/1844	18/02/1849	17032
81	Peuly	M	4.0	3.140693	0.469178	0.392473	3	22/04/1843	22/04/1848	16752
75	Bryon	M	4.0	0.79	0.437215	0.360259	1	09/02/1832	09/02/1837	12640
50	Magnon	F	4.0	0.610048	0.365297	0.337963	2	18/10/1839	18/10/1844	15480
66	Grantaire	M	4.0	0.428571	0.437215	0.361386	3	07/06/1841	07/06/1846	16047
1	Napoleon	M	5.0	0.0	0.328082	0.305439	0	18/10/1818	18/10/1824	44671
2	Mlle Gervais	F	4.0	0.0	0.400913	0.41854	0	14/07/1822	14/07/1827	45671
3	Mlle Gervais	F	4.0	0.0	0.400913	0.41854	0	04/05/1826	04/05/1831	47061
4	Countess De La	F	5.0	0.0	0.328082	0.305439	0	28/02/1822	28/02/1827	45532
5	Gebrand	F	5.0	0.0	0.328082	0.305439	0	01/01/1827	01/01/1832	47300
6	Champerceur	M	5.0	0.0	0.328082	0.305439	0	14/03/1818	14/03/1825	44818

Add column

Merge columns

Delete column

Clear column

Copy data to other column

Fill column with a value

Duplicate column

Create a boolean column from regex match

Create column with list of regex matching groups

Negate boolean values

Convert column to dynamic

Figure 5. Zoom on three attributes representing time

The nodes (characters) of the network have attributes (start date, end date, peak moment) which can make this graph dynamic - but it is not yet.

A couple of steps are needed to enable the dynamic features, and here a choice must be made:

Do we prefer to have...

1. ... nodes appearing on screen at their start date, and staying on screen for ever after?
2. ... nodes appearing on screen at their start date, and leaving the screen at their end date?
3. ... nodes being represented simply by their "peak moment" (a number), without reference to

chronological dates?

We will present these 3 possibilities.

1. dynamic nodes with a start date

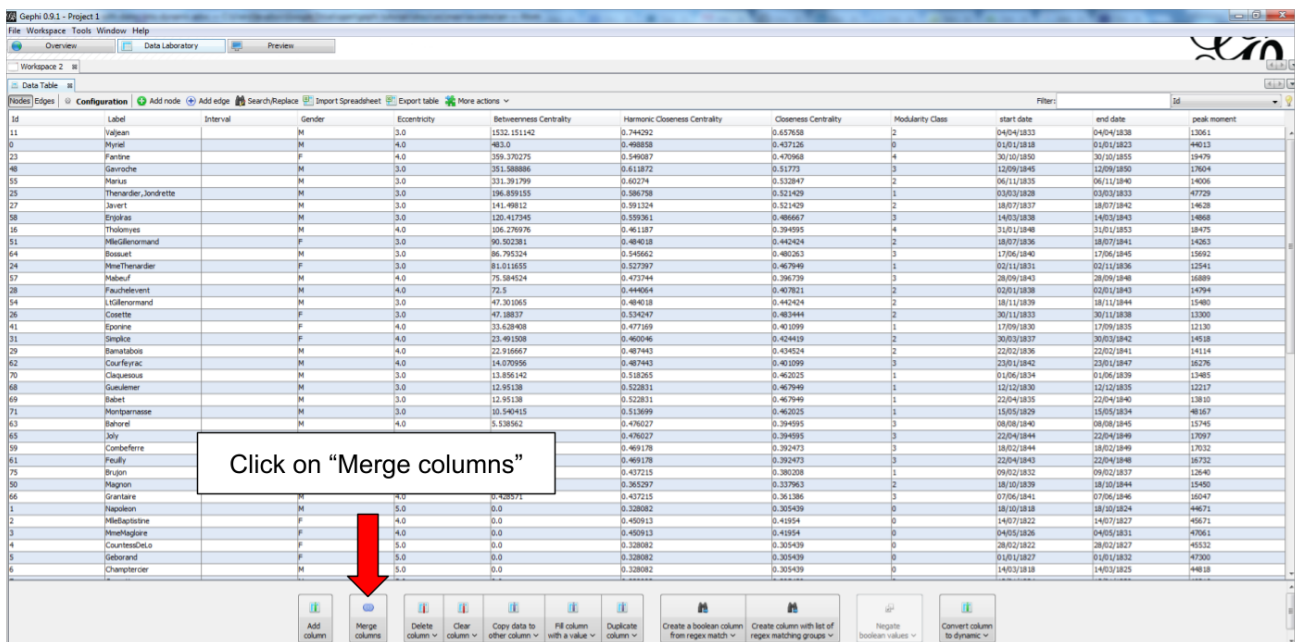


Figure 6. Merge columns

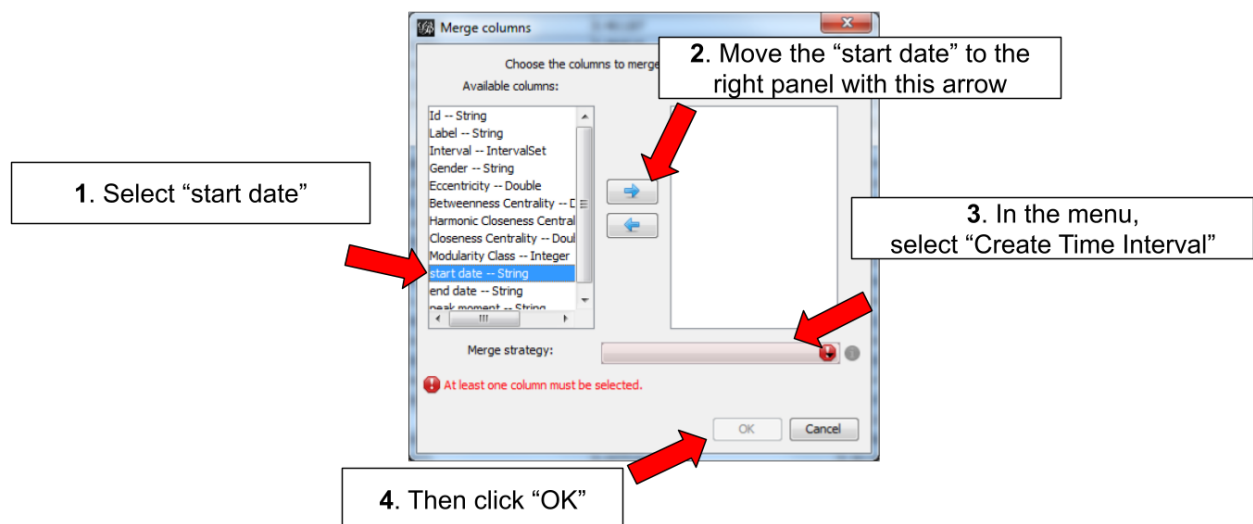


Figure 7. Set up the parameters - 1

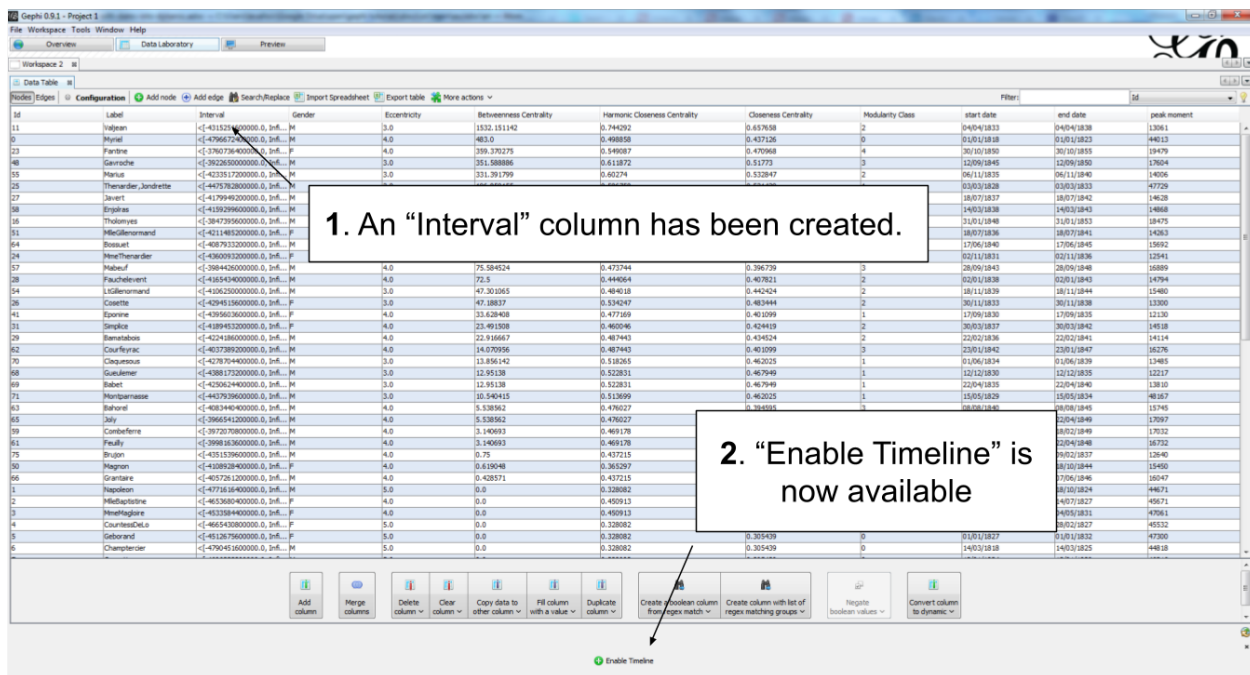
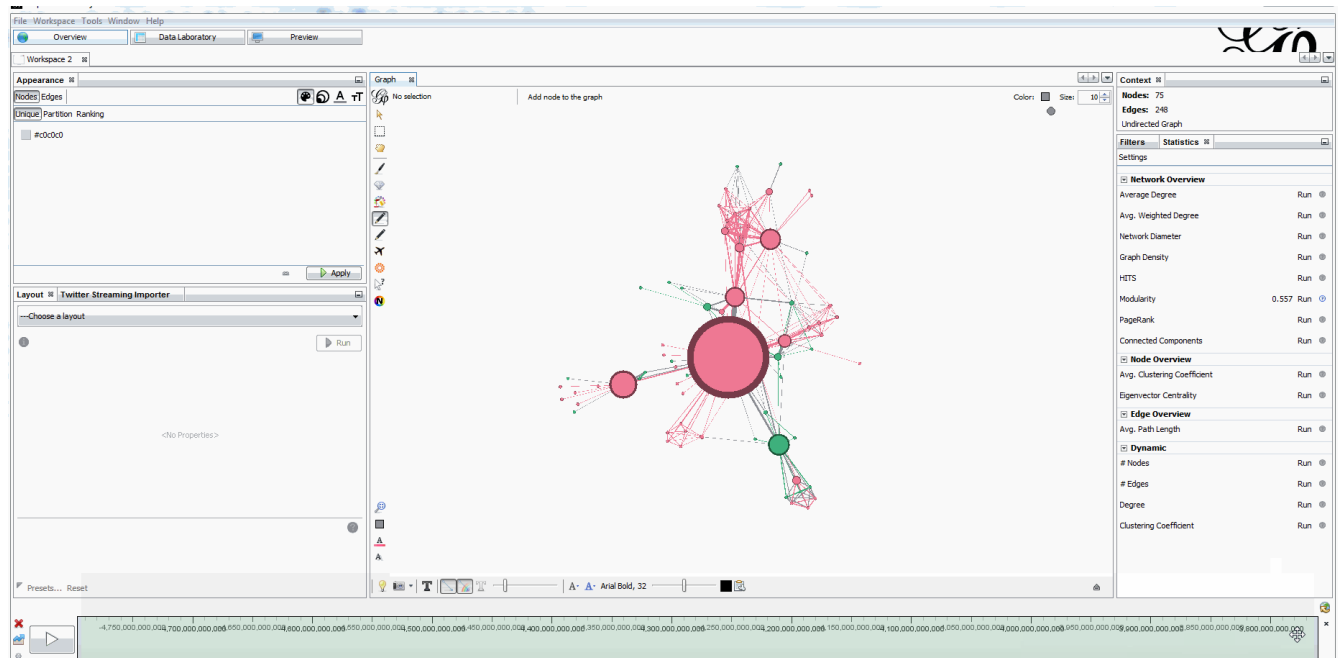


Figure 8. Result

Let's switch back to the Overview to see the Graph and how it evolves in time.

IMPORTANT

We are going to use the timeline to play the animation. The timeline has many features which are explained in a specific tutorial.



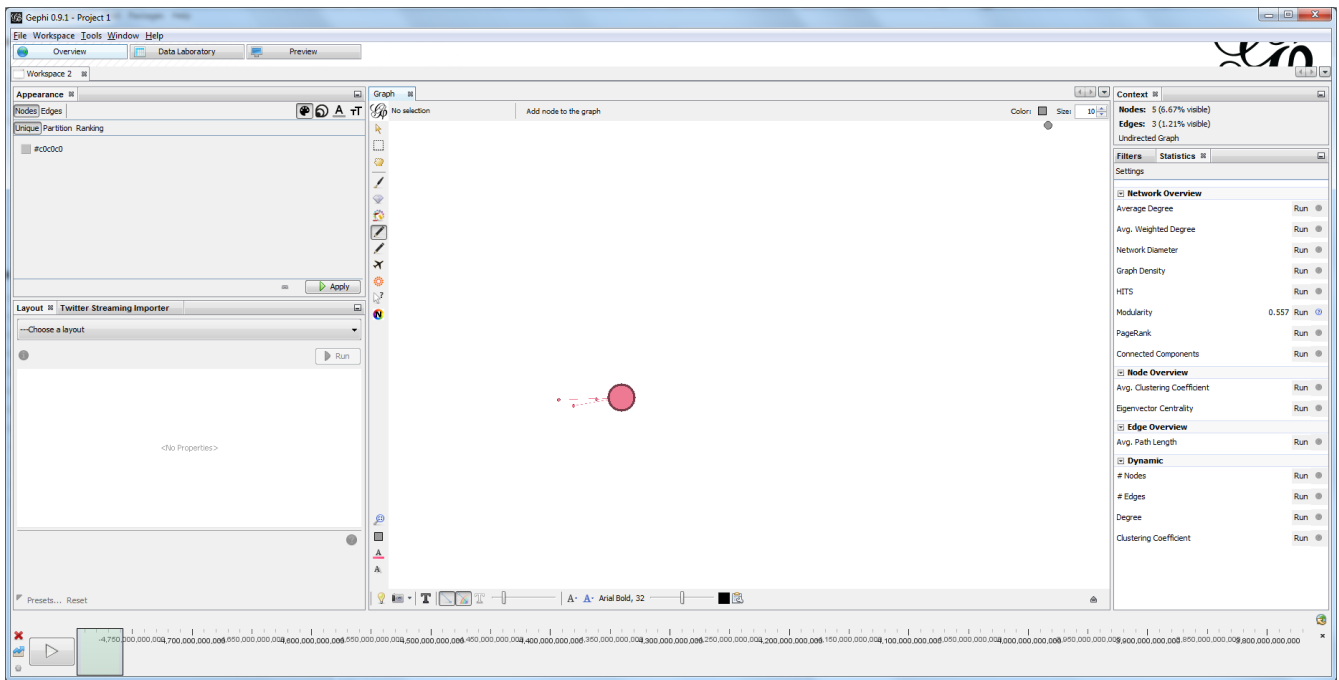


Figure 10. Animating the dynamic network

view online animation - link: <https://tinyurl.com/gephi-tuto-5>

to be continued

more tutorials on dynamic networks with Gephi

- [The wiki on gephi.org](http://wiki.gephi.org)

the end

Visit [the Gephi group on Facebook](#) to get help,

or visit [the website for more tutorials](#)

[1] D. E. Knuth, The Stanford GraphBase: A Platform for Combinatorial Computing, Addison-Wesley, Reading, MA (1993)