

Report for Information Visualization Assignment 2

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Matrix Solutions Design & Develop: Ruonan Zhang, Lee-Yin Wang, Chaoran Zhou

Reporting: Lee-Yin Wang, Chaoran Zhou

Force Directed Graph for Les Miserables Roles

threshold for node value: 0 - 256 (0 means no threshold)

0 Draw

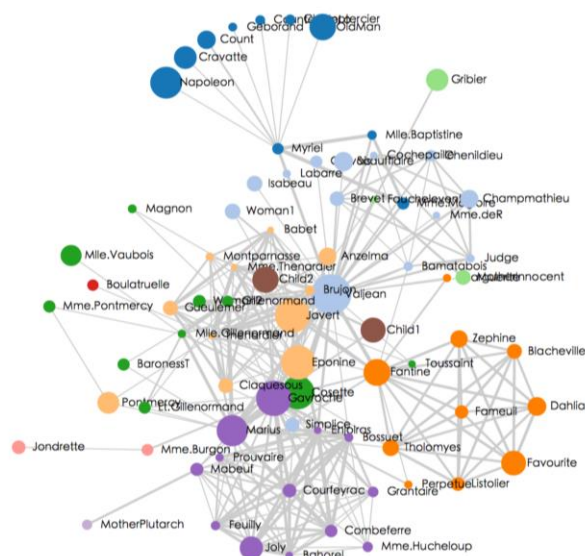


Figure 1 Force Directed Graph with All Nodes

In the Force Directed Graph we want to show the importance of each role, the grouping of the roles, the relationship among the roles, and also the strength of the relationships in Les Misérables.

A solid circle node represents a role. The radius length of a circle is decided by the importance of a role, that is the node value. People usually think the bigger things are

more important. When setting the length of a radius, we use square root method to scale the node value.

Different colors are used to distinguish different groups. People's eyes often recognize items in same color are in the same type.

A link line between two nodes displays the relationship between two roles. Relationship means a kind of link between two objects, so link line is good representation of relation.

Width of a link line shows the strength of relationship between two roles. Wider link lines look bigger, so make people feel the relationship stronger. We use logarithm method to scale link values.

threshold for node value: 0 - 256 (0 means no threshold)

100 Draw

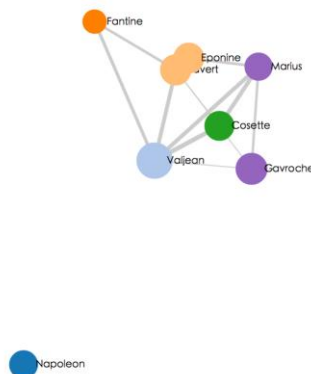


Figure 2 Force Directed Graph with Nodes Value > 100

In the above Figure 2 we type 100 in the textbox and then click on Draw button. Only nodes with value > 100 are left in the new generated graph. Except fewer nodes and fewer links we can find the node Napoleon is not linked with any other nodes when comparing Figure 2 with Figure 1, which has all nodes of roles. Figure 2 can intuitively reveal some hidden information about the novel Les Misérables. Napoleon is very important in Les Misérables, but he doesn't have any relationship with the core roles in this novel. In fact Napoleon is the background of this novel, and the story took place in the Historical period of Napoleon, so Napoleon is always mentioned in the story but not linked to the core roles in this novel.

Matrix Graph for Les Miserables Roles

Instead of using node-link diagram, explore different options and generate a visualization to show the structure of the same network. The visualization can include multiple charts or mix different types of charts.

We use a matrix to present the relationship between roles (fig b_1). Both x-axis and y-axis represent all the role-list. The default sorting way is by name to sort, users can see different sorting ways by choosing the dropdown list on the right side of the page. The option “by Frequency” is sorting by the link value between two nodes (fig b_2), and the option “by Cluster” is sorting by the group (fig b_3).

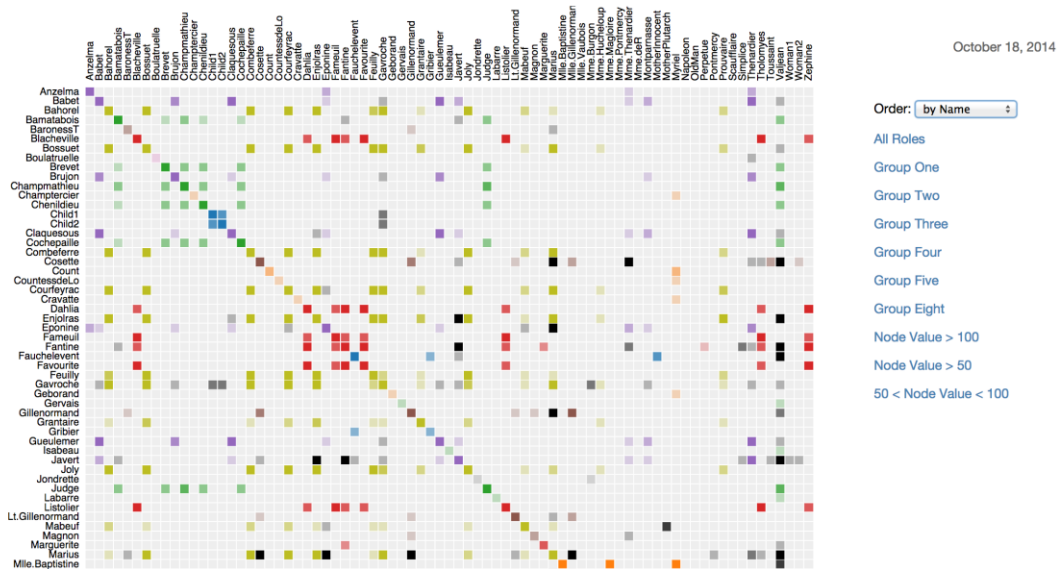


fig b_1: overall relation (sorting by name)

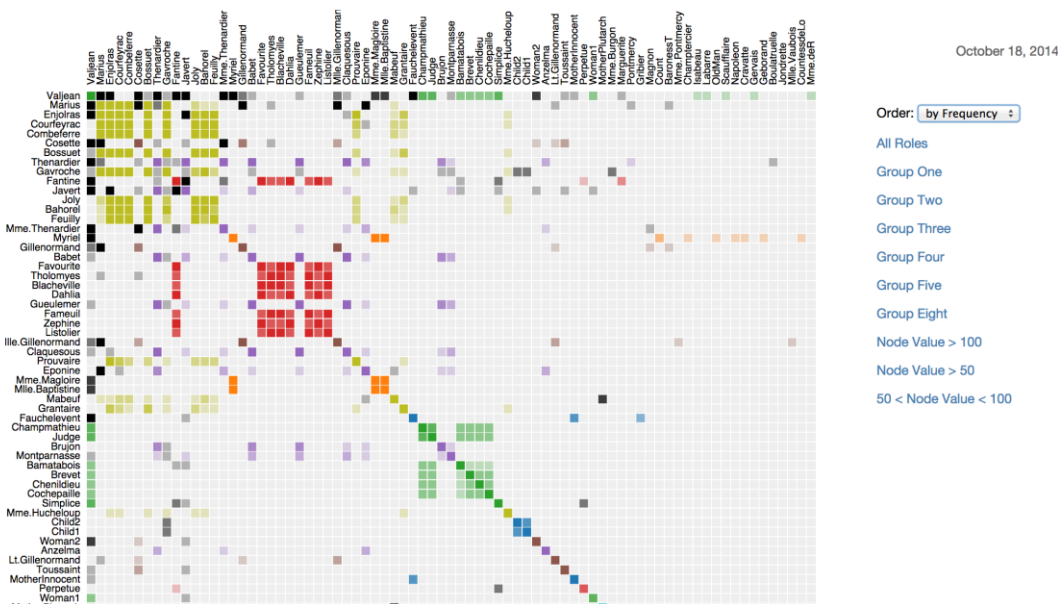


fig b_2: overall relation (sorting by the link value)

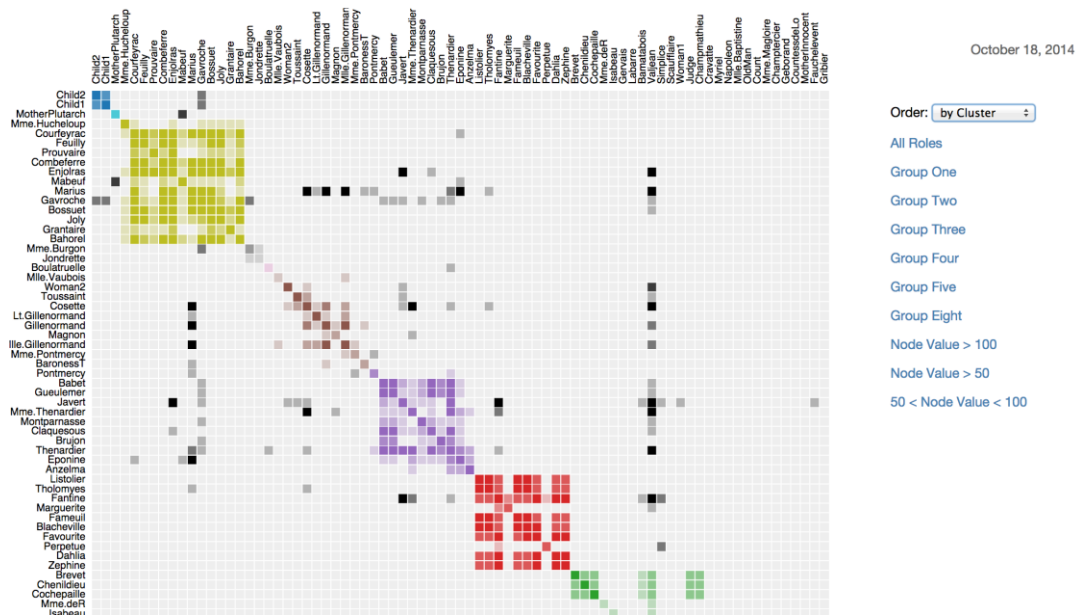


fig b_3: overall relation (sorting by group)

It means the two characters have relation if the corresponding grid has color except for light gray. Different color represents the characters are in the different group, and the darker color means the link value is bigger between the two characters.

When your mouse moves on the grid which is colored, the color of the corresponding two characters on x-axis and y-axis will become red to differentiate from others (fig b_4).

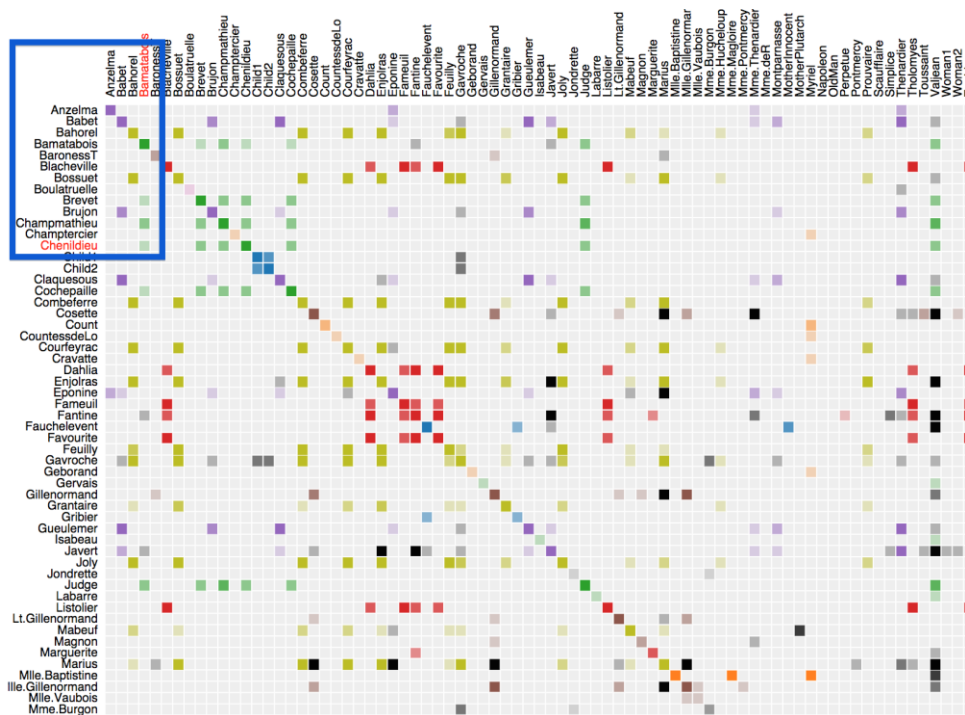


fig b_4

At first we want to change the length of the grid to represent the value of the nodes, but we found that the values vary widely. There are two nodes which value are one and one node which value is more than 200, so if we implement the node value by that way, it's hard to see the degree of the value difference at one glance, and it's also hard to present it clearly in the same screen. Thus we decide to show the label with the name and value of the node if users' mouse moves to the character (fig b_5). It's more clear and intuition to get the value for users.

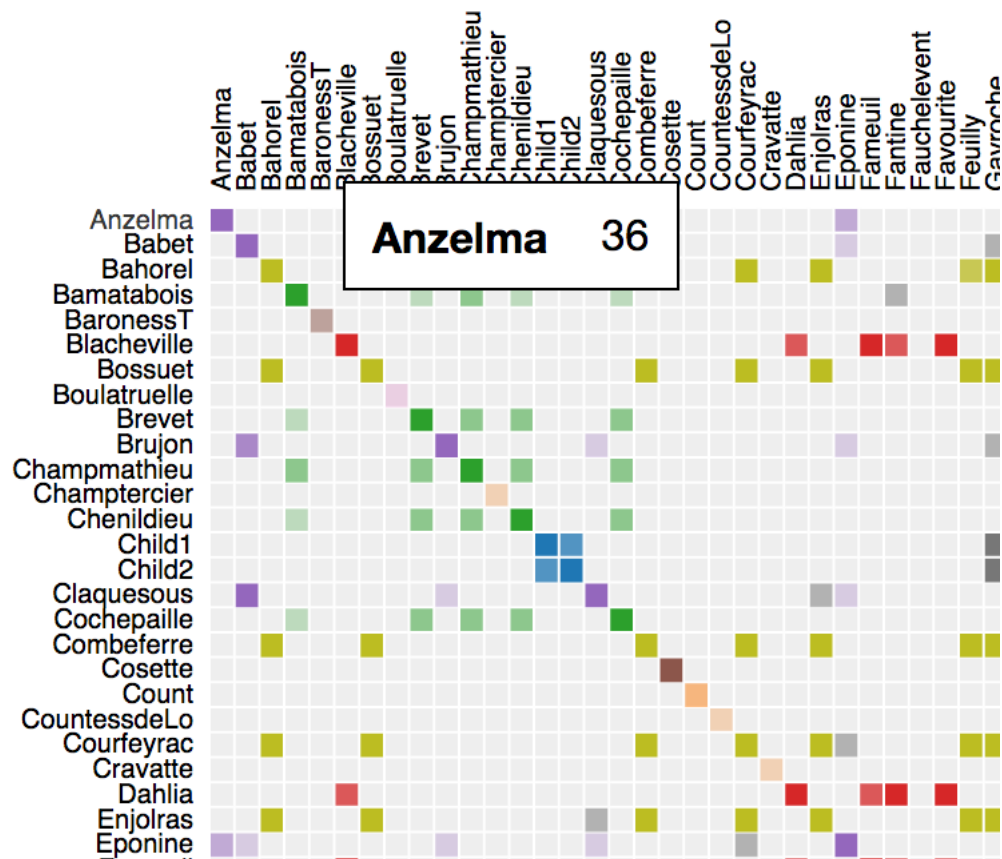


fig b_5

The first visualization is an overall diagram, users can see all the information in this diagram. In addition, we generated two more kinds of visualization to get more detail information. The first one is that we extracted some data which are in the same group to see the relation. Following are six different diagrams and these categorize by group one (fig b_6), group two (fig b_7), group three (fig b_8), group four (fig b_9), group five (fig b_10), and group eight (fig b_11). We can see the amount and the relationship complexity of the characters in a same group, if the grids of the diagrams are more colored, it means the relations between those characters are more complicated, and we also can get the relations in the same group more clearly.

Matrix Solutions for 2nd Question: *Group One*

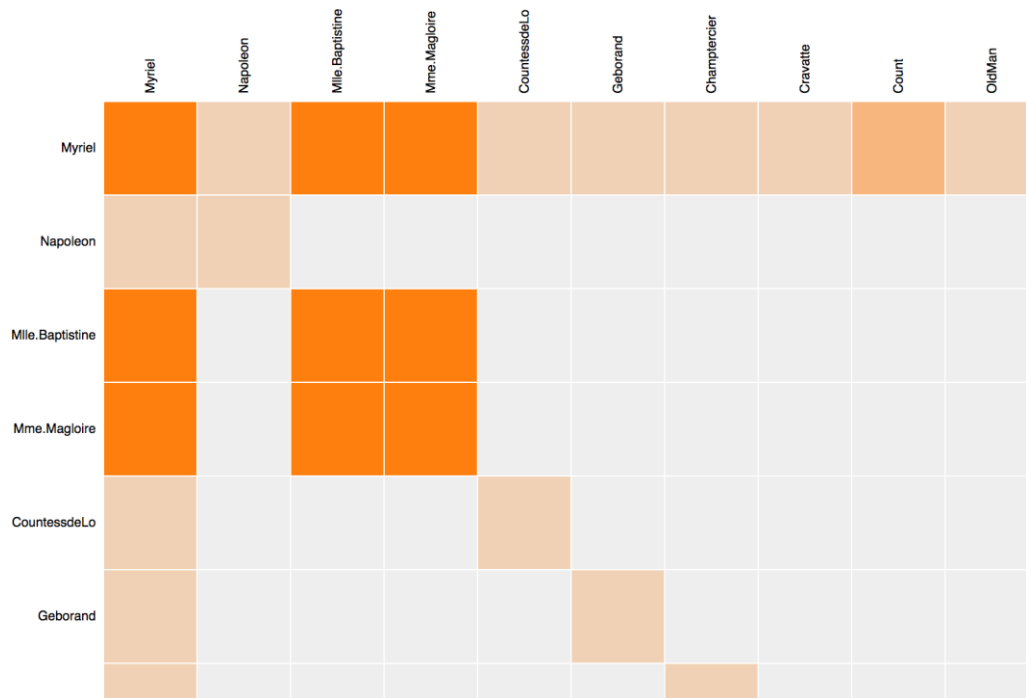


fig b_6: relation between group one

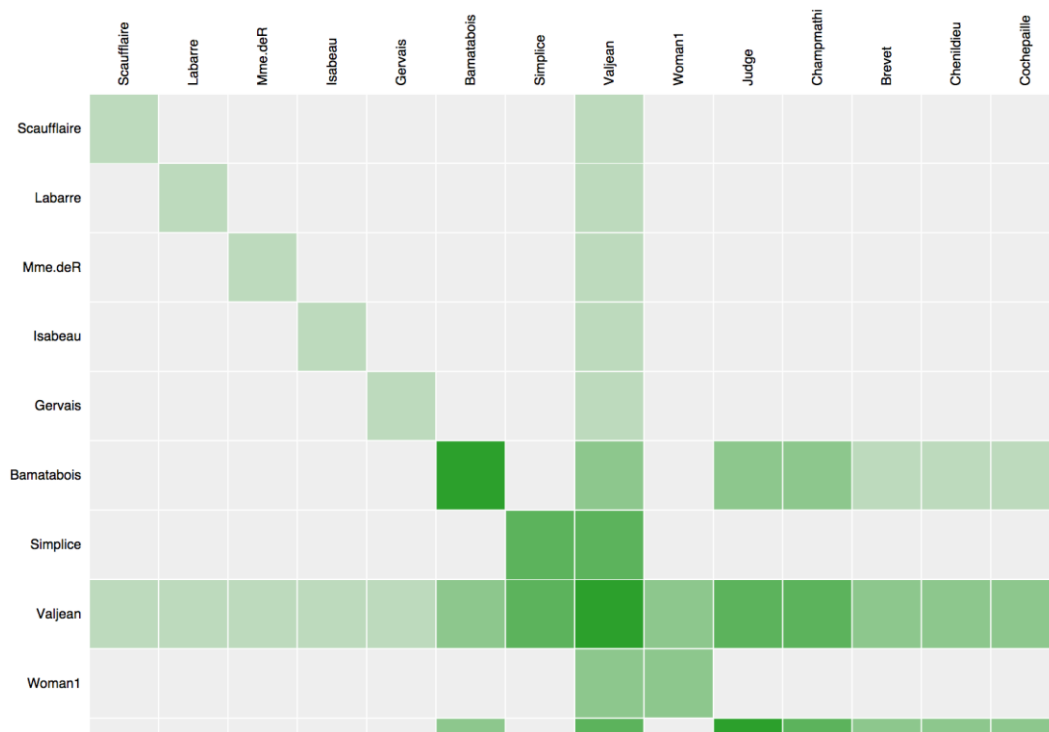


fig b_7: relation between group two

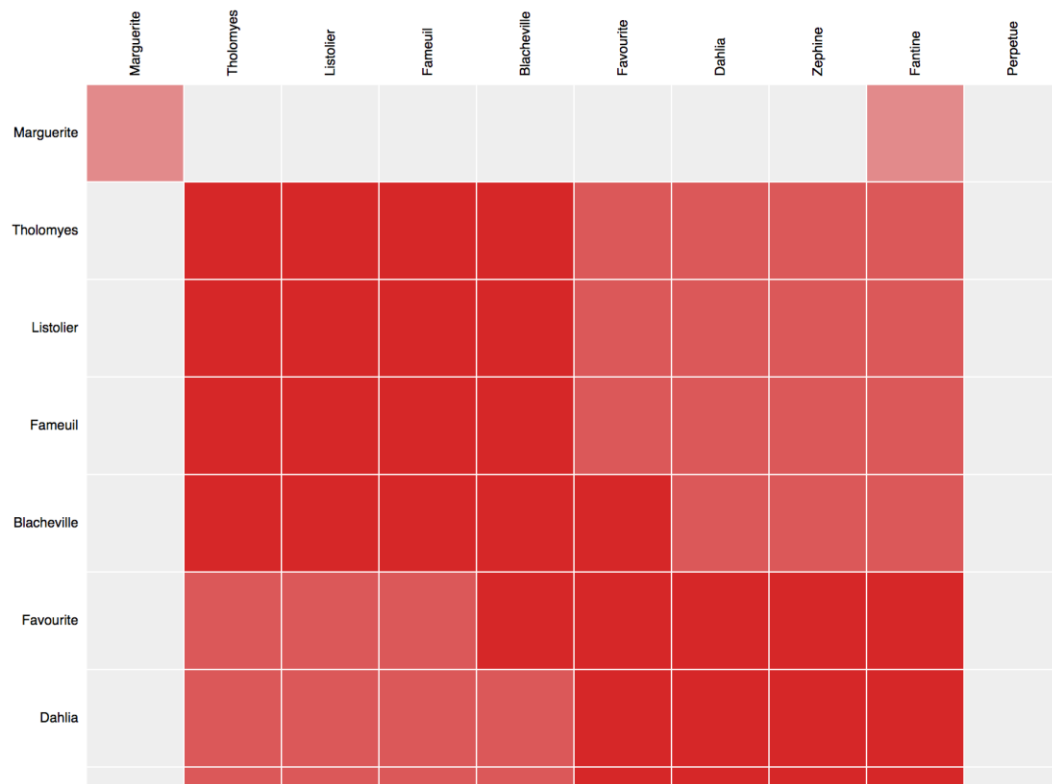


fig b_8: relation between group three

Matrix Solutions for 2nd Question: *Group Four*

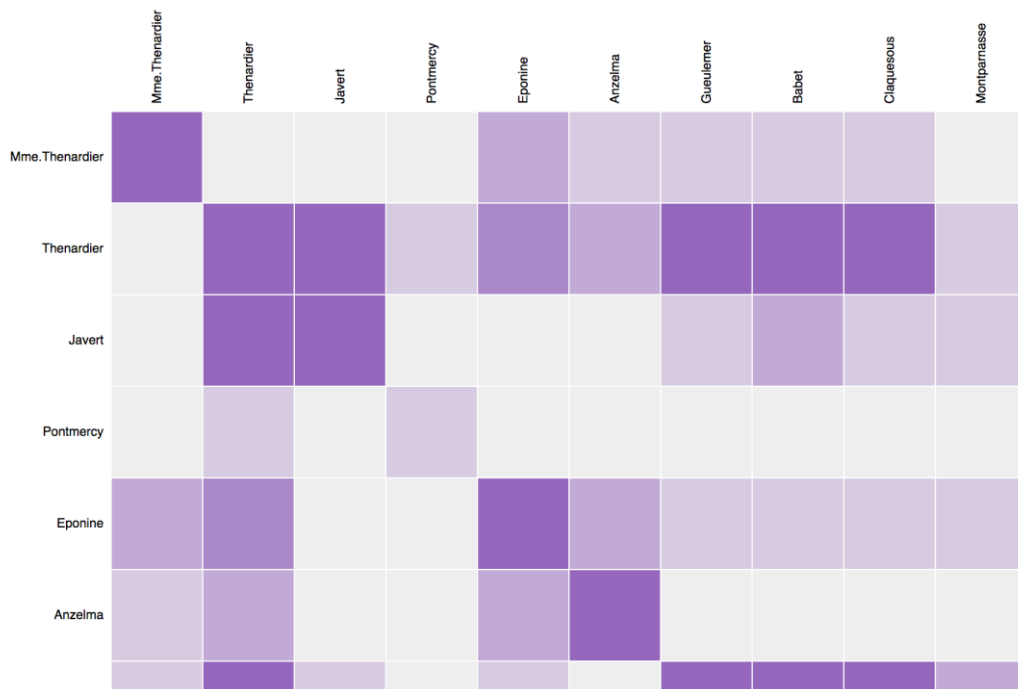


fig b_9: relation between group four

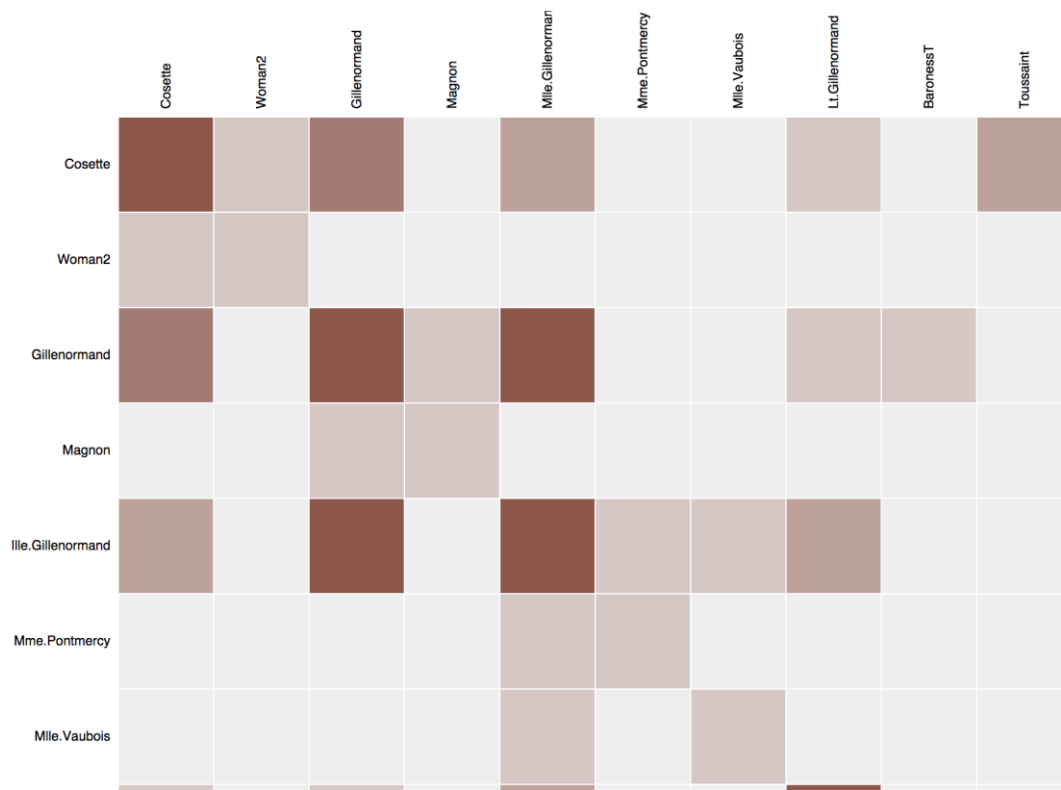


fig b_10: relation between group five

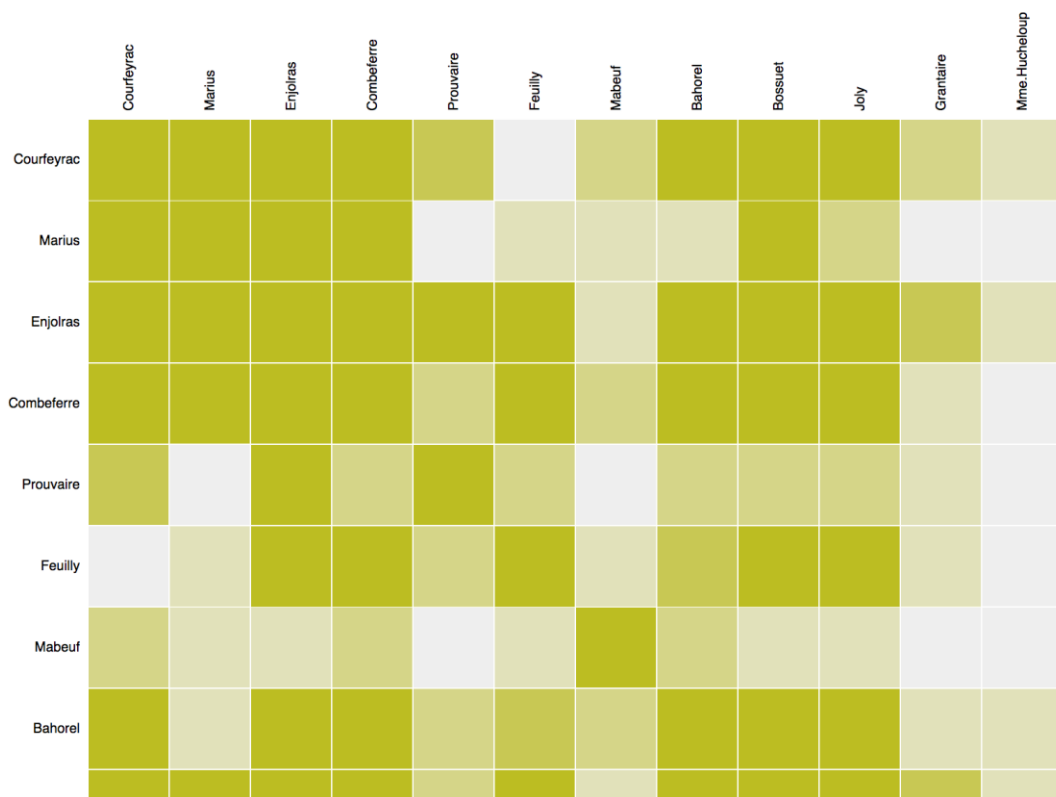


fig b_11: relation between group eight

The second one is that we extracted the data, which categorize by the value. Due to the bigger node value means the character is more important in this novel, we generated three more diagrams to see the relation between those more important characters. Followings are the diagrams, which generated by the node value greater than 100 (fig b_12), the node value greater than 50 (fig b_13), and the node value between 50 to 100 (fig b_14).

Matrix Solutions for 2nd Question: *Node Value > 100*

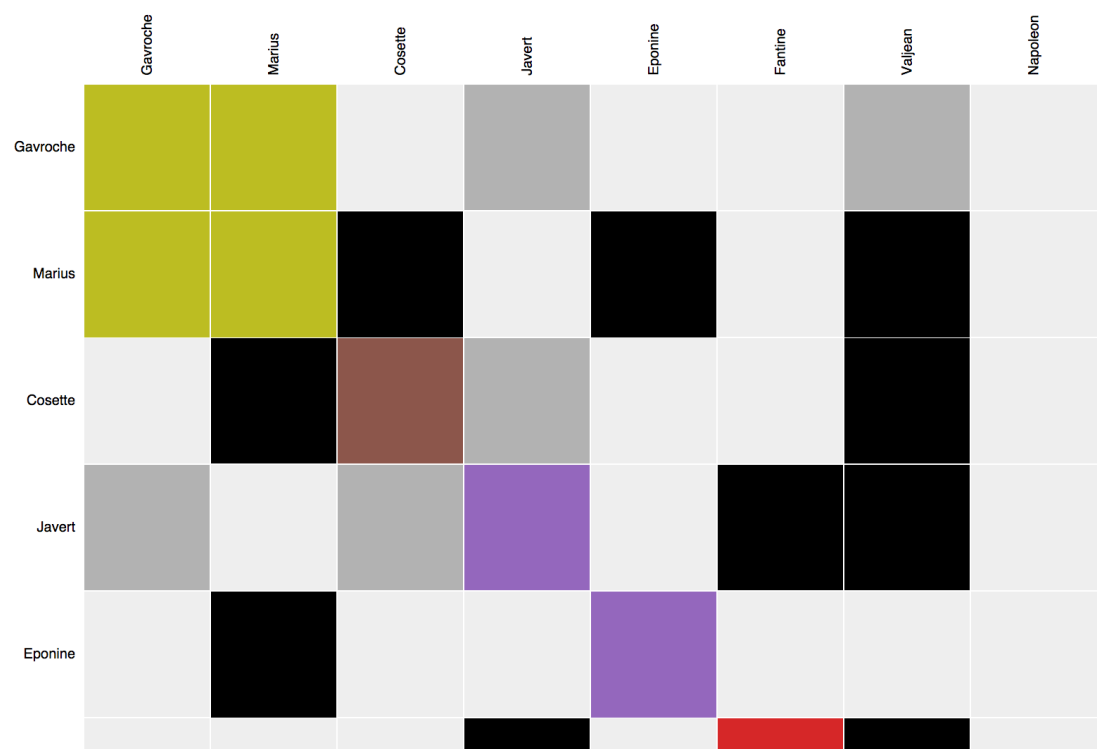


fig b_12: relation between the nodes value are greater than 100

Matrix Solutions for 2nd Question: *Node Value > 50*

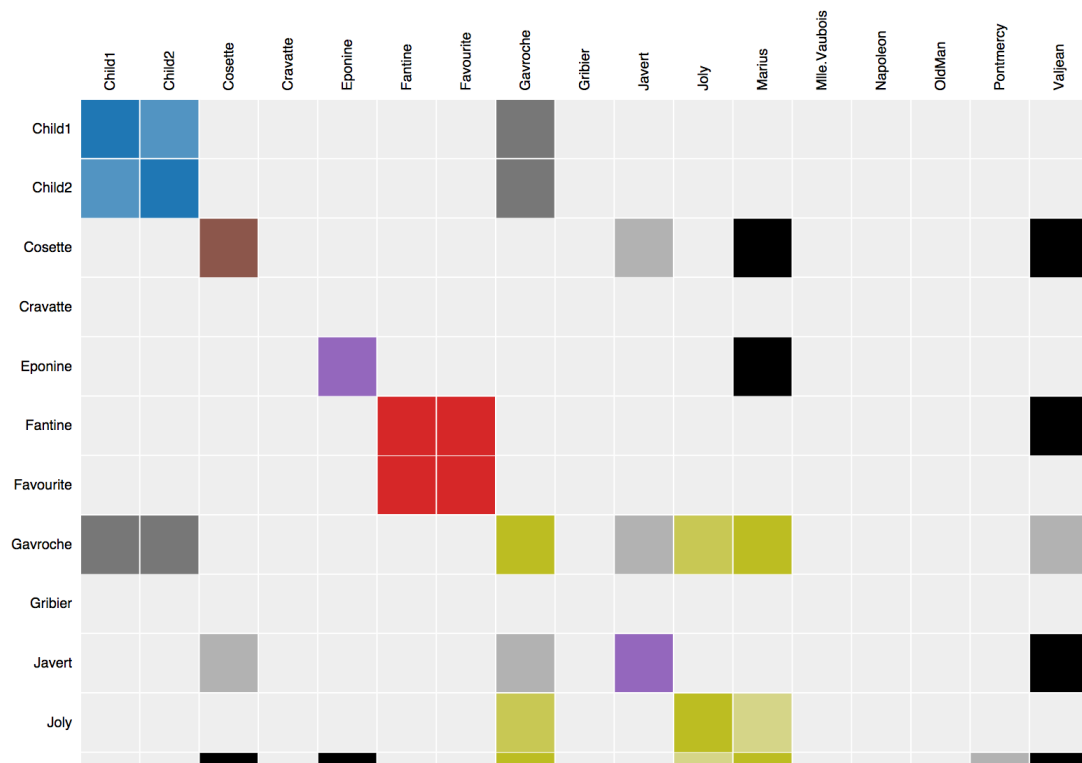


fig b_13: relation between the nodes value are greater than 50

Matrix Solutions for 2nd Question: $50 < \text{Node Value} < 100$

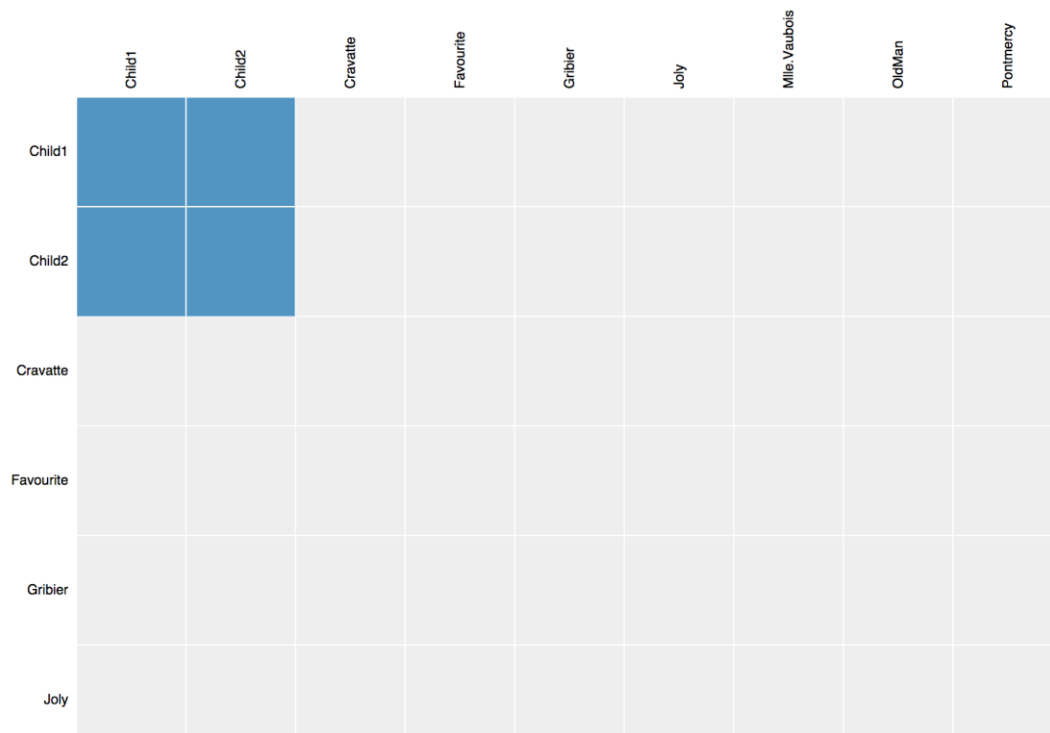


fig b_14: relation between the nodes value are between 50 and 100

In these three diagrams, we found that the colored grids are fewer because one of the relative characters' value is not in the range of value. For example, in the fig b_13, the row and column "Cravatte" don't have any color in the diagram, because the node value of other characters, who have relation with Cravatte are smaller than 50, they won't show in the diagram. We also can get the node amount and relations in the specified range more clearly.

Credits

Q1 Force Directed Graph for Les Miserables Roles:

[Q1 Solution](#) is built based on mbostock's block #950642, a Labeled Force Layout, developed and provided by [bl.ocks.org](#)
[bl.ocks.org](#) is run by [Mike Bostock](#).

Q2 Matrix Graph for Les Miserables Roles:

Q2 solution is built based on [Les Misérables Co-occurrence Matrix](#), provided by [Mike Bostock](#).

Source: [The Stanford GraphBase](#), author: [Donald E. Knuth](#).