Analysis of Italian Political Parties with the Self-Organizing Map

By Jonathan Gorday

Executive Summary:

The Italian parliamentary system is made up of two bodies, the Chamber of Deputies and the Senate of the Republic. The Chamber of Deputies is made up of 630 members, but the citizens of Italy do not vote for individuals to fill the Chamber of Deputies. Instead, the citizens place their votes for the party of their choice, and then the parties are assigned a certain amount of seats to fill depending on the amount of votes they got during the election.

An interesting fact about this system, however, is the sheer number of political parties that are in existence in Italy. The parties have therefore created separated into two main coalitions, The Union and House of Freedoms. These coalitions are made out of necessity, due to the fact that the number of parties present all but prevents a single party from having a clear majority.

For each party that currently has at least six deputies, data listed the number of votes for each bill in each of the following categories: 'for', 'against', and 'abstain'. For the purposes of this project, the votes that were 'abstain' were not considered to be votes. The remaining 'for' and 'against' votes were then added together to get the total number of 'true' votes, then that value was use to divide the number of 'for'. This gave a percentage between zero and one that describes what fraction of the political party voted 'for' each bill, with zero meaning 0% and one meaning 100%. This resulted in the following table.

House of Freedoms

0	0	0	0	0	0	0	LNP
0	0	0	0	1	0	1	AN
0	0	1	0.5	1	1	0	DC-PS
0	0.015	0.018	0	1	1	0.714	FI
0	0	0	0	1	1	0.333	UDC
1	1	1	1	1	1	1	RC-SE
1	1	1	1	1	1	1	RNP
1	1	1	1	1	1	1	UDEUR
1	1	1	1	1	1	1	VERDI
1	1	1	0.994	1	1	1	ULIVO
1	1	1	1	1	0.056	1	IDV
1	1	1	1	1	0	1	COM-IT

The Union

To analyze this data, a Self-Organizing Map, abbreviated to SOM, was used. The SOM will create a five by five grid upon which the political parties will be placed. This process takes a number of steps. First, a grid system will be created, with each space in the grid being given seven random values between zero and one to correlate to the seven bills in Table 1. Once this is done, the SOM then begins using Equation 2, a fairly simple distance formula shown below, to determine which one of the squares each party is closest to.

$$\sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2 + \cdots + (p_n - q_n)^2} = \sqrt{\sum_{i=1}^{n}(p_i - q_i)^2}$$

Once this is determined, the SOM trains that square the party is most like to make that space even more like the party, and does the same to a certain number of squares surrounding the square the party is most like. This is done for each party a large number of times, with the number of squares slowly decreasing as the repetitions increase. Finally, when the SOM has gone through the predetermined number of repetitions, it compares each party to the graph one last time, this time to label the squares that look most like each party.

This process gives a graphical appearance to the data, allowing it to be quickly analyzed and read. Things that are closer together on a SOM are more closely related than things that are far apart. An important fact to note, however, is that the level of correlation compared to distance is not a constant, even on the same map.

The SOM produced the table below after running.

LNP		AN		IDV
UDC		FI		COM-IT
DC-PS		ULIVO		RC-SE RNP UDEUR VERDI

(2)

The bottom right corner was extended to include the names of all four parties that shared the exact same voting pattern. As the graph shows, the graph is well separated with no areas of overlapping or other oddities. Also, by comparing neighbors from different coalitions with values from the data table, it is apparent that the difference between the two coalitions is greater than what the map suggests.

One major problem with this process was assuming the votes were representative of how each party stood on an issue. However, after examining the data table above, there is reason to doubt that this is the case, especially among the parties in The Union coalition where five of the seven parties voted the same way on each bill. Due to this consideration, the recommendation is to tentatively accept these two coalitions as the best fit for the current parties and to devote some more resources for another analysis of this issue.

Problem Description:

The Italian parliamentary system is made up of two bodies, the Chamber of Deputies and the Senate of the Republic. These two bodies function much like the United States'

parliamentary system, with the Chamber of Deputies roughly corresponding to the House of Representatives and the Senate of the Republic being similar to the Senate. The Chamber of Deputies is made up of 630 members, but the citizens of Italy do not vote for individuals to fill the Chamber of Deputies. Instead, the citizens place their votes for the party of their choice, and then the parties are assigned a certain amount of seats to fill depending on the amount of votes they got during the election. (Parliament of Italy)

An interesting fact about this system, however, is the sheer number of political parties that are in existence in Italy. The parties have therefore created separated into two main coalitions, The Union and House of Freedoms. These coalitions are made out of necessity, due to the fact that the number of parties present all but prevents a single party from having a clear majority. For example, the largest single party, Olive Tree, currently makes up only a third of the Chamber of Deputies. (Italian Chamber of Deputies)

The purpose of this report is to examine these two political coalitions to see if two groupings are the best for the political parties. If they aren't, this report should show what would be a better pair of groupings for these political parties. In order to test the fitness of the coalitions, voting data from the current Chamber of Deputies will be used.

Analysis Technique:

The data for this project was taken from the Chamber of Deputies' website for seven of the Chamber's most recent votes. For each party that currently has at least six deputies, data listed the number of votes for each bill in each of the following categories: 'for', 'against', and 'abstain'. For the purposes of this project, the votes that were 'abstain' were not considered to be votes. The remaining 'for' and 'against' votes were then added together to get the total number of 'true' votes, then that value was use to divide the number of 'for'. This gave a percentage between zero and one that describes what fraction of the political party voted 'for' each bill, with zero meaning 0% and one meaning 100%. This resulted in the following table.

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1	1	1	1	1	1	1	VERDI
1	1	1	0.994	1	1	1	ULIVO
1	1	1	1	1	0.056	1	IDV
1	1	1	1	1	0	1	COM-IT

The Union

(1)

Going across, the columns represent the percentage of 'for' votes on the following bills: DDL n.1808, DDL n.1750, DDL n.1253, DDL n.1254, DDL n.1608, PDL n.525-BIS, and DDL n.1041. (Camera dei Deputati) The final column is the abbreviations of the political parties that have at least six members. From top to bottom, the names of the political parties are: Northern League-Movement for Autonomy, National Alliance, Christian Democracy-New PSI, Forza Italia, Union of Christian and Centre Democrats, Communist Refoundation Party, Rose in the Fist, Popular UDEUR, Federation of the Greens, Olive Tree, Italy of Values, and Party of Italian Communists. (Italian Chamber of Deputies) The Mesoti, or mixed, portion from the website was dropped because these were politicians that were one of a very small number of deputies representing their party, most likely one or two.

To analyze this data, a Self-Organizing Map, abbreviated to SOM, was used. The SOM will create a five by five grid upon which the political parties will be placed. This process takes a number of steps. First, a grid system will be created, with each space in the grid being given seven random values between zero and one to correlate to the seven bills in Table 1. Once this is done, the SOM then begins using Equation 2, a fairly simple distance formula shown below, to determine which one of the squares each party is closest to.(Self-Organizing Map)

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(2)

Once this is determined, the SOM trains that square the party is most like to make that space even more like the party, and does the same to a certain number of squares surrounding the square the party is most like. This is done for each party a large number of times, with the number of squares slowly decreasing as the repetitions increase. Finally, when the SOM has gone through the predetermined number of repetitions, it compares each party to the graph one last time, this time to label the squares that look most like each party. (Self-Organizing Map)

This process gives a graphical appearance to the data, allowing it to be quickly analyzed and read. Things that are closer together on a SOM are more closely related than things that are far apart. An important fact to note, however, is that the level of correlation compared to distance is not a constant, even on the same map. (Self-Organizing Map)

Assumptions:

- Not counting abstains as votes will not skew the data.
- Leaving out the tiny parties of one or two people will not adversely affect the map.
- The way each party voted on an issue is equivalent to how that party feels on that issue.

Results:

The SOM produced the table below after running.

LNP		AN		IDV
UDC		FI		COM-IT
DC-PS		ULIVO		RC-SE RNP UDEUR VERDI

(3)

The bottom right corner was extended to include the names of all four parties that shared the exact same voting pattern. As the graph shows, the graph is well separated with no areas of overlapping or other oddities. Also, by comparing neighbors from different coalitions with values from Table 1, it is apparent that the difference between the two coalitions is greater than what the map suggests.

Normally, a series of charts describing the division on separate issues would follow Graph 3. Unfortunately, though, due to the extreme nature of most values in Table 1, these charts are largely uninteresting and resemble one another. This simply furthers the argument that these coalitions are optimal.

Issues and Suggestions for Further Work:

As stated in the assumptions, one major problem with this process was assuming the votes were representative of how each party stood on an issue. However, after examining Table 1, there is reason to doubt that this is the case, especially among the parties in The Union coalition where five of the seven parties voted the same way, with the exception of one vote on bill DDL n.1254 by a deputy from Olive Tree. A possible means of checking this would be to compare these votes to what each party's platform says, or by using those platforms to provide a basis for the SOM.

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