Spotify Network Analysis Measures Related to Centrality of Actors

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Social Network Analysis

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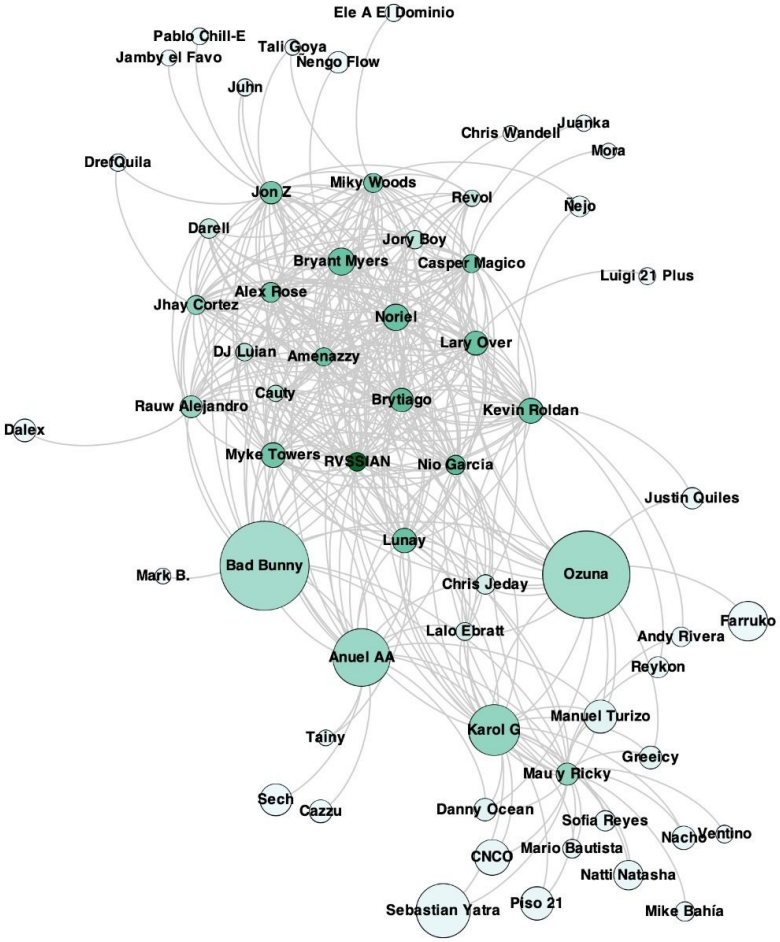
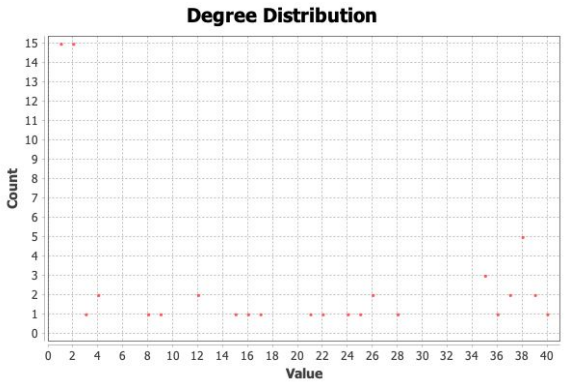


Figure 1: *Network render of Bad Bunny related artists in Spotify. The nodes represent the artists and the edges between them represent they are a related artist . The size of nodes represent the number of followers they have on Spotify and the color, the degree.*

SNA Measures Related to centrality

1. Degree:



Id	Degree
RVSSIAN	40
Brytiago	39
Nio Garcia	39
Noriel	38
Lary Over	38
Bryant Myers	38
Kevin Roldan	38
Lunay	38
Amenazzy	37
Casper Magico	37
Myke Towers	36
Alex Rose	35
Miky Woods	35
Jon Z	35
Jhay Cortez	28
Karol G	26
Mau y Ricky	26
Rauw Alejandro	25
Anuel AA	24
Ozuna	22
Bad Bunny	21
Cauty	17
DJ Luian	16
Jory Boy	15
Revol	12
Darell	12
Lalo Ebratt	9
Chris Jeday	8
Danny Ocean	4
Manuel Turizo	4
Greeicy	3
Ñejo	2
Juhn	2

Tali Goya	2
DrefQuila	2
Tainy	2
Justin Quiles	2
Andy Rivera	2
Reykon	2
CNCO	2
Mario Bautista	2
Nacho	2
Natti Natasha	2
Piso 21	2
Sebastian Yatra	2
Sofia Reyes	2
Mark B.	1
Chris Wandell	1
Luigi 21 Plus	1
Ñengo Flow	1
Juanka	1
Mora	1
Ele A El Dominio	1
Jamby el Favo	1
Pablo Chill-E	1
Dalex	1
Cazzu	1
Sech	1
Farruko	1
Mike Bahía	1
Ventino	1

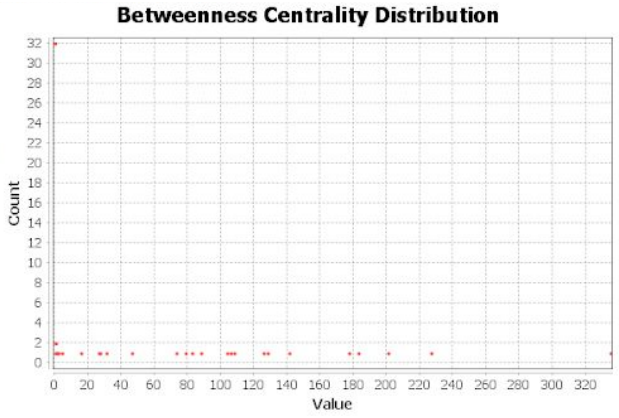
Degree centrality measures the number of connections an actor has, meaning the ability to communicate without intermediates with other nodes. These results indicate that RVSSIAN is the actor with the highest number of connections (40). Following, we have Brytiago and Nio Garcia with a score of 39, and then Noriel, Lary Over, Bryant Myers, Kevin Roldan, and Lunay with 38. All these actors have very close scores and are inside the main cluster. The next measures will help us determine the central actor as the proximity between scores can be misleading.

We can also see that many actors have only one connection and those are in the outer edges. It is observed that the actor with which we started (Bad Bunny) has 21 connections, we expected to have more as it was our starting point, but once again we realize that this is due to Spotify's algorithm.

Degree Top Ranking

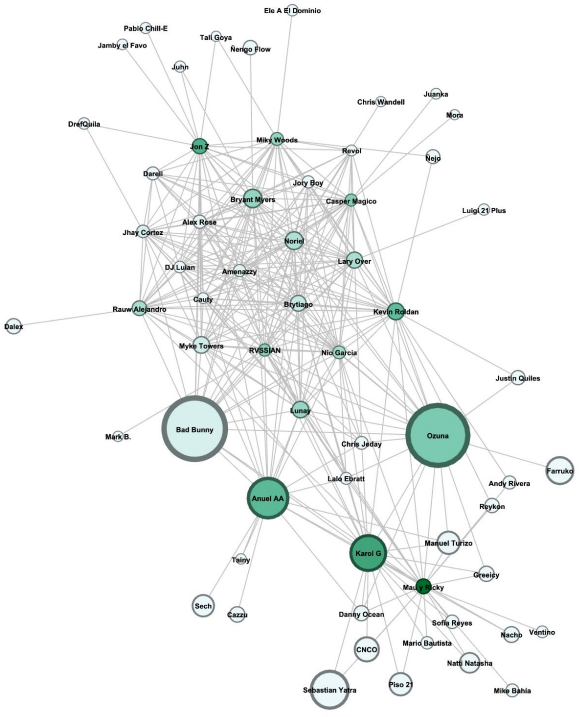
1. Rvssian
2. Brytiago
3. Nio Garcia

2. Betweenness:



Id	Betweenness Centrality
Mau y Ricky	334.839505
Karol G	226.788335
Jon Z	200.839808
Anuel AA	182.915488
Kevin Roldan	177.318468
Ozuna	141.225929
RVSSIAN	128.267937
Casper Magico	125.77735
Miky Woods	108.146886
Bryant Myers	105.975029
Lunay	103.772937
Nio Garcia	88.038065
Rauw Alejandro	82.67754
Lary Over	78.871789
Noriel	73.223355
Brytiago	46.41551
Myke Towers	31.01873
Jhay Cortez	27.326337
Bad Bunny	26.416735
Amenazzy	15.725145
Alex Rose	4.309148
Cauty	2.209475
Lalo Ebratt	1.363026
Chris Jeday	0.859068
DJ Luian	0.368801
Jory Boy	0.368801
Danny Ocean	0.36383
Manuel Turizo	0.36383
Revol	0.213143
Andy Rivera	0.0
Cazzu	0.0
Chris Wandell	0.0
CNCO	0.0
Dalex	0.0
Darell	0.0

DrefQuila	0.0
Ele A El Dominio	0.0
Farruko	0.0
Greeicy	0.0
Jamby el Favo	0.0
Juanka	0.0
Juhn	0.0
Justin Quiles	0.0
Luigi 21 Plus	0.0
Mario Bautista	0.0
Mark B.	0.0
Mike Bahía	0.0
Mora	0.0
Nacho	0.0
Natti Natasha	0.0
Ñejo	0.0
Ñengo Flow	0.0
Pablo Chill-E	0.0
Piso 21	0.0
Reykon	0.0
Sebastian Yatra	0.0
Sech	0.0
Sofia Reyes	0.0
Tainy	0.0
Tali Goya	0.0
Ventino	0.0



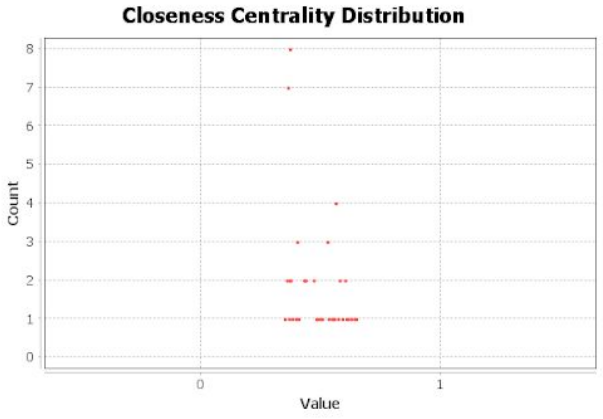
Betweenness shows the level at which other actors must pass through an actor to communicate with others. Mau Y Ricky have the highest betweenness (334.84), which means that they act like a bridge to connect a really high number of other actors among themselves. This can happen because even though they share the same genre, inside of reggaeton there are different subgenres and Mau y Ricky are the perfect intermediary to connect all these artists. This is the reason many of the outer actors are connected to the central network through Mau y Ricky, this is clearly seen in the network graph.

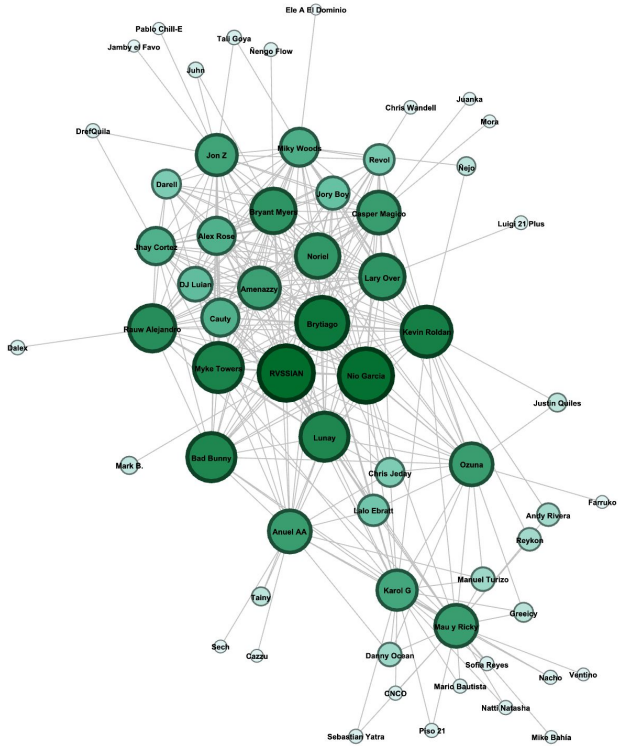
There are many actors with a betweenness of 0, meaning that they don't help for other actors to be related to each other, and the majority of them are located at the edges of the network.

Betweenness Top Ranking

1. Mau y Ricky
2. Karol G
3. Jon Z

3. Closeness:



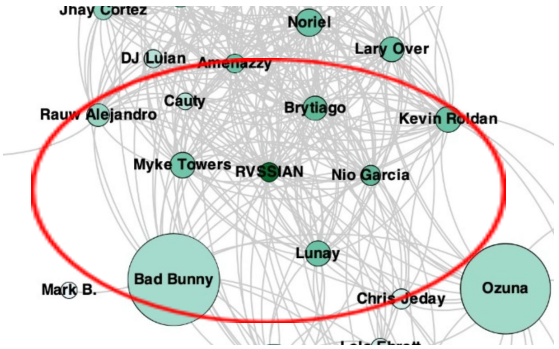


Id	Closeness Centr
RVSSIAN	0.645161
Nio Garcia	0.638298
Brytiago	0.625
Kevin Roldan	0.612245
Myke Towers	0.606061
Lunay	0.6
Bad Bunny	0.6
Rauw Alejandro	0.588235
Bryant Myers	0.576923
Lary Over	0.576923
Noriel	0.571429
Mau y Ricky	0.560748
Anuel AA	0.560748
Ozuna	0.560748
Casper Magico	0.560748
Amenazzy	0.555556
Jon Z	0.550459
Karol G	0.545455
Miky Woods	0.530973
Jhay Cortez	0.526316
Alex Rose	0.526316
Cauty	0.526316
DJ Luian	0.504202
Jory Boy	0.495868
Lalo Ebratt	0.483871
Revol	0.48
Chris Jeday	0.46875
Darell	0.46875
Danny Ocean	0.434783
Manuel Turizo	0.434783

Andy Rivera	0.428571
Reykon	0.428571
Greeicy	0.405405
Justin Quiles	0.4
Ñejo	0.4
Tainy	0.4
Mark B.	0.394737
Juhn	0.379747
Dalex	0.372671
Tali Goya	0.372671
CNCO	0.37037
DrefQuila	0.37037
Mario Bautista	0.37037
Nacho	0.37037
Natti Natasha	0.37037
Piso 21	0.37037
Sebastian Yatra	0.37037
Sofia Reyes	0.37037
Luigi 21 Plus	0.368098
Ñengo Flow	0.368098
Chris Wandell	0.365854
Cazzu	0.361446
Farruko	0.361446
Juanka	0.361446
Mike Bahía	0.361446
Mora	0.361446
Sech	0.361446
Ventino	0.361446
Jamby el Favo	0.357143
Pablo Chill-E	0.357143
Ele A El Dominio	0.348837

Closeness represents how able an actor is to reach directly many other actors in the network without intermediaries. As expected, RVSSIAN takes the first place with a closeness of 0,645 and Nio Garcia and Brytiago follow him with 0,638 and 0,635 respectively. This shows that they are the actors that Spotify wants to promote to Martina as they appear more on the related artist recommendations when she listens to the genre.

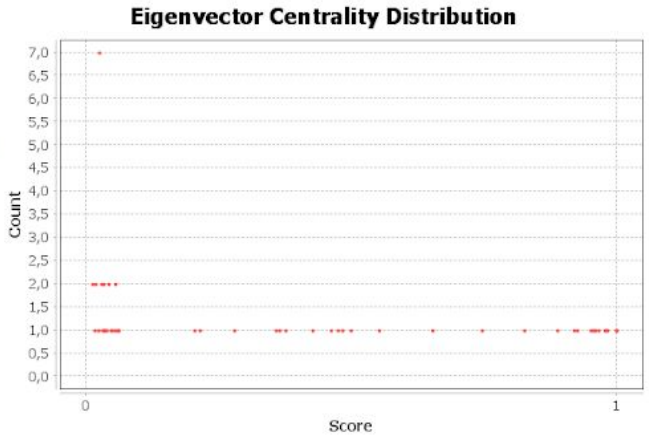
We can also see that the artists with the highest values on this measure are really close together and are part of the main node cluster in the middle (RVSSIAN, Bad Bunny, Myke Towers, Lunay, Nio Garcia, Kavin Roldan, etc), which we can conclude that the closeness is certainly based on the main cluster of the network. This can be shown on the figure on the right.



Closeness Top Ranking

1. Rvssian
2. Nio Garcia
3. Brytiago

4. Eigenvector:



Id	Eigenvector Centrality
Brytiago	1.0
RVSSIAN	0.999615
Noriel	0.998834
Lary Over	0.982442
Amenazzy	0.979776
Bryant Myers	0.977975
Nio Garcia	0.965877
Alex Rose	0.959396
Casper Magico	0.955789
Myke Towers	0.950987
Kevin Roldan	0.925894
Lunay	0.919348
Miky Woods	0.888084
Jon Z	0.825882
Jhay Cortez	0.745448
Rauw Alejandro	0.652541
Bad Bunny	0.551381
Cauty	0.498
DJ Luian	0.482004
Anuel AA	0.473742
Jory Boy	0.460585
Ozuna	0.425954
Revol	0.374832
Karol G	0.363349
Darell	0.356761
Mau y Ricky	0.277912
Lalo Ebratt	0.212889
Chris Jeday	0.202899
Ñejo	0.059423
Juhn	0.059065
Tali Goya	0.056129
Danny Ocean	0.053381
Manuel Turizo	0.053381
DrefQuila	0.05146

Tainy	0.046304
Justin Quiles	0.044871
Andy Rivera	0.040535
Reykon	0.040535
Greeicy	0.037385
Mark B.	0.032778
Chris Wandell	0.032597
Luigi 21 Plus	0.032097
Ñengo Flow	0.031956
Juanka	0.031217
Mora	0.031217
Ele A El Dominio	0.029021
Jamby el Favo	0.027108
Pablo Chill-E	0.027108
CNCO	0.022917
Mario Bautista	0.022917
Nacho	0.022917
Natti Natasha	0.022917
Piso 21	0.022917
Sebastian Yatra	0.022917
Sofia Reyes	0.022917
Dalex	0.021419
Cazzu	0.015996
Sech	0.015996
Farruko	0.014468
Mike Bahía	0.010132
Ventino	0.010132

Eigenvector measures the influence a node has based on the links it has to other nodes in the network, taking into account not only the number of connections but the quality they hold. Here, we find Brytiago in the first place, followed by RVSSIAN. The difference between these 2 is 0.000385, this small difference could be as in this measure the quality of each node is taken into account, RVSSIAN has a high quality, and as Brytiago is connected to it, it has a higher score than RVSSIAN.

Furthermore, we have many nodes with low eigenvector results, meaning that they would take longer to be recommended and they are not as influential as the other actors.

Eigenvector Top Ranking

1. Brytiago
2. Rvssian
3. Noriel

Conclusions

Spotify just launched the feature for users to see their most listened songs of the year, here they also find out how many new artists they discovered and this is thanks to the algorithm we just explored. Spotify enables this by recommending us artists that we are likely to enjoy according to those we already do.

At first glance we thought that Bad Bunny was going to be the central actor but that was until we figured out how the algorithm worked based on our previous study, and the measures obtained. Despite this being an egocentric network, the ego of the creation of the network isn't the central actor, because what Spotify's recommendation algorithm wants for users to amplify the network of artists they normally listen to, and Martina already listens a lot to Bad Bunny.

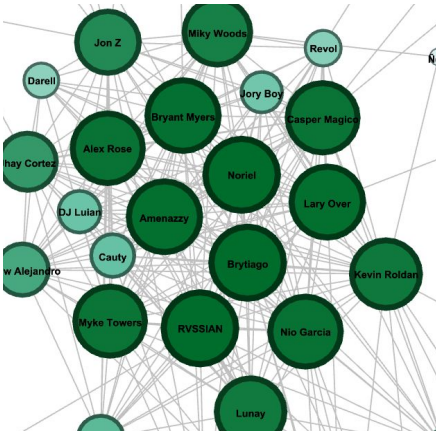
Even though RVSSIAN had the highest degree followed closely by Brytiago and Nio Garcia, their betweenness is not as high as expected, which means that despite being directly related to many actors they aren't that good to connect them in Spotify. However, for closeness they are back on the top with RVSSIAN, meaning that they are the artists that Spotify believes that Martina will enjoy more in order to amplify her music selection based on her listening behavior.

Based on the analysis and thinking about what Spotify wants for Martina we believe that the central actor is RVSSIAN, because this is the actor that Spotify suggests more to Martina based on her interests as it is the one that appears more in the recommendation section of the artists she usually listens to. Moreover, this can also be deduced from the values of all the measures we have done throughout this class, where it is clear that, not only because the eigenvector value says so, but RVSSIAN has been the most or one of the most influential actors on this project due to his connections and the importance of those connections with other artists. We assume that being the most influential node helps RVSSIAN to appear promptly into Martina's recommendations, as the node is not only connected to a lot of nodes but also to the most connected ones, giving to RVSSIAN a really high possibility to

appear sooner in the recommendations. In the same way, being super influential in the network, makes the node crucial to the network. As it offers possibly shortest alternative paths.

We believe that in the end a directed network would have been more insightful to the analysis of the actors' measures of centrality in this case, even though we still believe that if we got more actors as they belong to the same genre, eventually they would connect to each other.

Finally, we also discovered that at least half of the actors on this network had such low values that were nearly negligible to the case, however, it also showed a good insight about who are the real "stars" in this musical ecosystem based on Martina's tastes. This is clearly shown with the Eigenvector value, which shows the most influential actors to be the most central of the network, or the ones represented on the main cluster of the ecosystem (figure on the right).



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