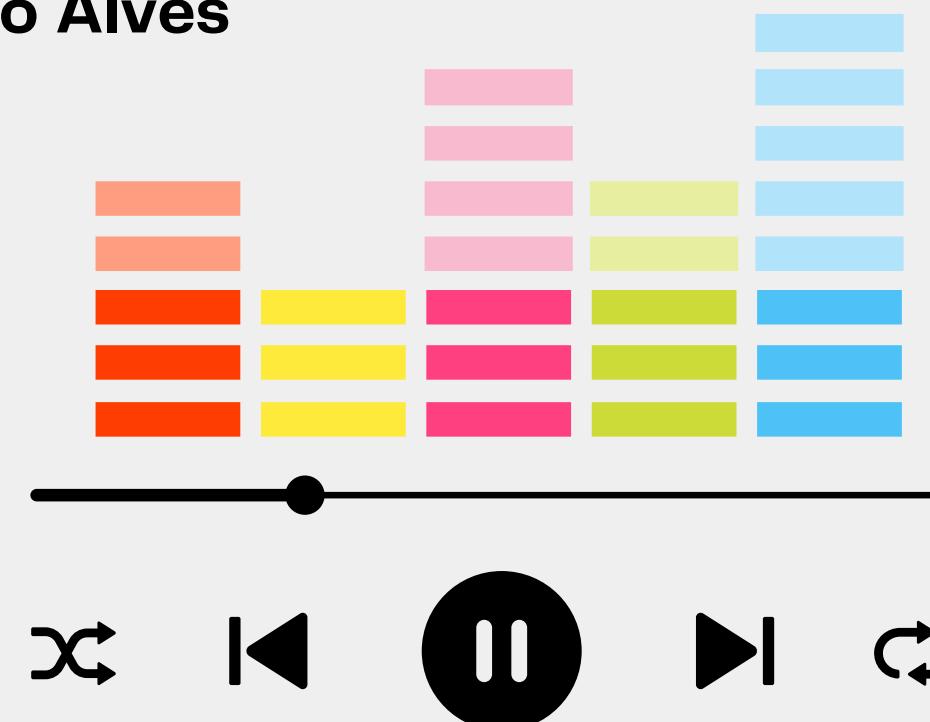


# OPTIMIZING MARKETING STRATEGIES THROUGH SOCIAL NETWORK ANALYSIS: A SOCIAL INTERACTION CASE STUDY ON DEEZER'S MUSIC STREAMING PLATFORM

## Social Network Analysis

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# INTRO

This project was undertaken as part of the Social Network Analysis course taught at NOVA IMS – NOVA Information Management School. As competition in the music streaming industry continues to intensify, exploring user social interactions to improve marketing strategies in the music streaming industry becomes increasingly important for platforms seeking to understand user behaviour to sustain and grow their user base.

The study focuses on Deezer, a platform facing stiff competition from Spotify in converting free users into paying ones. By using Social Network Analysis, the study aims to understand Deezer's users' social interactions and their implications for the platform's marketing strategy. It will explore the possibility of adapting products and subscription offerings to different communities and tailoring some offerings specifically for women.

## **This study has four main objectives:**

1. Identifying communities within the platform's network and extracting insights from the top ones.
2. Examining gender-specific patterns within communities to determine whether gender-specific strategies can be effective.
3. Identifying key users who can help reach more than 50% of the community.
4. Providing recommendations to help the platform formulate a better strategy.

# ANALYSTS OVERVIEW

The dataset is a social network of Deezer users from European countries, collected in March 2020 via the public API. It includes nodes representing users and edges representing mutual follower relationships. The vertex features are based on the artists liked by users. The gender of users was predicted using binary node classification, derived from the name field for each user.

## Dataset Overview

- The dataset contains 28,281 nodes and 92,752 edges, indicating a relatively large user network.
- The network's density is 0.0002, suggesting a sparse network, and the transitivity is 0.0959, indicating some level of clustering.

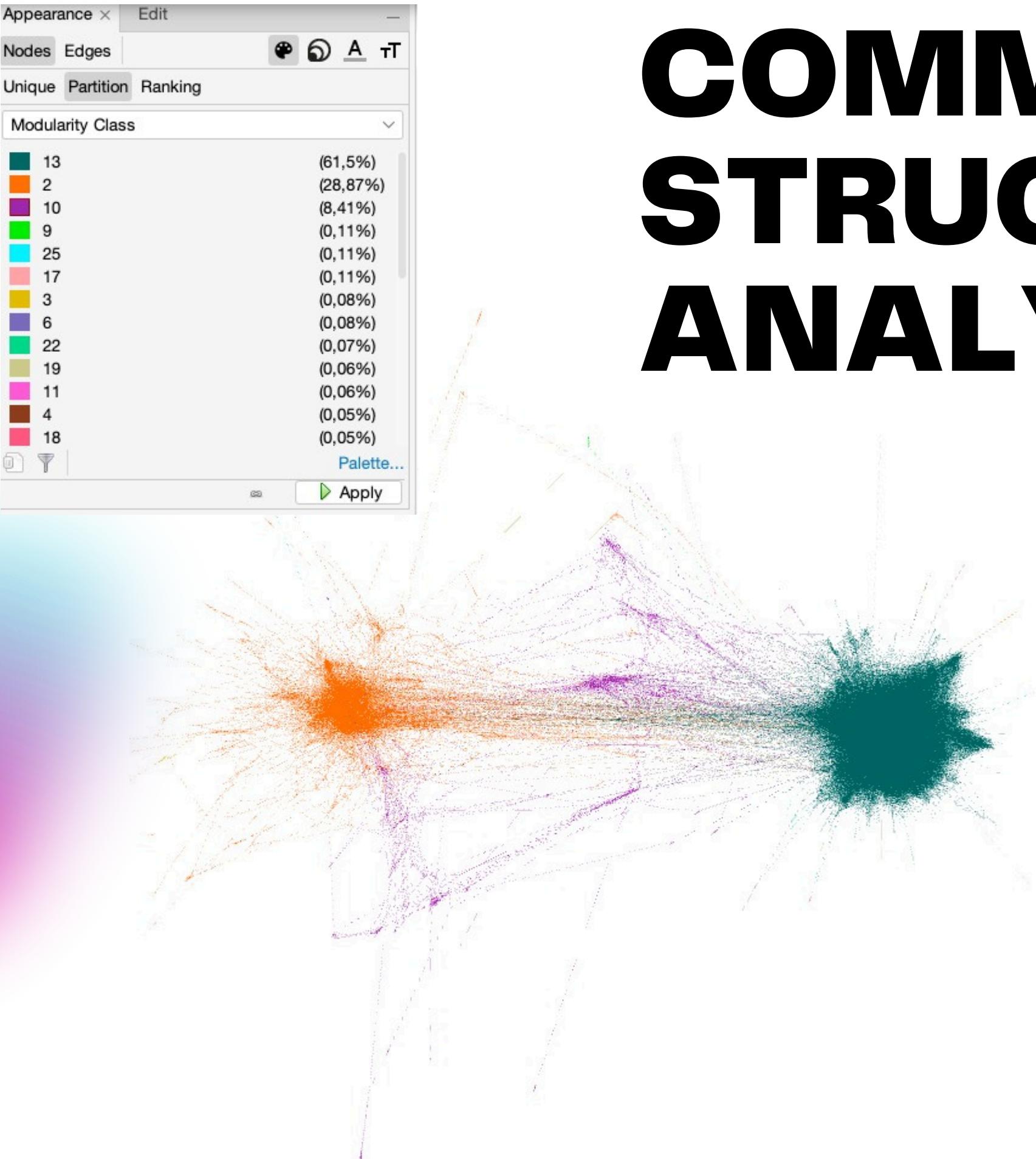
## Relevant Metrics

- Modularity: Community detection.
- Gender Analysis: Trying to analyze gender-specific communities.
- Degree Centrality & Betweenness Centrality are potential measures to analyze the network. The first identifies potential influencers with the most direct connections. The second highlights users who act as bridges between different parts of the network, essential for maintaining connectivity.

## Possible Limitations

- Low network density can limit the potential for strong connections, resulting in only a few individuals having a significant impact.
- Predictions on the gender of users might not be accurate.
- It might lack additional user attributes that could provide a more comprehensive understanding on user preferences and behaviors.

Dataset statistics	
Directed	No.
Node features	Yes.
Edge features	No.
Node labels	Yes. Binary class.
Temporal	No.
Nodes	28,281
Edges	92,752
Density	0.0002
Transitivity	0.0959



# COMMUNITY STRUCTURE ANALYSIS —

Modularity analysis can be used to detect communities by examining the mutual follower relationships.

By applying a modularity resolution of 7.0, 29 distinct communities can be identified within Deezer's user base. Notably, three of these communities stand out due to their larger size, consisting of 13, 2, and 10 in the graph.

# **QUESTION 1**

**ARE THERE COMMUNITIES IN OUR NETWORK, THAT WE CAN TRY AND  
UNDERSTAND BETTER? CAN YOU GIVE US INFORMATION ON THE TOP ONES?**

By dividing the network into communities, it was able to better understand the structure of the network users' similar interests. On the first approach, it seems that Community 13 holds a significant influence on the network dynamics followed by Community 2 and Community 10 holds a small percentage but often means more specific interests or characteristics and by identifying them it is possible to tailor a specialized strategy to engage with these users.

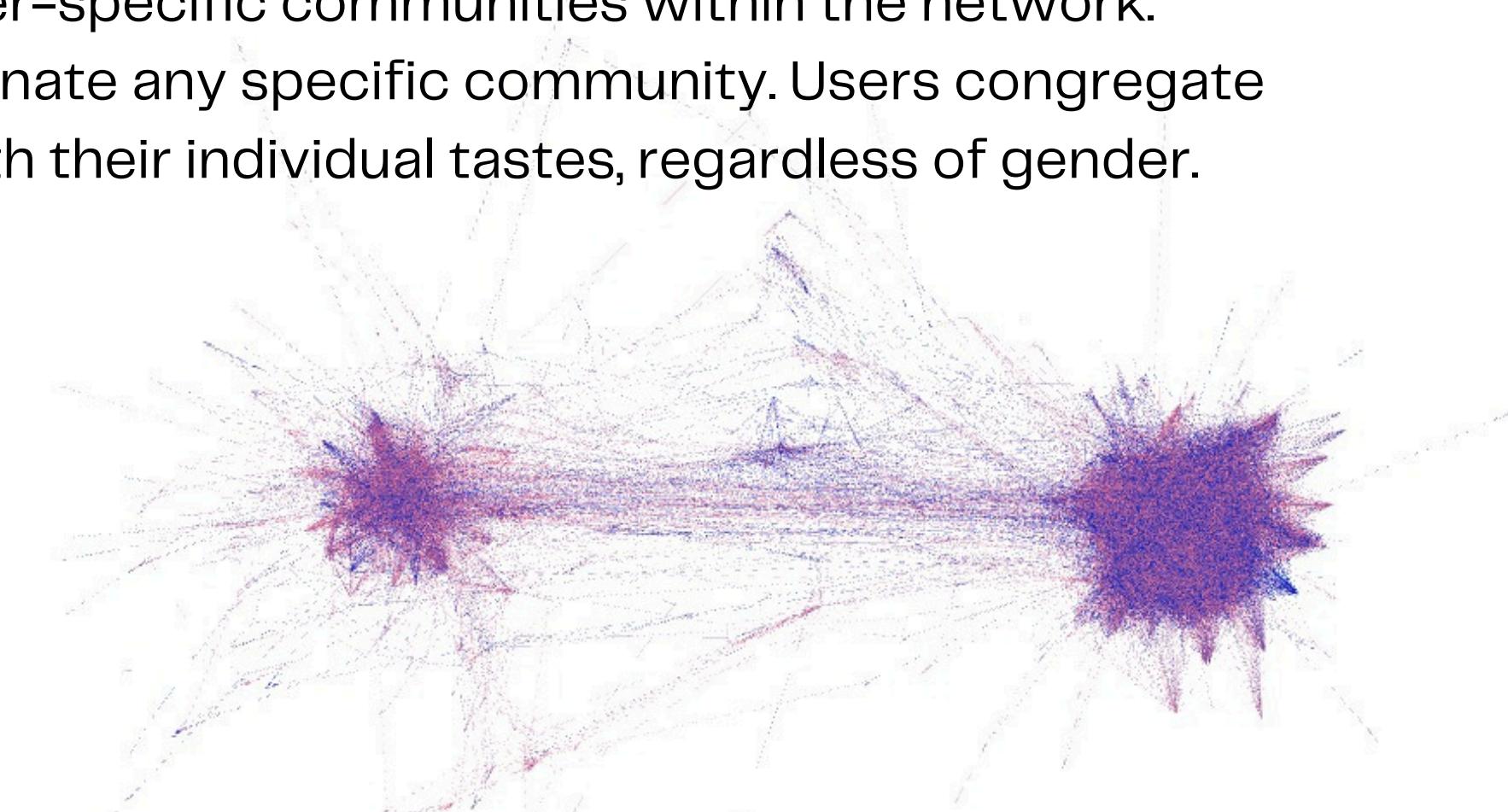
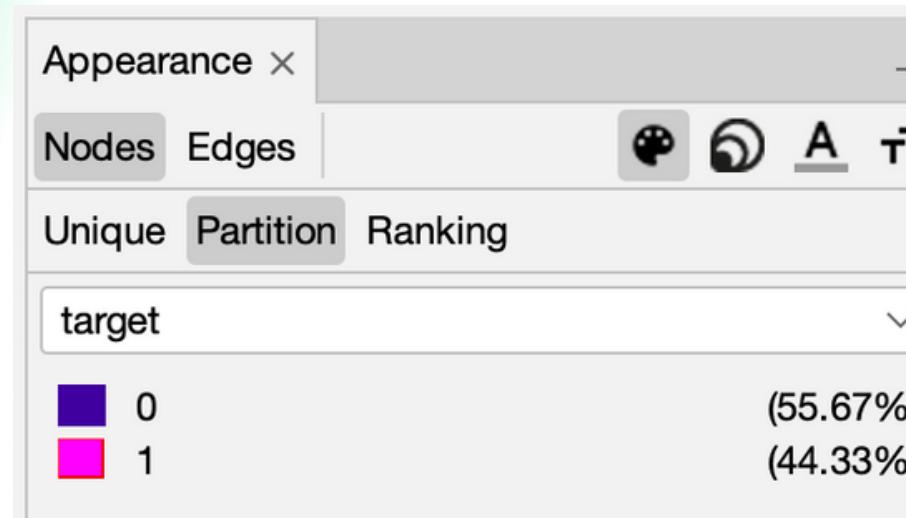
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# GENDER-BASED COMMUNITIES

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When importing the information on the target features, it was trying to understand the gender dynamics at play and if it had any influence on the network.

In examining the composition of the communities identified, it is possible to observe that there are no gender-specific communities within the network. Neither gender appears to dominate any specific community. Users congregate around artists who resonate with their individual tastes, regardless of gender.

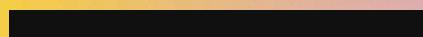


## **QUESTION 2**

### **ARE THERE GENDER-SPECIFIC COMMUNITIES, OR DIFFERENCES IN THE DISTRIBUTIONS OF MEN AND WOMEN?**

This insight suggests that the formation of the communities is based on factors other than gender. For this reason, traditional gender-based marketing initiatives may not yield the desired impact. By recognizing that shared musical passions, rather than gender distinctions, form the foundation of connections among Deezer's users, the company can devise strategies that are inclusive, impactful, and representative of its diverse user base.

On top of that, as was mentioned earlier, the prediction of the gender might not be accurate and mislead the strategy.



# **INFLUENTIAL USERS & KEY CONNECTORS**

By calculating and analyzing network metrics such as degree centrality, HUBS, and betweenness centrality it was trying to identify the best metric between all and collect the most influential users and key connectors.

## **Degree Centrality**

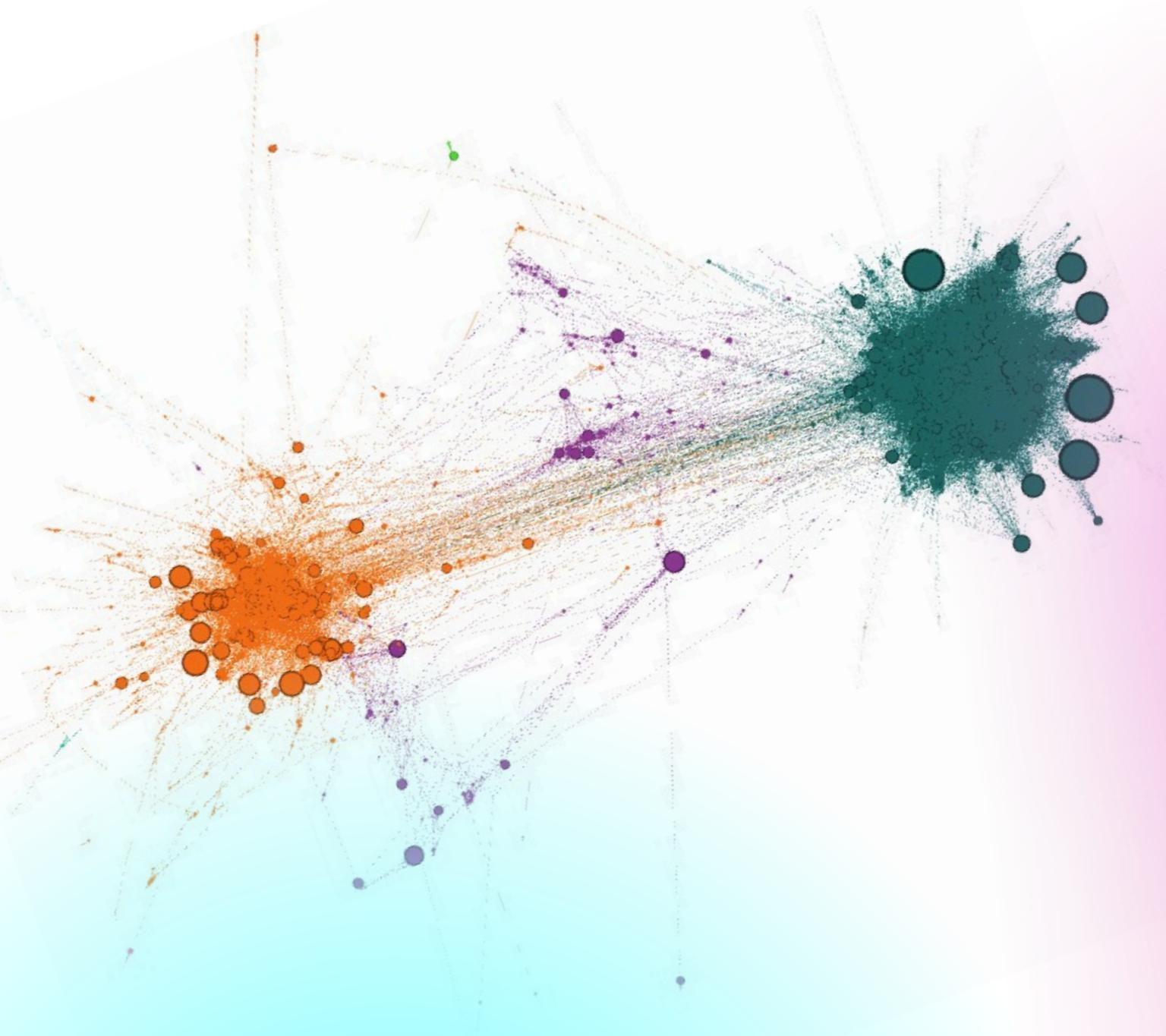
Pinpoint users with the most direct connections in the network.

## **HUBS**

Identifying the HUBS within the network.

## **Betweenness Centrality**

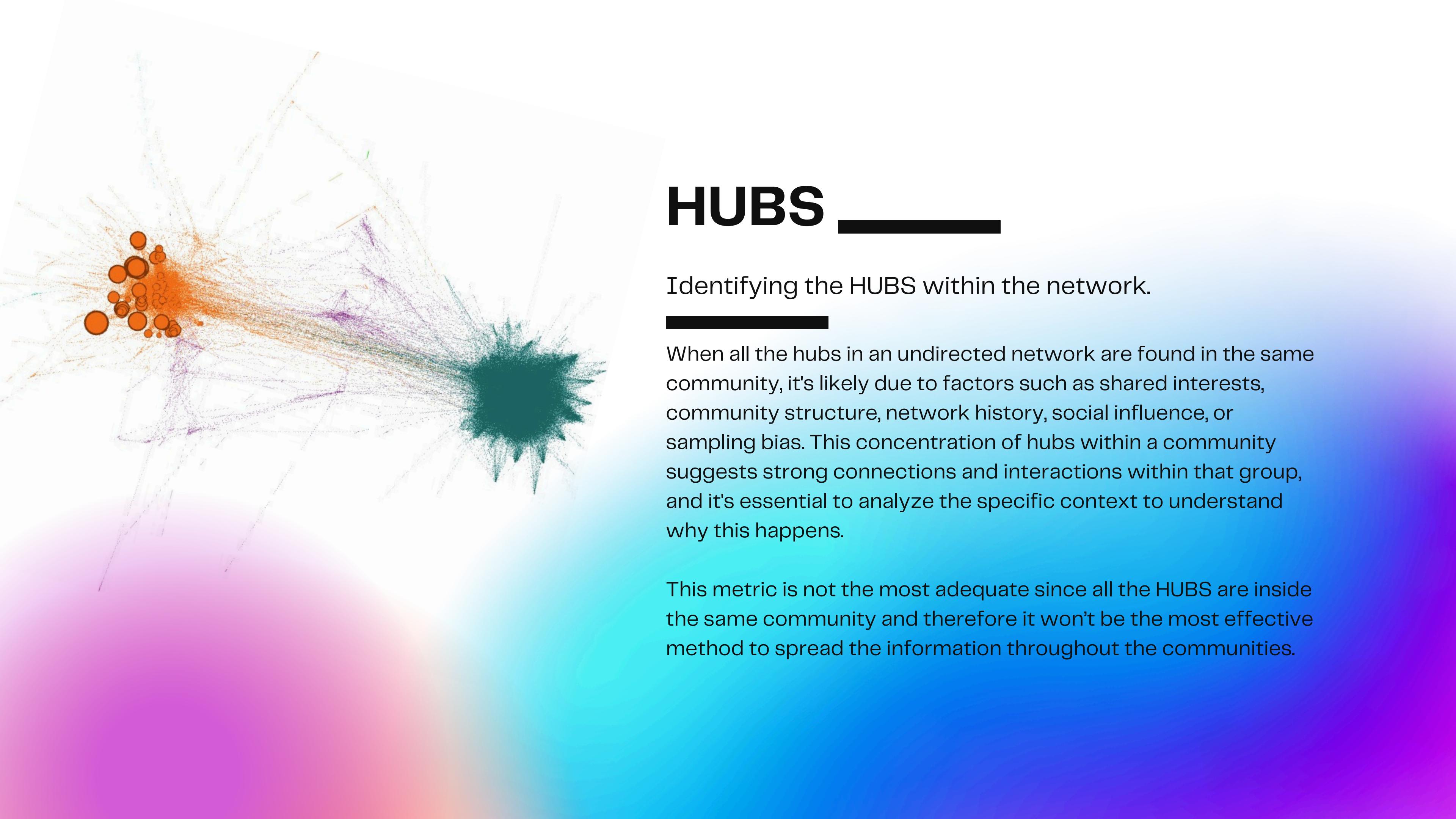
Identifies users who serve as critical bridges within the network.



# DEGREE CENTRALITY

Pinpoint users with the most direct connections in the network.

These are users who have the most followers or mutual connections. They can be important for understanding community dynamics and influence.



# HUBS

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Identifying the HUBS within the network.

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When all the hubs in an undirected network are found in the same community, it's likely due to factors such as shared interests, community structure, network history, social influence, or sampling bias. This concentration of hubs within a community suggests strong connections and interactions within that group, and it's essential to analyze the specific context to understand why this happens.

This metric is not the most adequate since all the HUBS are inside the same community and therefore it won't be the most effective method to spread the information throughout the communities.

# MOST INFLUENTIAL METRIC



## BETWEENNESS CENTRALITY

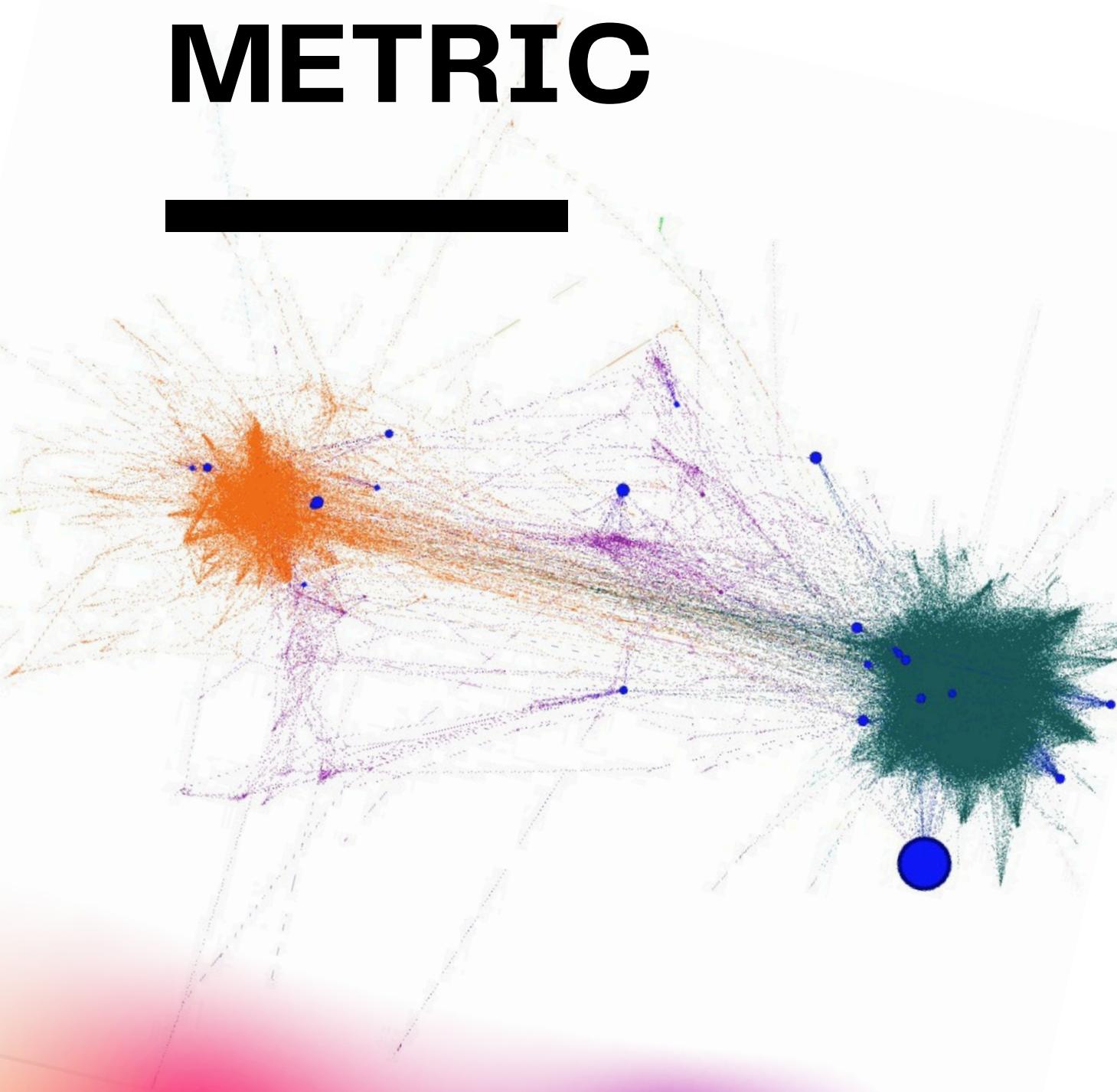
Betweenness Centrality indicates the extent to which a node lies on the paths between other nodes. Users with high Betweenness Centrality facilitate the transfer of information because they lie on the shortest paths between other users. These users may not be the most connected, yet they are strategically positioned to influence the spread of information.

## CALCULATE THE CUMULATIVE PERCENTAGE

By calculating the cumulative percentage of nodes until it reaches 50%, it was able to identify 22 users as the top influencers who can help reach half of the network..

Id	Label	target	modularity_class	betweenesscentrality	cumulative percentage
14771	14771	0	13	0.113825	11.38%
11987	11987	1	10	0.027489	14.13%
21925	21925	0	13	0.025495	16.68%
28044	28044	0	2	0.024872	19.17%
4361	4361	0	13	0.022931	21.46%
10971	10971	0	13	0.022731	23.73%
867	867	1	13	0.019995	25.73%
3296	3296	1	13	0.019979	27.73%
23143	23143	0	13	0.019278	29.66%
24904	24904	0	13	0.018061	31.47%
22581	22581	0	2	0.017663	33.23%
1925	1925	0	10	0.017397	34.97%
14942	14942	1	2	0.017199	36.69%
2518	2518	1	13	0.016687	38.36%
17527	17527	0	2	0.016657	40.03%
23914	23914	0	13	0.016318	41.66%
23372	23372	1	13	0.015957	43.25%
11484	11484	0	2	0.014855	44.74%
11599	11599	1	13	0.014817	46.22%
19445	19445	1	10	0.014808	47.70%
1	1	0	2	0.014398	49.14%
9717	9717	0	2	0.013677	50.51%

# MOST INFLUENTIAL METRIC



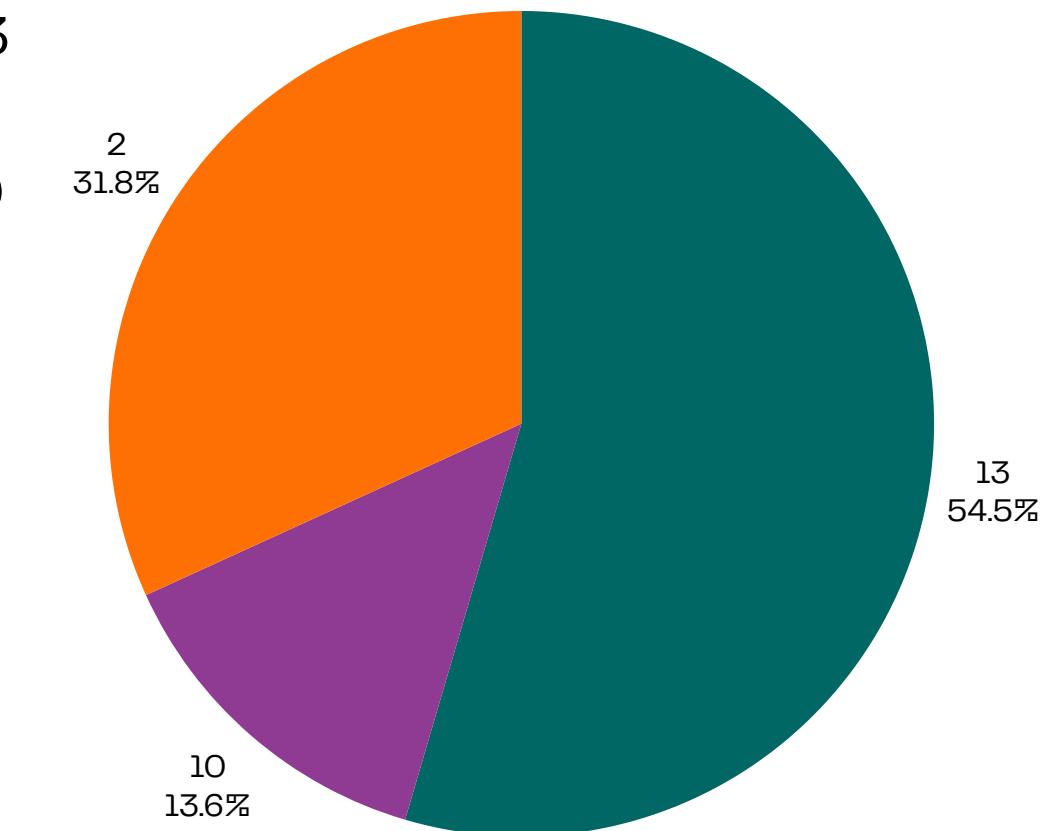
## BETWEENNESS CENTRALITY

With these 22 key users identified, these individuals are strategically positioned, holding significant potential to influence over 50% of the network, thereby playing a crucial role in Deezer's marketing strategy.

Since users with high Betweenness Centrality act as bridges within a network, by targeting the identified users, Deezer will be able to reach more users across its entire network.

We noticed that out of the 22 nodes:

- 54.5% belongs to the Community 13
- 31.8% belongs to the Community 2
- 13.6% belongs to the Community 10



# CONCLUSIONS

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## 1. Communities

Our analysis identified 29 distinct communities, with three groups standing out due to their size (13, 2, and 10).

### **Strategic recommendation:**

Develop targeted marketing campaigns catering to these communities, with a particular emphasis on communities 13, 2, and 10. Community 13 holds a significant influence on the network dynamics followed by Community 2.

Meanwhile, although Community 10 holds a small percentage, often that means more specific interests or characteristics and by identifying them it is possible to tailor a specialized strategy to engage with these users.

## 2. Gender-based communities

Our analysis revealed that the formation of communities is based on factors other than gender. For this reason, traditional gender-based marketing initiatives may not yield the desired impact.

### **Strategic recommendation:**

Deezer should recognize that shared musical passions, rather than gender distinctions, form the foundation of connections among the platform's users. By doing so, the company can devise strategies that are inclusive, impactful, and representative of its diverse user base.

## 3. Influencers

Our analysis identified 22 key users, who have the potential to influence over 50% of the network, thereby playing a crucial role in Deezer's marketing strategy.

### **Strategic recommendation:**

Deezer should engage these key users through unique incentives, exclusive content, and early access to new features. Endorsements from these users could enhance the conversion rate from free plans to paid subscriptions.

**THANK YOU FOR  
YOUR ATTENTION!**

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