

MDSAA

Master's Degree Program in
Data Science and Advanced Analytics

Beyond Streaming: How TikTok is Empowering Emerging Musicians

Lucas Costelha Lopes

Master Thesis

presented as partial requirement for obtaining a Master's Degree in Data Science and Advanced Analytics

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

BEYOND STREAMING: HOW TIKTOK IS EMPOWERING EMERGING MUSICIANS

by

Lucas Costelha Lopes

Master Thesis presented as partial requirement for obtaining the Master's Degree in Data Science and Advanced Analytics, with a specialization in Business Analytics

Supervised by

Nuno António, NOVA IMS

November, 2023

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledged the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Lucas Costelha Lopes

Lisbon, 2nd of November 2023

DEDICATION

This dissertation is dedicated to my parents and brother, who, despite the physical distance, have always been there for me. Thank you for your guidance, support, and sacrifices that made my journey possible.

Your unwavering belief in my abilities has been a constant source of strength and determination.

Obrigado.

ACKNOWLEDGMENTS

To Professor Nuno António, thank you for your guidance, mentorship, and willingness to help. Your contribution was paramount to the success of this project.

Thank you to every teacher and professor who has ever supported and pushed me to strive for more.

To my friends, thank you for the camaraderie, relentless support, occasional much-needed distractions, and, above all else, for walking this path with me.

To my family, my deepest appreciation for your constant encouragement and unconditional support. Without it, none of this would have been possible.

Last but not least, thank you to all the artists who, through words and melodies, make the world a better place.

ABSTRACT

The era of digital innovation has fundamentally transformed the societal landscape and business conduct. From the rise of online giants like Amazon to the emergence of professions built around video-sharing platforms such as YouTube, every aspect of our daily lives has experienced some degree of change. The music industry is no exception. In recent years, due to its digitization, the commodification of music has been profoundly reshaped, indicating a reconfiguration of the established norms, this time in favour of the artists themselves.

Through social media, independent musicians can now promote themselves, avoiding the need to resort to record labels that have historically controlled the industry. This possibility led to a substantial decrease in these corporations' profits due to the decline in record contracts and the consequent cut back in the royalties from music streaming platforms.

This study focused on 67 rising artists who charted on Spotify's Top 200 for the first time in 2021. The data used includes the number of Spotify's monthly listeners and TikTok's number of videos made monthly using the artists' songs. To study the relationship between the two platforms as well as TikTok's contribute to the artist's career, methods such as the Spearman Correlation Coefficient, Hierarchical Clustering, and Statistical Inference were used, as well as data visualization of each artist's key statistics. Results show a correlation between TikTok and Spotify streaming numbers, but more importantly, show that short-term virality on TikTok leads to the creation of a sustained listener base on Spotify. These results help artists better understand the impact social media, more specifically TikTok, has on their career and how they can leverage this in their favour. The business implications of this study highlight TikTok's rise in the music industry, especially as a music discovery tool.

KEYWORDS

Music Industry; Social Media; Spotify; TikTok; Music Discovery

Sustainable Development Goals (SDG):



TABLE OF CONTENTS

1. Introduction.....	1
1.1. Background And Problem Identification	1
2. Literature Review	3
3. Methodology	5
3.1. Research Design	5
3.2. Methods	5
4. Results And Discussion	8
4.1. Spearman Correlation Coefficient.....	8
4.2. Hierarchical Clustering	11
4.3. Statistical Inference Of Distributions	13
4.4. Graphical Analysis.....	14
5. Conclusions.....	15
6. Limitations And Recommendations For Future Research.....	17
Bibliographical References	18
Appendix A (Artist Identification).....	22
Appendix B (Spearman Correlation Coefficient)	23
Appendix C (Ethics Committee Approval)	25

LIST OF FIGURES

Figure 1 – Research model	5
Figure 2 – Spotify Monthly Listeners vs TikTok Monthly Videos – Artist 30 (2021)	10
Figure 3 – Hierarchical Clustering dendrogram: TikTok videos	11
Figure 4 – Scatterplot: Spotify Listeners vs TikTok Videos (2021)	12
Figure 5 – Spotify Monthly Listeners vs TikTok Monthly Videos – Artist 67 (2021)	14

LIST OF TABLES

Table 1 – Spearman Correlation Coefficient Standards	8
Table 2 – Classification of resulting clusters	12
Table 3 – Artist Identification.....	22
Table 4 – Spearman Correlation Coefficient	23

LIST OF ABBREVIATIONS AND ACRONYMS

MI	Music Industry
SML	Spotify Monthly Listeners
STL	Spotify Total Listeners
TMV	TikTok Monthly Videos
TTV	TikTok Total Videos

1. INTRODUCTION

For years, the music industry was under almost total control of traditional record labels, with listeners' preferences being influenced by whatever they put in circulation (Fountain, 2021). However, over the last 30 years, the way music is made and distributed has shifted, largely due to the rise of the internet and mobile devices, which created the possibility for a new type of business: the streaming service (Vonderau, 2019). Moreover, the early 2000s rise of MP3 files and the widespread use of illegal platforms such as Pirate Bay for downloading music forced the industry to adapt (Hracs, 2012).

The need for change was evident. Services like Napster, which facilitated the sharing of copyrighted music files, saw a tremendous increase in their user base (Robinson & Halle, 2002), with this one, in particular, attracting 60 million users by 2001, with no advertising whatsoever (Leyshon, 2003). It would be a matter of time until music streaming giants like Spotify, a company with almost 430 million users and over 9 billion dollars in revenue (*Spotify Revenue 2013-2022 / Statista, 2022*), were born.

Alongside the rapid rise of social media platforms, such as Facebook, Instagram, and later TikTok, these music streaming services revolutionized the music industry by providing quick, easy, and reliable access to new music artists on a daily basis (Spilker, 2017). This transition completely redefined music consumption worldwide, especially considering that it introduced the "Free vs. Premium" music streaming concept, reformulating the industry's business model and how artists are paid (Aguar, 2017).

1.1. BACKGROUND AND PROBLEM IDENTIFICATION

The digitization of the music industry forced its usual players to adapt. Instead of purchasing music through vinyl or CDs, people could now pay for streaming services or even stream for free on websites like YouTube (Hampton-Sosa, 2017). The shift was so radical that, according to the International Federation of the Phonographic Industry (IFPI), as of 2022, only 10% of music consumption was made through purchased music, compared to over 51% on dedicated streaming platforms (Bayley, 2022). The reason is evident, considering that for a flat monthly fee, users have unlimited access to over 70 million songs (Ingham, 2020), over the usual ten or twenty that would come on a CD. Perhaps more importantly, Spotify has had a significant

role as a music discovery tool and a launch pad for aspiring artists (Prey et al., 2022), providing them with a direct path to new listeners and facilitating the creation of a solid fan base.

However, not everything that derived from these changes was positive. Contrary to the benefits reaped by the audience, artists have repeatedly complained about the unsustainability of the new business model (Sisario, 2021). This model, called Pro Rata has become the industry standard for major streaming services like Spotify or Apple Music and heavily favours artists with mass appeal (Sisario, 2021). Pro Rata is a Latin term that essentially means “in proportion to”, indicating that something is assigned according to the share of ownership of the whole. Under this method, the subscription fees of all subscribers are aggregated in one big royalty pot, which is then proportionally divided based on the artist’s streams (Lei, 2023). If, say, musician X had 5 percent of all Spotify streams on a given month, he or whoever owns the music rights gets 5 percent of the pot, meaning that, effectively, he gets 5 percent of each user’s money, even those who have never listened to his tracks. Moreover, in the case of many artists, the music produced is either partially or totally owned by a record label, which collects most of the streaming royalties, in some cases up to 85% (Schwartz & Clark, 2020). All this makes it extremely difficult to have a sustainable career in music and solely rely on it as a primary income source.

Nonetheless, a new phenomenon has been registered. Thanks to social media platforms like TikTok, smaller artists have been able to make their songs “go viral” and then transition to Spotify, amassing huge numbers of streams in what has been called the TikTok-To-Spotify Pipeline (Whateley, 2023). For many, what usually follows is a contract with a major record label (Perrett, 2021). The difference is that artists now have leverage to negotiate, considering that one of the key offers from Record Labels, marketing and promotion, is now secured by the artist’s self-made popularity on TikTok. This leverage completely shifts the tide of the industry in favour of smaller artists, enabling them better contract terms. However, overnight success is not guaranteed, and it is still not clear if sudden virality on TikTok is equivalent to a steady number of streams and the creation of a fan base on streaming platforms.

Considering the above, this study aims to better understand and investigate whether there is a relationship between virality on TikTok and popularity on Spotify and thus answer the research question “Does TikTok help aspiring artists become successful in the music industry?”

2. LITERATURE REVIEW

Considering how recent TikTok itself is, not many relevant studies have been carried out to quantify its impact on aspiring artists' careers, let alone by comparing its behaviour with music streaming platforms and the overall music industry. There have, however, been some attempts at measuring how effective it is as a self-promotion tool for already established artists, as well as at determining a relationship between a song's number of streams on Spotify and its popularity on various platforms. These studies will be discussed and analysed during this literature review, and their findings will serve as references for this investigation.

According to Colley et al. (2022), few notable associations exist between Spotify's descriptive popularity metrics and other platforms' popularity metrics. The authors aggregated data from several sources, including Google Trends, YouTube, Twitter, Billboard, and TikTok, and measured the correlation between them. For TikTok, in specific, an attempt was made to establish a connection between Spotify metrics such as danceability, energy, tempo, etc., and TikTok's popularity metrics, such as likes, share count, or play count, from songs of 20,000 trending videos, that were then cross-referenced with the Spotify songs dataset resulting in 358 unique songs.

Another study analysed the content posted to TikTok by five small independent artists, focusing on the four months surrounding the release of a new song (Mallard, 2023). Data collected included likes, comments, views, shares, and followers of the respective TikTok accounts and Spotify monthly listeners and stream count for the song released. The author concluded that artists with higher TikTok followers and Spotify listeners' conversion rates also showed much larger fan engagement through user-generated content that resorted to the artist's song.

A similar investigation by Jorgenson (2022) sought to identify the trends in mainstream pop music promotion by comparing the metrics of five of the top ten songs on the Billboard 2021 Year-End Hot 100 chart, including its ranking; Spotify Monthly Listeners and streams; with TikTok's hashtag views and number of sound uses. The author concluded that there is indeed a strong correlation between the artists' musical success and TikTok's popularity. Besides that, the app has been capitalizing on this by creating its own music division, specialized in advising

artists and labels on how to promote themselves in order to establish itself as a reference in the music industry.

In a different study, Tintiangko et al. (2023), attempted to understand the usage of TikTok and its contributions to the career of artists, by interviewing 11 Filipino musicians between December 2021 and February 2023. Despite concluding that TikTok is an essential outlet that artists can strategically use to advance their careers, musicians also reported the added burden of having to maintain their presence on another social platform.

Research on this topic is limited, but the insights already collected could be beneficial for further investigation. Two of the studies presented were based on very small sample sizes of deliberately picked artists (Mallard, 2023), (Jorgenson, 2022). Moreover, in one of those studies (Jorgenson, 2022), the artists picked were already well established, which could mean that the relationship identified between their musical success and TikTok presence was not indicative of a real correlation, but merely derives from the artists' presence on other social media channels. This issue highlights the importance of selecting unknown artists for future research in order to only include artist whose data has not yet been affected by previous success. Another key takeaway was the importance of timing for measuring the contribution of TikTok to artists' success as they usually become more present on social media right before and after the release of a new song, as does the content related to them and their songs. In addition, it is also worth acknowledging the fact that TikTok is trying to affirm itself as a music company by contributing to the growth of musicians' careers (Leight, 2019).

To summarize, based on existing literature, it is possible to point to an apparent relationship between TikTok and music success seems to exist. However, studies to date also emphasise how little knowledge there is on the topic. This research aims to fill that gap by providing a data-driven and evidence-based approach.

3. METHODOLOGY

3.1. RESEARCH DESIGN

The ultimate goal for this research topic is to understand if social media platforms, specifically TikTok, can be leveraged as marketing and music discovery tools, contributing to the growth and success of aspiring music artists. The proposed approach, demonstrated in Figure 1, is to, through an exploratory and data-driven approach, identify patterns in music consumption and virality on both Spotify and TikTok and understand the effectiveness of the so-called “TikTok to Spotify pipeline” (Caswell, 2022). With this phenomenon, artists are able to transfer their TikTok virality to music streaming platforms.

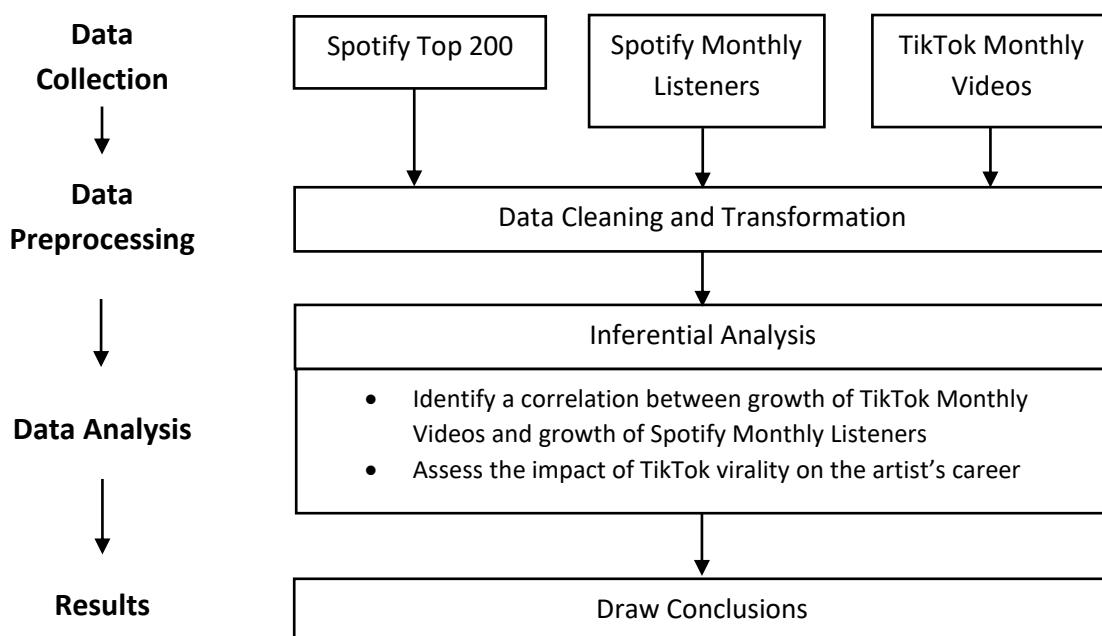


Figure 1 - Research design

3.2. METHODS

The first step in conducting the study was to gather data that would be significant to its purpose. Considering the goal of determining the contribution of TikTok to artists' virality in music streaming platforms, the first step consisted of identifying a series of relevant performers. The Spotify Top 200, which is currently one of the most relevant pop charts (M. Harris et al., 2019), was used for this list of the 200 most streamed songs on Spotify each week. This data was extracted from Spotify.Charts (*Spotify Charts - Fans make Spotify Charts*), a platform created by Spotify that enables users to view and extract data regarding the current trends in music streaming and track top songs and artists. During 2021, over a thousand songs,

1102 to be exact, charted on Spotify's Top 200. Among the artists responsible for those songs, 454 different ones were identified. Considering the goal of analysing TikTok's potential as a career starter, the ones that had already established careers and had previously charted were dismissed, leaving a sample of 181 emerging artists.

From this point on, it was necessary to collect historical data about these artists, from both Spotify and TikTok, in order to establish comparisons and find trends. Unfortunately, neither of these companies makes this data available to the general public, forcing the usage of third-party providers, such as Chartmetric¹, SoundCharts², or Songstats³. All these platforms require some sort of access fee, which can amount to hundreds of euros per month for the complete data catalog. However, Songstats (Songstats, n.d.) provides a trial period in which users are allowed partial access to the platform, which contains a substantial amount of information. From this platform, two key variables were extracted to conduct the study: Spotify monthly listeners, consisting of the total number of unique individuals who streamed one of the artist's songs at least once within the last 28 days, and TikTok monthly videos, consisting of the total number of TikTok videos made with the artist's songs. It is vital to mention that the availability of data on this platform conditioned the study's time frame to 2021, considering that for periods prior to that, there was no TikTok data available. Furthermore, for periods after that, there was no Spotify data available either. Moreover, considering how "small" some artists are, data regarding only 67 of them was available.

Despite the constraints, the final dataset was created, containing a sample of 67 artists, identified in Appendix A, who charted from January 1st to December 31st of 2021, as well as their respective number of Spotify monthly listeners and TikTok monthly videos made with their songs.

The data preprocessing section was done in Excel and Python. For data manipulation and visualization, libraries including NumPy (C. R. Harris et al., 2020), Pandas (*Pandas-Dev/Pandas*, 2022) (McKinney, 2010) and Matplotlib (Hunter, 2007) were used.

¹ <https://chartmetric.com/pt>

² <https://soundcharts.com/>

³ <https://songstats.com/welcome>

To perform the inferential analysis itself – determine if there is an association between popularity on TikTok and streaming increase in Spotify – Python was again used, specifically the Scipy library (Virtanen et al., 2020), to calculate the Spearman correlation coefficient of Spotify monthly listeners and number of videos made with the artist's songs on TikTok. The choice for Spearman over Pearson lays in the fact that the data is not normally distributed. Moreover, as normality in the data cannot be assumed, the Kruskal-Wallis test was used to determine if there were statistically significant differences between the median of the groups - the number of Spotify listeners and the number of TikTok videos made with the songs of the respective artists for the year of 2021. The same library, SciPy (Virtanen et al., 2020), was used to perform this test.

Additionally, hierarchical clustering was used to find distinct groups of artists and identify their differences. The clusters were built resorting to the Spotify Monthly Listeners count, using the libraries previously mentioned, Pandas and SciPy, and an extra package from this last library was specifically used to perform the hierarchical clustering (Bar-Joseph et al., 2001). Lastly, a graphical analysis of the metrics used was performed for each artist in order to identify timing patterns and similarities regarding the peaks in popularity on Spotify and TikTok.

4. RESULTS AND DISCUSSION

This chapter presents and discusses the results obtained through the application of the previously mentioned methods. These results highlight the key findings extracted from the outlined techniques and provide insights into the implications they could have on unknown artists' careers and the music industry.

4.1. SPEARMAN CORRELATION COEFFICIENT

To study the relationship between the 67 artists' number of Spotify monthly listeners and TikTok monthly videos made with their songs, the Spearman Correlation Coefficient was calculated (Appendix B). Table 1 summarizes the correlation coefficients based on the grading standards. Of the three most commonly used interpretations of the coefficient values (Akoglu, 2018), Dancey & Reidy's (Dancey & Reidy, 2007) was the one chosen considering the context of the problem.

Table 1 - Spearman Correlation Coefficient Standards

Grading Standards	Correlation Degree	Number of Artists
$r = 1$	Perfect Positive	0
$1 > r \geq 0.7$	Strong Positive	13
$0.7 > r \geq 0.4$	Moderate Positive	15
$0.4 > r > 0$	Weak Positive	25
0	None	0
$0 > r > -0.4$	Weak Negative	13
$-0.4 \geq r > -0.7$	Moderate Negative	1
$-0.7 \geq r > -1$	Strong Negative	0
$r = -1$	Perfect Negative	0

As visible in Table 1, 53 of the 67 artists show a positive correlation between the Spotify monthly listeners and TikTok monthly videos made with their songs, totalling almost 80%. Of the aforementioned 53 artists, and disregarding those where the positive correlation is weak, 52% of them show either a moderate or strong positive correlation.

To further assess the statistical significance of this test, the p-value was calculated for three different significance levels. At each level, the number of artists for which the null hypothesis (H_0 : there is no relationship between the number of videos made on TikTok and the number of monthly streamers on Spotify) was rejected, concluding that there is indeed a statistically significant correlation, varied. At the 1% significance level, 12 artists showed a statistically significant coefficient, while at 5% and 10%, 23 and 26 artists respectively, had a statistically significant correlation coefficient.

Of the 12 artists whose correlation coefficient was statistically significant at the 1% significance level, all had correlation coefficients over 0.7, i.e., a strong positive correlation. Moreover, of the 23 whose correlation coefficient was statistically significant at the 5% significance level, all had a positive correlation superior to 0.6 except for one artist, who had a negative correlation inferior to 0.6. The occurrence is similar at the 10% significance level, where the other three artists show positive correlation coefficients superior to 0.5 when compared to the previous level.

Considering the overall sample of 67 artists and that there is a statistically significant correlation between the two variables, at a 5% significance level, for only 23 artists, one could argue that TikTok virality has no actual contribution to growth on Spotify. However, the Spearman correlation coefficient, for measuring the strength and direction of association between two variables, can simultaneously be extremely suitable and harmful to this analysis.

Upon further inspection of the data, it was possible to conclude that in the case of many artists, there is indeed a correlation between the artists' Spotify monthly listeners and TikTok monthly videos made with their songs, but only until a specific point in time, which of course varies depending on the artist. In practice, both variables behave very similarly until the artists' songs reach a peak number of views on TikTok. From this point onward this number drops dramatically. In contrast, the number of Spotify monthly listeners drops significantly less, as illustrated in Figure 2.

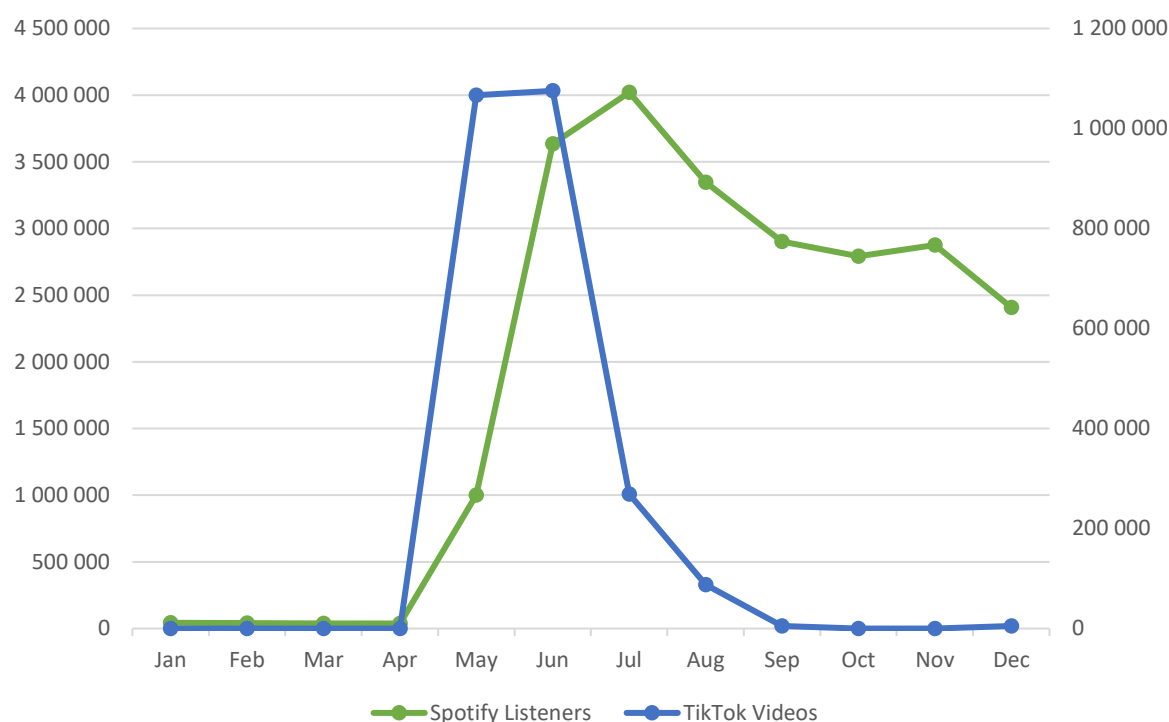


Figure 2 – Spotify Monthly Listeners vs TikTok Monthly Videos – Artist 30 (2021)

In this case, artist 30's TikTok views suddenly rose between April and May, hitting an all-time high in June. During that same time, the Spotify number of monthly listeners reached 3.76 million users in June, compared to only 37,000 in April. On the other hand, an impressively massive drop in the artist songs' videos on TikTok follows. However, despite the drop in Spotify's monthly listeners, its reduction is nowhere near as significant as TikTok's. For this artist in particular, the resulting Spearman correlation coefficient obtained was 0.640, which is considered moderate by the standard previously presented.

Moreover, this value was only considered statistically significant at 5% and 10% significance levels. These levels could imply that the truth may differ despite what some coefficients and their statistical significance might appear to show. Low coefficients do not necessarily imply that TikTok did not contribute to artists' success on Spotify. They may only reveal that the variables did not have similar behaviour throughout most of the studied period.

This phenomenon, however, could be a clear indicator that: TikTok virality leads to sustained streaming numbers and the creation of a solid fan base on Spotify, which ultimately is the goal of aspiring artists. Moreover, once this surge in streams triggers the Spotify algorithm, it creates a snowball effect, leading to songs being placed in all sorts of playlists, whether

editorial, user, or algorithmically generated, thus increasing the artists' visibility among the app users.

4.2. HIERARCHICAL CLUSTERING

To further explore the data, hierarchical clustering was performed to understand whether any groups of artists show different behaviours in their growth in terms of Spotify vs TikTok numbers. Using the total number of TikTok videos made with each artist's songs, the results were plotted, as shown in Figure 3.

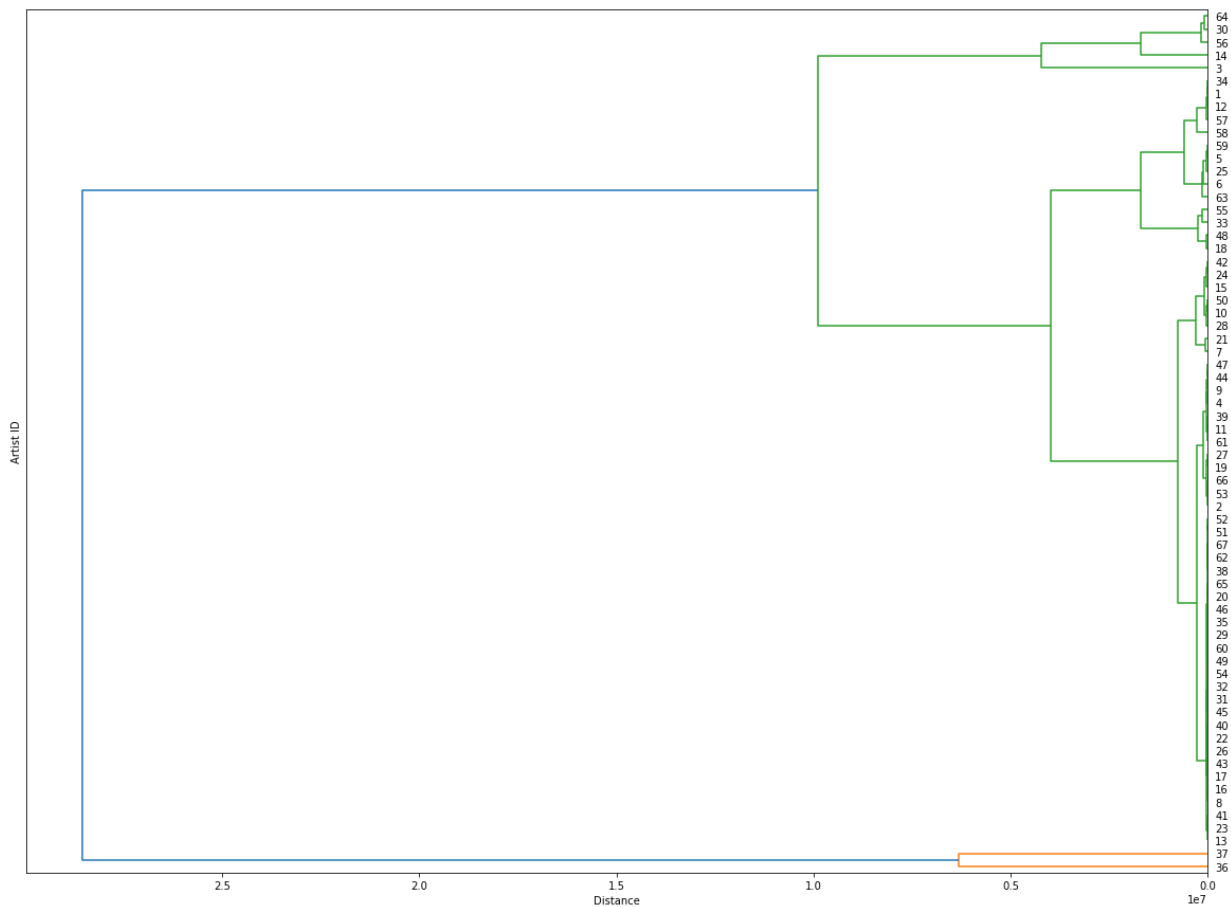


Figure 3 – Hierarchical Clustering dendrogram: TikTok videos

From the above dendrogram, it is possible to identify 3 clusters, or even six if the level of similarity between them is increased. Considering the number of clusters is 3, their respective distribution and classification are the following (Table 3):

Table 2 - Classification of resulting clusters

Cluster	Number of Observations (Artists)	Number of videos made (v)
A	2	$v > 10\,000\,000$
B	5	$10\,000\,000 > v > 2\,000\,000$
C	60	$v < 2\,000\,000$

In cluster A, it is possible to find artists whose songs were used in more than 10 million videos in 2021. Cluster B includes artists whose songs were used in more than 2 million but less than 10 million videos while cluster C contains artists whose songs were used in less than 2 million videos.

Upon further observation of the specific artists of each cluster, it became evident that the artists with the most significant number of videos on TikTok were not necessarily those who would amass the largest number of Spotify monthly listeners (Figure 4).

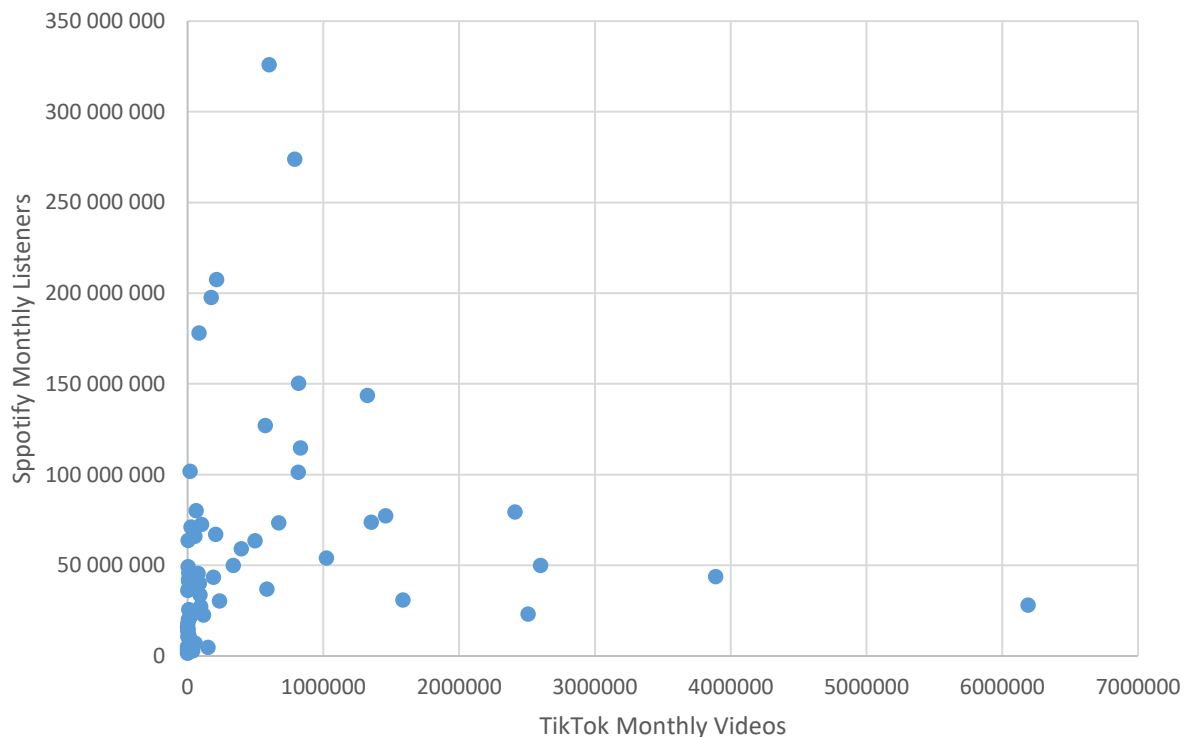


Figure 4 - Scatterplot: Spotify Listeners vs TikTok Videos (2021)

In the context of this study, and considering conclusions reached based on previous analysis, this finding could indicate two things. Firstly, for some of these 67 emerging artists, TikTok might not have been the cause of the growth in Spotify monthly listeners, as other external factors could have also contributed to the surge in popularity. These factors could include featuring another artist's song, opening another already-established artist's concert, or even presence on other social media platforms. Secondly, it could also indicate that artists do not need to become full-time creators on TikTok, given that a single and isolated peak in virality could be sufficient to create a solid fanbase of Spotify listeners.

4.3. STATISTICAL INFERENCE OF DISTRIBUTIONS

To determine if the artists' number of Spotify monthly listeners and TikTok monthly videos made with their songs have a similar distribution, the Kruskal-Wallis test, a statistical test that determines if the medians are equal across the samples (H_0), was used. Kruskal-Wallis is the non-parametric test equivalent to the one-way ANOVA, meaning it does not assume normally distributed data.

Rejecting the H_0 null hypothesis (H_0) means that at least one of the groups being compared has a different median, thus providing sufficient evidence to conclude that at least one group has a different distribution. For this study, a p-value inferior to 0.0001 ($P < 0.0001$) was considered the threshold for rejecting the null hypothesis. Hence, a p-value superior to that value will indicate insufficient evidence to say there is a statistically significant difference between the distribution of the groups. The results indicate significant differences between the variables, Chi-Square (2, $N = 67$) = 95.79565357293137, $p < .01$, $p = 1.273750523217832e-22$. Therefore, the null hypothesis is rejected, and it is possible to conclude that there are significant differences between the median of the artist's number of Spotify monthly listeners and TikTok monthly videos made with their songs.

These results indicate that the number of TikTok videos made with the artists' songs does not follow the same distribution as their number of Spotify monthly streams, which reinforces what has been previously stated: despite the loss of virality on TikTok, artists are still able to maintain a solid number of streams on Spotify.

4.4. GRAPHICAL ANALYSIS

For a more solid understanding of the impact the number of TikTok monthly videos made with the artists' songs had on the overall number of Spotify monthly listeners, charts with these variables were plotted for every single artist. From the individual analysis, it was clear that for some artists, there was a rapid growth in Spotify's monthly listeners immediately preceded by or even concurrent with the growth of the number of TikTok videos made with the artists' songs as is the case of artist 67, as illustrated in Figure 5.

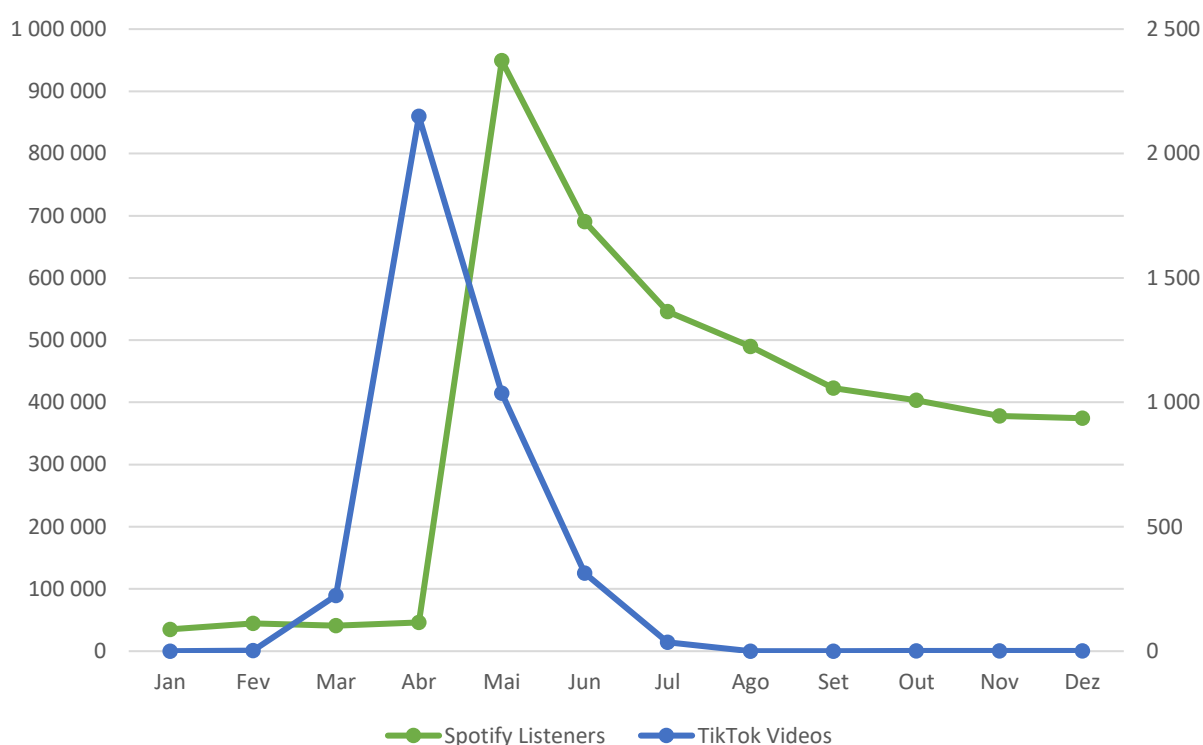


Figure 5 - Spotify Monthly Listeners vs TikTok Monthly Videos – Artist 67 (2021)

As a matter of fact, this is observable in 31 of the 67 artists analysed. Despite not being able to claim with absolute confidence that in the case of these artists, TikTok was the main, if not the sole contributor to success on Spotify, the data still indicates there is a strong case in favour of this possibility.

5. CONCLUSIONS

Both music and, more recently, social media have become part of our everyday lives, so much so that in 2021, over 694 million songs were streamed and 167 million TikTok videos were watched in a single minute, in the United States alone (*Chart: A Minute on the Internet in 2021 / Statista, 2021*). With so much content being constantly produced and diffused, it is difficult for consumers to absorb it all and almost impossible for artists to stand out from the crowd. Considering the relevance of this evidence, the study explored the multifaceted relationship between TikTok virality and its impact on artist's success on streaming platforms such as Spotify, aiming to answer the question "Does TikTok help aspiring artists become successful in the music industry?".

The research findings show that there is indeed a positive correlation between the number of times an artist's song is used on TikTok and the number of Spotify monthly listeners of that same artist. However, this correlation does not necessarily imply causality, i.e., the increase in Spotify's monthly listeners might not have been caused by popularity on TikTok alone but instead by the added contribution of external factors. Interestingly, the study also revealed that the effects of a surge in TikTok virality extend beyond short-term popularity on Spotify. These findings mean that temporary success on TikTok can lead to sustained streaming numbers on Spotify and, more importantly, a wider audience as well as the creation of a solid fan base. This association proves the value of social media platforms as a music discovery tools and as new intervenors in the music industry, with tremendous potential to significantly contribute to its reshaping, this time, in favour of music artists.

Moreover, through the data analysed, it was possible to conclude that artists who were able to gather more fans on Spotify (measured by monthly listeners) did not always have a more considerable number of TikTok videos made using their songs. This divergence reinforces two key points: the existent correlation does not necessarily imply causality; secondly music artists do not need to become full-time TikTok content creators after going viral to maintain a steady number of Spotify streams.

This study differed from others by analysing a broader sample of artists, applying different criteria to their selection, and using a data-driven approach. The research findings provide multiple conclusions that contribute to the literature and show that there is an evident

relationship between TikTok and Spotify's success. Nonetheless, it is not yet clear if TikTok's success alone is a guarantee of streaming success.

This study also provides the industry with valuable insights into what changes could be expected in years to come. As artists can currently use TikTok as leverage to obtain better record deals, labels should consider adapting, given that there is now a free alternative for one of the main services they provide, marketing. Moreover, streaming platforms like Spotify should become aware of the importance of TikTok, not only as a music discovery tool, but also, as a potential future competitor in the streaming market.

6. LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Like many studies, this faced a series of limitations that conditioned the extent of its scope. The first set of constraints involved deciding the appropriate approach to the subject at hand, i.e., how to gauge the effect and contribution of an artist's TikTok virality to music streaming platforms and which metrics and criteria to use as success-defining. Both these terms, virality and success, are ambiguous and subject to bias when analysed. This limitation was even more magnified by the lack of literature available and previous research on this topic, the existence of which could have provided guidelines and insights for a better investigation. The second set of constraints occurred during the data collection stage. Collecting data from platforms such as Spotify and TikTok was unexpectedly more complex than initially anticipated, as none of these platforms provided a substantial part of the information required for the study. As a result, third-party providers were necessary; however, most of these required a subscription fee to access the data, with only one offering a free trial period, granting access to limited information.

For future research, it would be beneficial to consider not only different types of variables, such as the artist's global rank and number of playlists their songs were included in, among others but also their presence on other social media platforms as well as external factors that could have contributed to their success. Likewise, extending the study's time frame and increasing the number of artists included could lead to a better understanding of the correlation between the platforms.

There is, in fact, little research on the influence of TikTok on the music industry, which could be justified by the platform's recency. However, its importance to artists' careers has become abundantly clear. Hence, further studies should focus on measuring TikTok's real impacts and provide artists with insights on how to leverage the platform in their favour.

BIBLIOGRAPHICAL REFERENCES

Aguiar, L. (2017). Let the music play? Free streaming and its effects on digital music

consumption. *Information Economics and Policy*, 41, 1–14.

<https://doi.org/10.1016/j.infoecopol.2017.06.002>

Akoglu, H. (2018). User's guide to correlation coefficients. *Turkish Journal of Emergency*

Medicine, 18(3), 91–93. <https://doi.org/10.1016/j.tjem.2018.08.001>

Bar-Joseph, Z., Gifford, D. K., & Jaakkola, T. S. (2001). Fast optimal leaf ordering for

hierarchical clustering. *Bioinformatics*, 17(suppl_1), S22–S29.

https://doi.org/10.1093/bioinformatics/17.suppl_1.S22

Bayley, J. (2022, November 17). *IFPI releases Engaging with Music 2022 Report*. IFPI.

<https://www.ifpi.org/ifpi-releases-engaging-with-music-2022-report/>

Caswell, E. (2022, May 31). *We tracked what happens after TikTok songs go viral*. Vox.

[https://www.vox.com/videos/23148752/viral-tiktok-musicians-songs-data-](https://www.vox.com/videos/23148752/viral-tiktok-musicians-songs-data-investigation)

[investigation](https://www.vox.com/videos/23148752/viral-tiktok-musicians-songs-data-investigation)

Chart: A Minute on the Internet in 2021 | Statista. (n.d.). Retrieved October 24, 2023, from

[https://www.statista.com/chart/25443/estimated-amount-of-data-created-on-the-](https://www.statista.com/chart/25443/estimated-amount-of-data-created-on-the-internet-in-one-minute/)

[internet-in-one-minute/](https://www.statista.com/chart/25443/estimated-amount-of-data-created-on-the-internet-in-one-minute/)

Colley, L., Dybka, A., Gauthier, A., Laboissonniere, J., Mougeot, A., Mowla, N., Dick, K., Khalil,

H., & Wainer, G. (2022). Elucidation of the Relationship Between a Song's Spotify

Descriptive Metrics and its Popularity on Various Platforms. In H. V. Leong, S. S.

Sarvestani, Y. Teranishi, A. Cuzzocrea, H. Kashiwazaki, D. Towey, J. J. Yang, & H.

Shahriar (Eds.), *2022 IEEE 46th Annual Computers, Software, and Applications*

Conference (compsac 2022) (pp. 241–249). IEEE.

<https://doi.org/10.1109/COMPSAC54236.2022.00042>

- Dancey, C. P., & Reidy, J. (2007). *Statistics Without Maths for Psychology*. Pearson Education.
- Hampton-Sosa, W. (2017). The impact of creativity and community facilitation on music streaming adoption and digital piracy. *Computers in Human Behavior*, 69, 444–453. Scopus. <https://doi.org/10.1016/j.chb.2016.11.055>
- Harris, C. R., Millman, K. J., van der Walt, S. J., Gommers, R., Virtanen, P., Cournapeau, D., Wieser, E., Taylor, J., Berg, S., Smith, N. J., Kern, R., Picus, M., Hoyer, S., van Kerkwijk, M. H., Brett, M., Haldane, A., del Río, J. F., Wiebe, M., Peterson, P., ... Oliphant, T. E. (2020). Array programming with NumPy. *Nature*, 585(7825), Article 7825. <https://doi.org/10.1038/s41586-020-2649-2>
- Harris, M., Liu, B., Park, C., Ramireddy, R., Ren, G., Ren, M., Yu, S., Daw, A., & Pender, J. (2019). *Analyzing the Spotify Top 200 Through a Point Process Lens* (arXiv:1910.01445). arXiv. <http://arxiv.org/abs/1910.01445>
- Hunter, J. D. (2007). Matplotlib: A 2D Graphics Environment. *Computing in Science & Engineering*, 9(3), 90–95. <https://doi.org/10.1109/MCSE.2007.55>
- Ingham, T. (2020, November 23). Spotify Now Hosts 70 Million Songs. But It Can't Keep That Up Forever. *Rolling Stone*. <https://www.rollingstone.com/pro/features/spotify-now-hosts-70-million-songs-but-it-cant-keep-that-up-forever-1094234/>
- Jorgenson, L. (2022). *The Influence of TikTok: Promotion Trends in Mainstream Pop Music*. <https://scholarworks.calstate.edu/concern/projects/2n49t7424>
- Lei, X. (2023). Pro-rata vs User-centric in the music streaming industry. *Economics Letters*, 226, 111111. <https://doi.org/10.1016/j.econlet.2023.111111>
- Leight, E. (2019, August 12). “If You Can Get Famous Easily, You’re Gonna Do It”: How TikTok Took Over Music. *Rolling Stone*. <https://www.rollingstone.com/pro/features/tiktok-video-app-growth-867587/>

- Mallard, A. (2023, May). *The Implications of TikTok Engagement on the Number of Spotify Listeners: A Study on Independent Artists*.
<http://archives.northwestu.edu/handle/nu/61675>
- McKinney, W. (2010). Data Structures for Statistical Computing in Python. *Proceedings of the 9th Python in Science Conference*, 56–61. <https://doi.org/10.25080/Majora-92bf1922-00a>
- pandas-dev/pandas: Pandas*. (n.d.). <https://doi.org/10.5281/zenodo.8364959>
- Perrett, C. (n.d.). *A 21-year-old former college student was ready to give up on her dreams until a viral TikTok launched her career and helped her snag a record deal*. Insider.
Retrieved October 2, 2023, from <https://www.insider.com/viral-tiktok-rosie-record-label-and-her-dream-career-2021-11>
- Prey, R., Esteve Del Valle, M., & Zwerwer, L. (2022). Platform pop: Disentangling Spotify's intermediary role in the music industry. *Information, Communication & Society*, 25(1), 74–92. <https://doi.org/10.1080/1369118X.2020.1761859>
- Robinson, L., & Halle, D. (2002). Digitization, the internet, and the arts: eBay, Napster, SAG, and e-books. *Qualitative Sociology*, 25(3), 359–383. Scopus.
<https://doi.org/10.1023/A:1016034013716>
- Schwartz, D., & Clark, D. E. (2020, October 21). Bad Deals Are Baked Into the Way the Music Industry Operates. *Vice*. <https://www.vice.com/en/article/y3gmjw/bad-deals-are-baked-into-the-way-the-music-industry-operates>
- Sisario, B. (2021, May 7). Musicians Say Streaming Doesn't Pay. Can the Industry Change? *The New York Times*. <https://www.nytimes.com/2021/05/07/arts/music/streaming-music-payments.html>

Songstats. (n.d.). *Songstats / Music Data Analytics for Artists & Labels*. Songstats. Retrieved September 27, 2023, from <https://songstats.com/welcome>

Spilker, H. S. (2017). *Digital music distribution: The sociology of online music streams* (p. 208). Scopus. <https://doi.org/10.4324/9781315561639>

Spotify Charts—Spotify Charts are made by fans. (n.d.). Retrieved September 27, 2023, from <https://charts.spotify.com/charts/view/regional-global-weekly/latest>

Spotify revenue 2013-2022 | Statista. (n.d.). Retrieved October 2, 2023, from <https://www.statista.com/statistics/813713/spotify-revenue/>

Tintiangko, J., Fung, A. Y. H., & Leo-Liu, J. (2023). Compelled TikTok creators? The ambivalent affordances of the short video app for Filipino musicians. *Media, Culture & Society*, 45(8), 1600–1615. <https://doi.org/10.1177/01634437231174356>

Virtanen, P., Gommers, R., Oliphant, T. E., Haberland, M., Reddy, T., Cournapeau, D., Burovski, E., Peterson, P., Weckesser, W., Bright, J., van der Walt, S. J., Brett, M., Wilson, J., Millman, K. J., Mayorov, N., Nelson, A. R. J., Jones, E., Kern, R., Larson, E., ... van Mulbregt, P. (2020). SciPy 1.0: Fundamental algorithms for scientific computing in Python. *Nature Methods*, 17(3), Article 3. <https://doi.org/10.1038/s41592-019-0686-2>

Vonderau, P. (2019). The Spotify Effect: Digital Distribution and Financial Growth. *Television & New Media*, 20(1), 3–19. <https://doi.org/10.1177/1527476417741200>

Whateley, D. (n.d.). *How TikTok is changing the music industry and the way we discover new, popular songs*. Business Insider. Retrieved October 2, 2023, from <https://www.businessinsider.com/how-tiktok-is-changing-music-industry>

APPENDIX A (ARTIST IDENTIFICATION)

Table 3 - Artist Identification

Artists ID	Artist Name		Artist ID	Artist Name
1	220 KID		35	LPB Poody
2	42 Dugg		36	220 KID
3	Amaarae		37	Måneskin
4	A-Wall		38	Masked Wolf
5	bbno\$		39	Matt Maeson
6	Beach Bunny		40	Matt Maltese
7	BIA		41	Mitchell Tenpenny
8	Big Red Machine		42	Mr. Naisgai
9	Blxst		43	NEIKED
10	Chase Atlantic		44	Nic D
11	Christian Nodal		45	Niko Moon
12	CKay		46	No Rome
13	Clinton Kane		47	Nurko
14	Coi Leray		48	Pi'erre Bourne
15	DannyLux		49	Pooh Shiesty
16	DJ Scheme		50	Rexx Life Raj
17	Drakeo the Ruler		51	Riton
18	Duncan Laurence		52	Ryan Hurd
19	Dwele		53	Sara Kays
20	EPMD		54	Seori
21	Eyedress		55	Strick
22	Hopsin		56	Sub Urban
23	Hotboii		57	Tai Verdes
24	HVME		58	Tate McRae
25	iann dior		59	The Living Tombstone
26	Isaiah Rashad		60	The Walters
27	Joshua Bassett		61	Tiny Meat Gang
28	Joy Again		62	Trinidad Cardona
29	Karlae		63	T-Shyne
30	Kayla Nicole		64	Tyler Cole
31	King Los		65	Victor Cardenas
32	Lil Duke		66	Yak Gotti
33	Lil Keed		67	Yung Gravy
34	Los Legendarios		-	-

APPENDIX B (SPEARMAN CORRELATION COEFFICIENT)

Table 4 - Spearman Correlation Coefficient

Artists ID	Artist Name	SCC	p-value
1	220 KID	0.447552448	0.144586301
2	42 Dugg	-0.027972028	0.931234351
3	Amaarae	0.734265734	0.00654349
4	A-Wall	0.685314685	0.013905969
5	bbno\$	0.573426573	0.05126559
6	Beach Bunny	-0.006993007	0.982791769
7	BIA	-0.055944056	0.862898074
8	Big Red Machine	0.874813556	0.000195525
9	Blxst	0.72027972	0.008239769
10	Chase Atlantic	0.118881119	0.712884219
11	Christian Nodal	0.34965035	0.265238787
12	CKay	0.741258741	0.00580115
13	Clinton Kane	0.643356643	0.024003191
14	Coi Leray	0.230769231	0.470531995
15	DannyLux	0.699300699	0.011374199
16	DJ Scheme	-0.133806135	0.678446686
17	Drakeo the Ruler	0.090909091	0.778725396
18	Duncan Laurence	0.293706294	0.354147641
19	Dwele	0.048951049	0.879918579
20	EPMD	0.363636364	0.245265001
21	Eyedress	0.719302673	0.008369441
22	Hopsin	0.265734266	0.403833088
23	Hotboii	-0.118881119	0.712884219
24	HVME	0.888111888	0.000114134
25	iann dior	-0.615384615	0.033169901
26	Isaiah Rashad	0.846153846	0.000521134
27	Joshua Bassett	0.370629371	0.235621004
28	Joy Again	-0.188811189	0.556737056
29	Karlae	0.522810236	0.081156621
30	Kayla Nicole	0.640981719	0.024700038
31	King Los	0.109594205	0.734568275
32	Lil Duke	0.122592132	0.704272667
33	Lil Keed	-0.048951049	0.879918579
34	Los Legendarios	0.622377622	0.030675895

Artist ID	Artist Name	SCC	p-value
35	LPB Poody	0.287071705	0.365625884
36	220 KID	0.909090909	4.19104E-05
37	Måneskin	0.615384615	0.033169901
38	Masked Wolf	0.027972028	0.931234351
39	Matt Maeson	0.227671102	0.476675824
40	Matt Maltese	0.336842105	0.284329303
41	Mitchell Tenpenny	0.727272727	0.007355029
42	Mr. Naisgai	0.666692589	0.017894047
43	NEIKED	0.528182111	0.0775272
44	Nic D	0.321678322	0.307909876
45	Niko Moon	0.160839161	0.61752349
46	No Rome	0.475524476	0.118175957
47	Nurko	0.230769231	0.470531995
48	Pi'erre Bourne	-0.13986014	0.664633162
49	Pooh Shiesty	-0.06993007	0.829023641
50	Rexx Life Raj	0.335664336	0.286122903
51	Riton	0.482517483	0.112109291
52	Ryan Hurd	0.091789485	0.776630219
53	Sara Kays	0.629370629	0.028319671
54	Seori	0.266946177	0.401611049
55	Strick	0.706293706	0.010245194
56	Sub Urban	0.104895105	0.745609481
57	Tai Verdes	0.741258741	0.00580115
58	Tate McRae	-0.251748252	0.429918785
59	The Living Tombstone	0.699300699	0.011374199
60	The Walters	-0.028021059	0.931114067
61	Tiny Meat Gang	0.38029112	0.222673422
62	Trinidad Cardona	-0.28371322	0.371509667
63	T-Shyne	0.880830057	0.00015446
64	Tyler Cole	-0.160839161	0.61752349
65	Victor Cardenas	0.804195804	0.001614769
66	Yak Gotti	0.013986014	0.965590269
67	Yung Gravy	0.19860154	0.536061805

APPENDIX C (ETHICS COMMITTEE APPROVAL)



This is to certify that

Project No.: **DSCI2023-11-212876**

Project Title: **Beyond Streaming: How TikTok is Empowering Emerging Musicians**

Principal Researcher: **Lucas Costelha Lopes**

according to the regulations of the Ethics Committee of NOVA IMS and MagIC Research Center this project was considered to meet the requirements of the NOVA IMS Internal Review Board, being considered **APPROVED** on 23/11/2023.

It is the Principal Researcher's responsibility to ensure that all researchers and stakeholders associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Ethics Committee, via amendment or progress report, of

- Any significant change to the project and the reason for that change;
- Any unforeseen events or unexpected developments that merit notification;
- The inability of the Principal Researcher to continue in that role or any other change in research personnel involved in the project.

Lisbon, 23/11/2023

NOVA IMS Ethics Committee

ethicscommittee@novaims.unl.pt