Final Report

Mapping the Rise:

Streaming Success of Female Rappers by City

This capstone project explores the intersection of geography, music, and gender by analyzing the streaming success and cultural impact of female rappers across US cities. By combining data from Spotify, Billboard, TIDAL, and editorial sources, the project identifies which cities have contributed most significantly to the rise of female rap artists.

The ultimate goal is to use these findings as the foundation for developing a machine learning model that predicts future hit songs by female rappers, based on factors such as city representation, streaming patterns, playlist inclusion, and chart performance.

1. Context

For decades, female rappers have faced barriers in the music industry, including limited radio play, industry bias, and underrepresentation in major playlists. However, in recent years, there has been a notable increase in the visibility and success of female rap artists.

Official statistics clearly show they have increased their presence and success, but remain underrepresented and face significant challenges compared to men in the industry. While some have achieved major commercial milestones, the overall landscape is still marked by gender disparities in chart representation, recognition, and industry treatment.

According to the USC Annenberg Inclusion Initiative, women accounted for 23.3% of artists on the Billboard Hot 100 Year-End Chart in 2021, compared to 76.7% men. Over the decade from 2012 to 2021, women made up just 21.8% of credited artists on these charts, despite being about 51% of the U.S. population. In 2024, the

percentage of women on the Hot 100 Year-End chart rose to 37.7%, a significant increase from 22.7% in 2012, but still showing a male majority.

While a few female rappers have achieved major commercial success—Nicki Minaj has sold over 100 million records, outselling many male peers—her case is an exception. Most best-selling and most-awarded rappers remain men.

Industry Challenges and Inequality

Female rappers face more scrutiny, higher standards, and less respect than their male counterparts. They often have to work "twice as hard to get half the respect," as noted by Nicki Minaj and echoed in academic and media analyses.

Moreover, they are frequently pressured to conform to industry expectations around sexuality and appearance, and their lyrical content is often subject to more criticism than that of men.

Finally, they are more likely to be compared to one another and pitted against each other in the media, while male rappers are less frequently subject to such comparisons.

The Importance of the City of Origin in Rap Music

Even though the most notable streaming successes for female rappers are strongly associated with major hip hop hubs like New York, Houston, Los Angeles and Atlanta, there are no official, city-by-city streaming statistics for female rappers published by major music platforms or industry organizations.

The city of origin is crucial in rap music, shaping everything from sound and style to social commentary and the trajectory of artists' careers. Each major city's unique history and culture have contributed to the genre's diversity, innovation, and enduring relevance.

For all these reasons, this project aims to identify which cities have the most successful female rappers and, ultimately, to try to build a machine learning model capable of predicting future hits by female rappers based on their geographical origin.

2. Methodology

I began by importing and cleaning five different datasets from TIDAL, Spotify, Billboard, and Complex. Each dataset came with its own formatting challenges, such as inconsistent delimiters and column structures, which I resolved during the loading phase.

Next, I standardized city names to ensure consistency across datasets. For example, boroughs like “Queens,” “Brooklyn,” and “Harlem” were all renamed as “NYC” to reflect the cultural centrality of New York in the hip hop landscape.

To focus specifically on female rappers, I filtered all datasets using a gender column. For two of the Spotify datasets, gender and city attributes were generated using ChatGPT, providing the necessary structure to isolate female artists and map them geographically.

Once the data was filtered, I grouped each dataset by artist and city to count the number of times each artist appeared across different platforms. These grouped datasets were then merged into one dataframe, enabling a comprehensive view of each artist’s total representation.

I further cleaned the artist names by removing extra whitespace, standardizing capitalization, and correcting parsing errors (changing “j” to “doja cat”). I then removed non-rap artists such as Beyoncé, Rihanna, Dua Lipa and other misclassified male rappers.

After cleaning, I calculated the total number of appearances per artist per city by summing contributions from each data source. In the end, I sorted to final dataset to identify the most prominent female rappers by city and used it to generate visualizations.

3. Key Findings

Nicki Minaj (NYC) is the most prominent female rapper overall, with the highest total presence across TIDAL, Billboard, and Spotify datasets.

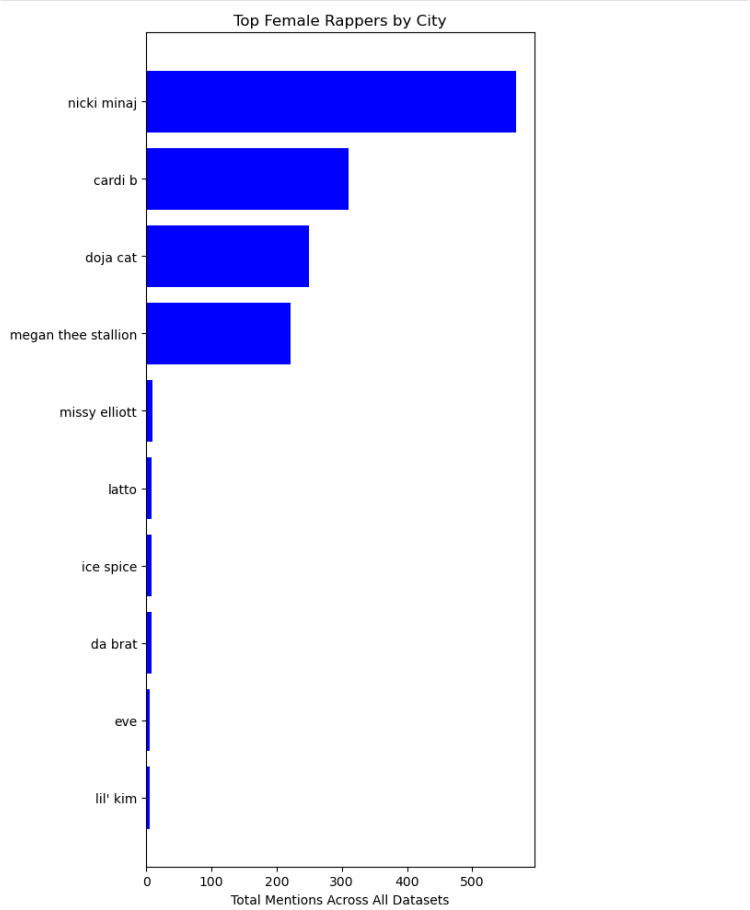
Cardi B (NYC), Doja Cat (Los Angeles), and Megan Thee Stallion (Houston) also ranked among the top four.

NYC emerged as the leading city for female rap talent, followed by Houston and Los Angeles, reflecting both historical and current cultural significance.

4. Output Files

Female Rappers Captsone Final Results

city_grouped	artist	tidal_count	hiphop_count	top10k_count	complex_count	billboard_count	total_count
nyc	nicki minaj	33.0	9.0	55.0	1.0	469.0	567.0
nyc	cardi b	1.0	9.0	19.0	1.0	280.0	310.0
los angeles	doja cat	0.0	1.0	38.0	0.0	210.0	249.0
houston	megan thee stallion	0.0	5.0	34.0	1.0	181.0	221.0
portsmouth	missy elliott	10.0	0.0	0.0	0.0	0.0	10.0
atlanta	latto	0.0	5.0	3.0	1.0	0.0	9.0
nyc	ice spice	0.0	7.0	0.0	1.0	0.0	8.0
chicago	da brat	8.0	0.0	0.0	0.0	0.0	8.0
philadelphia	eve	6.0	0.0	0.0	0.0	0.0	6.0
nyc	lil' kim	5.0	0.0	0.0	0.0	0.0	5.0
sydney	iggy azalea	5.0	0.0	0.0	0.0	0.0	5.0
hackensack	coi leray	0.0	5.0	0.0	0.0	0.0	5.0
nyc	foxy brown	3.0	0.0	0.0	0.0	0.0	3.0
miami	trina	3.0	0.0	0.0	0.0	0.0	3.0
memphis	glorilla	0.0	1.0	0.0	1.0	0.0	2.0
nyc	lil mama	2.0	0.0	0.0	0.0	0.0	2.0
new orleans	toya	2.0	0.0	0.0	0.0	0.0	2.0
nyc	scar lip	0.0	0.0	0.0	1.0	0.0	1.0
nyc	young m.a	1.0	0.0	0.0	0.0	0.0	1.0
nyc	maiya the don	0.0	0.0	0.0	1.0	0.0	1.0
nyc	lola brooke	0.0	0.0	0.0	1.0	0.0	1.0
philadelphia	lay bankz	0.0	0.0	0.0	1.0	0.0	1.0
nyc	kenzo b	0.0	0.0	0.0	1.0	0.0	1.0
philadelphia	tierra whack	0.0	0.0	0.0	1.0	0.0	1.0
nyc	remy ma	1.0	0.0	0.0	0.0	0.0	1.0
atlanta	baby tate	0.0	0.0	0.0	1.0	0.0	1.0
nyc	angie martinez	1.0	0.0	0.0	0.0	0.0	1.0
atlanta	bktherula	0.0	0.0	0.0	1.0	0.0	1.0
miami	city girls	0.0	0.0	0.0	1.0	0.0	1.0
memphis	slimeroni	0.0	0.0	0.0	1.0	0.0	1.0
memphis	k carbon	0.0	0.0	0.0	1.0	0.0	1.0
memphis	gloss up	0.0	0.0	0.0	1.0	0.0	1.0
london	little simz	0.0	0.0	0.0	1.0	0.0	1.0
london	ivorian doll	0.0	0.0	0.0	1.0	0.0	1.0
houston	monaleo	0.0	0.0	0.0	1.0	0.0	1.0
houston	kentheman	0.0	0.0	0.0	1.0	0.0	1.0
detroit	kash doll	0.0	0.0	0.0	1.0	0.0	1.0
chicago	mello buckzz	0.0	0.0	0.0	1.0	0.0	1.0
atlanta	lakeyah	0.0	0.0	0.0	1.0	0.0	1.0
atlanta	kali	0.0	0.0	0.0	1.0	0.0	1.0
miami	mellow rackz	0.0	0.0	0.0	1.0	0.0	1.0



5. Future Directions

This analysis lays the foundation for building a predictive model that can estimate the likelihood of a female rapper producing a hit based on input variables like artist city, playlist placements, streaming metrics, and genre characteristics. Future work may involve looking into duration, tempo, energy, lyrical themes or collaborations with other artists, and modeling with mulitple methods.

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