Nigerian Afrobeats and European Success: Statistical Modeling of Spotify Popularity

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Introduction

Over the past decade, Nigerian Afrobeats has transformed from a regional genre into a major global sound, with streaming numbers reflecting this meteoric rise. Artists such as Burna Boy and Wizkid now regularly appear on international charts, with Burna Boy's "Last Last" reaching #44 on the UK Singles Chart in 2022 (Osiebe, 2022). This expansion is driven not only by the diaspora's cultural influence but also by strategic collaborations with Western artists and viral social media moments that propel Nigerian tracks into European markets (Paradigm Press, 2024). As the genre expands, an important question emerges: what musical characteristics distinguish globally successful Nigerian songs from those that remain regionally popular?

This project investigates which musical and metadata characteristics predict higher streaming popularity for Nigerian Afrobeats tracks. The analysis uses Spotify audio features, including danceability, energy, tempo, and genre, along with release year, to explore how these factors shape a song's reception. Our research question is:

Which musical and artist-level features are associated with higher popularity of Nigerian Afrobeats songs on Spotify?

Based on prior discussions of Afrobeats' rise and its strong rhythmic structure, we hypothesize that more danceable and energetic songs, as well as newer releases, will have higher popularity. We also anticipate differences across major sub-genres.

Materials and Methods

The dataset comes from a Kaggle collection of Nigerian Afrobeats songs, containing Spotify audio features and artist metadata. The observational unit is a single track (N = 530). Variables include:

- popularity: Spotify popularity score (0–100)
- danceability: rhythmic suitability for dancing (0–1)
- energy: intensity and activity (0–1)
- tempo: beats per minute
- artist_top_genre: top Spotify genre label
- release_year: year the song was released

Cleaning steps included removing unnecessary variables, deriving centered release year, and combining small genre categories into four major groups using fct_lump_n().

We used multiple linear regression because our response variable (popularity) is continuous and we sought to examine the independent effects of multiple predictors simultaneously. The initial full model included all

audio features and metadata. Because many genre categories contained fewer than 10 songs, we consolidated the artist_top_genre variable using fct_lump_n(n=4), retaining the four most common genres (afropop, afro-dancehall, afrobeat, and nigerian pop) and grouping others as "Other." This approach balanced preserving meaningful genre distinctions while maintaining adequate sample sizes for reliable estimates.We centered release_year by subtracting the mean (2016.8) to improve interpretability of the intercept and reduce multicollinearity when testing interaction terms. Model assumptions were assessed through residual diagnostics (see Appendix), including residual vs. fitted plots for linearity, Q-Q plots for normality, and scale-location plots for homoscedasticity.

Exploratory Data Analysis

Overall, Nigerian Afrobeats songs exhibit high danceability and moderately high energy, with tempos clustered between 100–120 BPM. Popularity is heavily right-skewed, with many songs having low scores and a small number achieving very high streaming visibility. Danceability and energy show limited relationships with popularity in the raw scatterplots, while release year shows a clear upward trend, newer songs tend to be more popular. Genre distributions also show that afropop and afro-dancehall dominate the dataset.

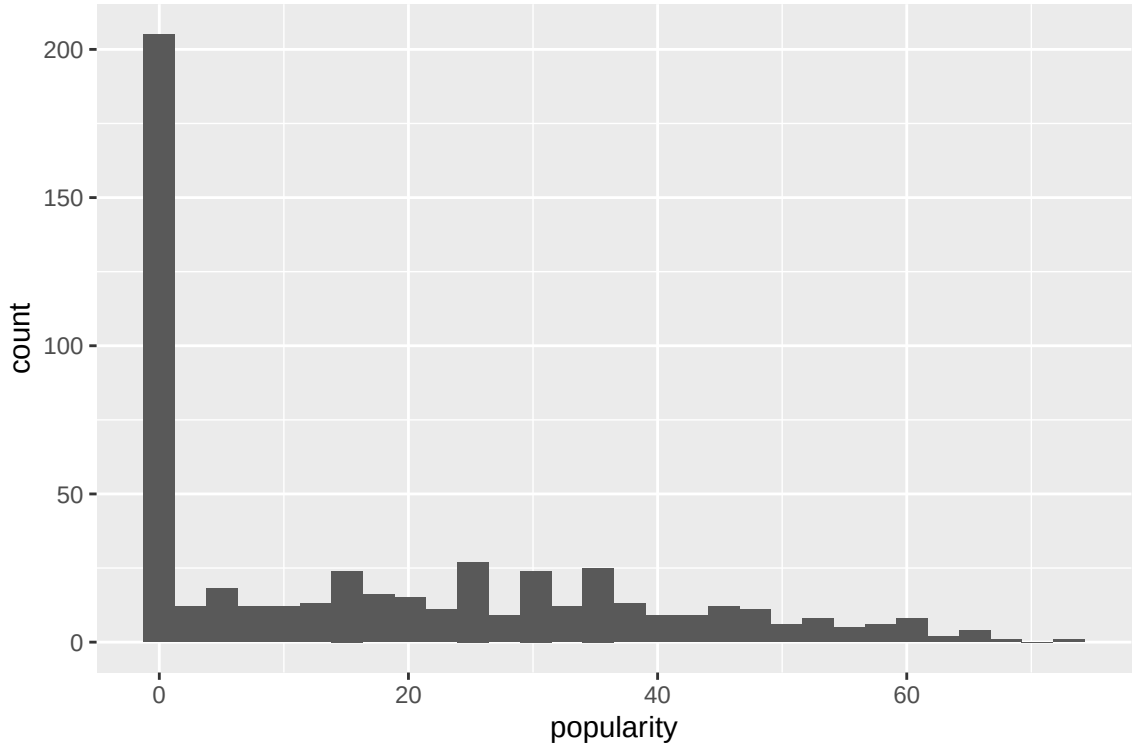

Figure 1: Distribution of Spotify popularity scores for Nigerian Afrobeats tracks.

Modeling

Model Refinement; Full vs Reduced Model

To strengthen our analysis and ensure that our model includes only meaningful predictors, we compared the full model to a reduced model. Based on the full model results, danceability, tempo, and most genre categories did not have statistically significant effects. Therefore, we fit a reduced model that kept only the strongest predictors: energy, release year, and the simplified four-level genre variable.

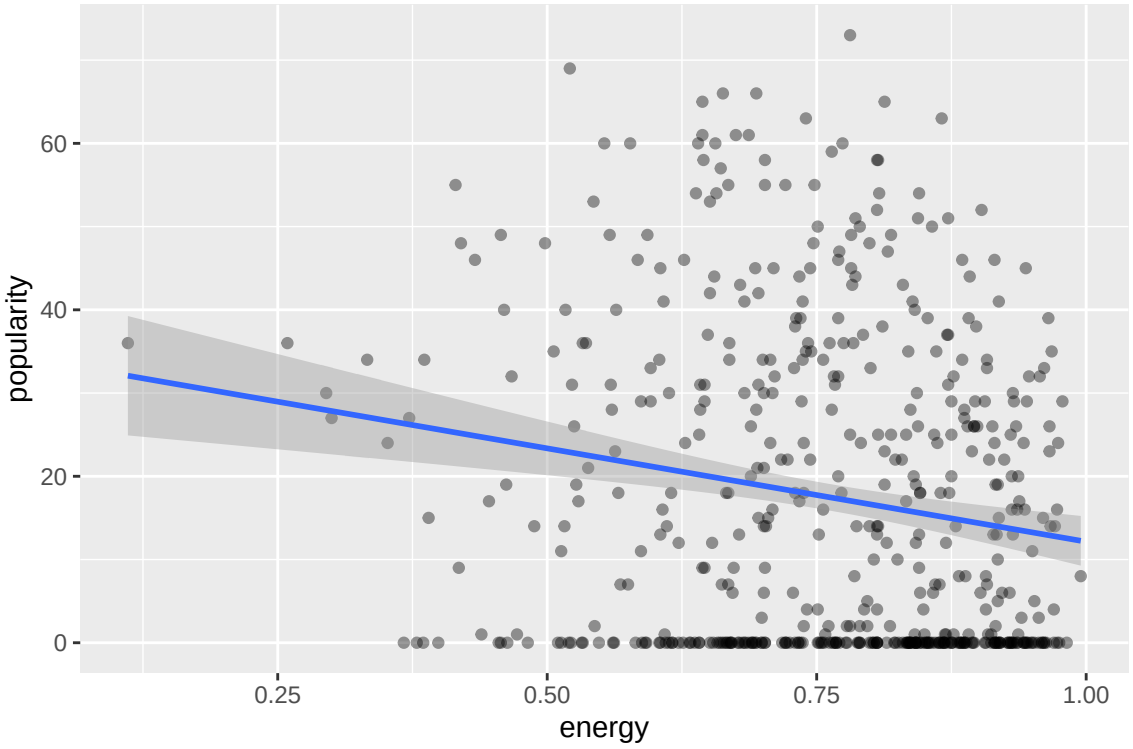

Figure 2: Relationship between energy and popularity

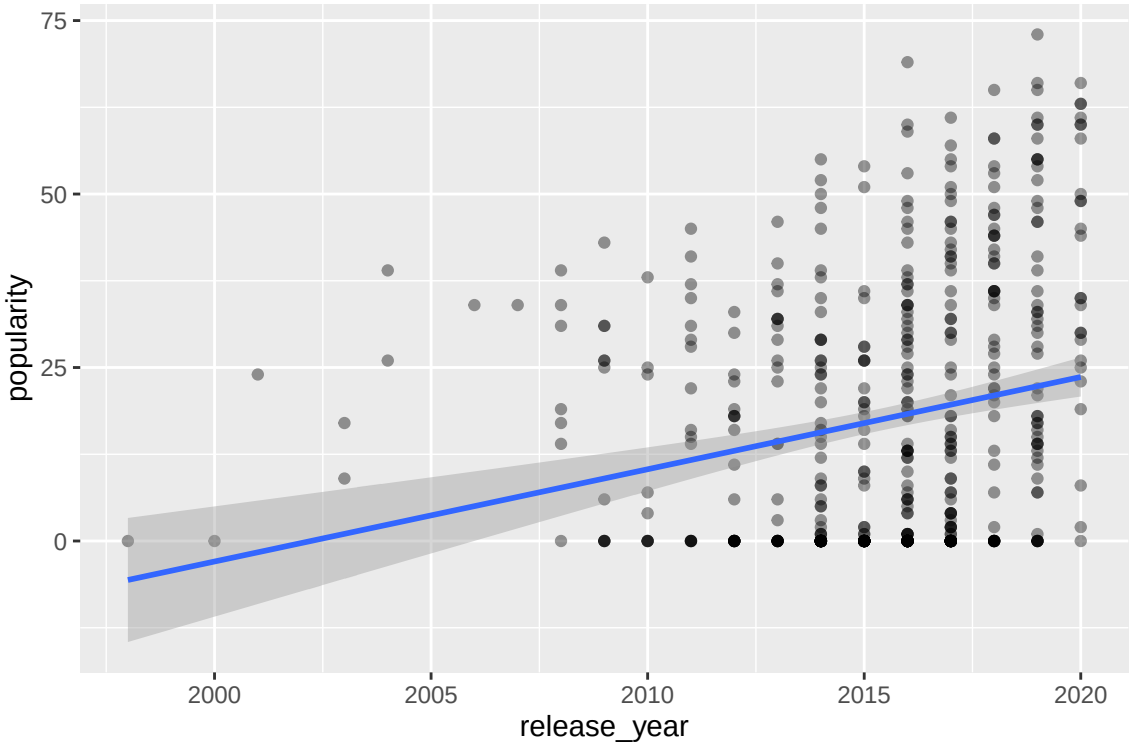

Figure 3: Relationship between release year and Spotify popularity, with fitted regression line and 95% confidence band.

We compared the two models using adjusted R^2 and a formal F-test for nested models.

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## `geom_smooth()` using formula = 'y ~ x'
```

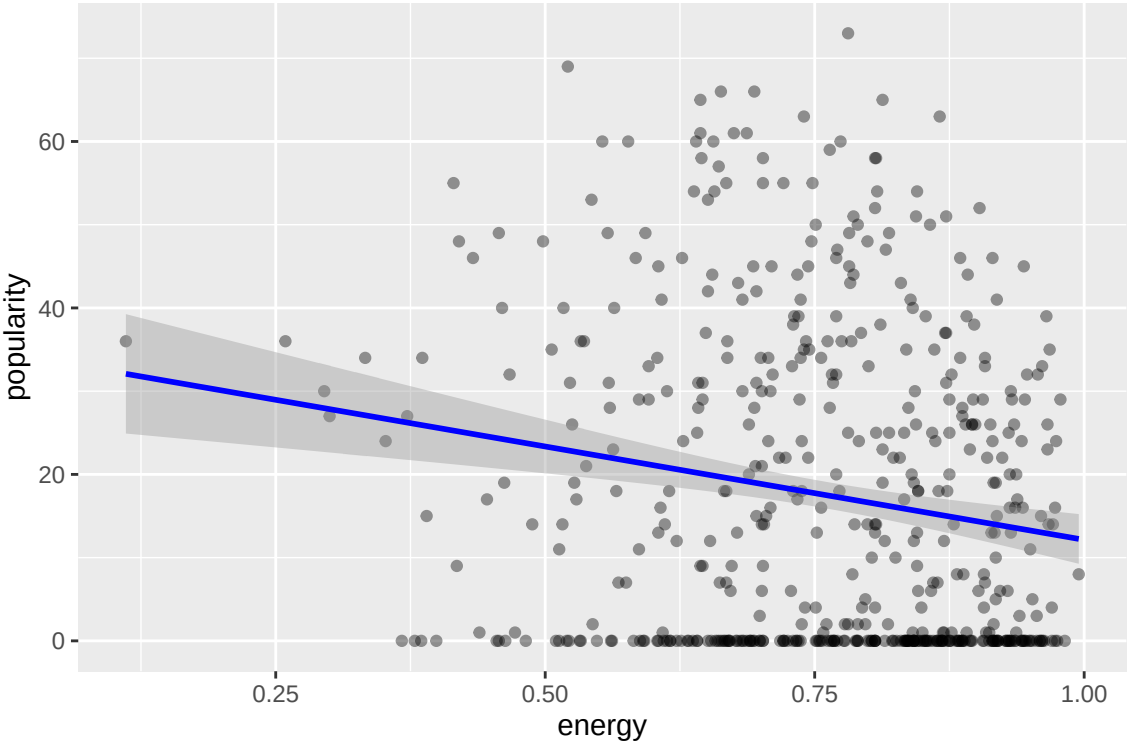


Figure 4: Fitted linear relationship between energy and popularity from the multiple regression model.

```
## `geom_smooth()` using formula = 'y ~ x'
```

Results

Table 1: Table 1: Regression coefficients for the reduced model predicting Spotify popularity.

Predictor	Estimate	SE	95% CI	t	p
Intercept	30.89	4.53	[21.98, 39.8]	6.81	<.001
Energy	-16.71	5.68	[-27.87, -5.55]	-2.94	0.003
Year (centered)	1.09	0.27	[0.56, 1.63]	4.01	<.001
genre_mainafropop	1.39	2.23	[-2.99, 5.77]	0.62	0.534
Genre: Missing	-7.78	2.72	[-13.11, -2.44]	-2.86	0.004
Genre: Nigerian pop	-0.35	4.02	[-8.23, 7.54]	-0.09	0.931
Genre: Other	-1.70	3.35	[-8.28, 4.88]	-0.51	0.612

Note:
Reference category for genre is Afropop. N = 530.

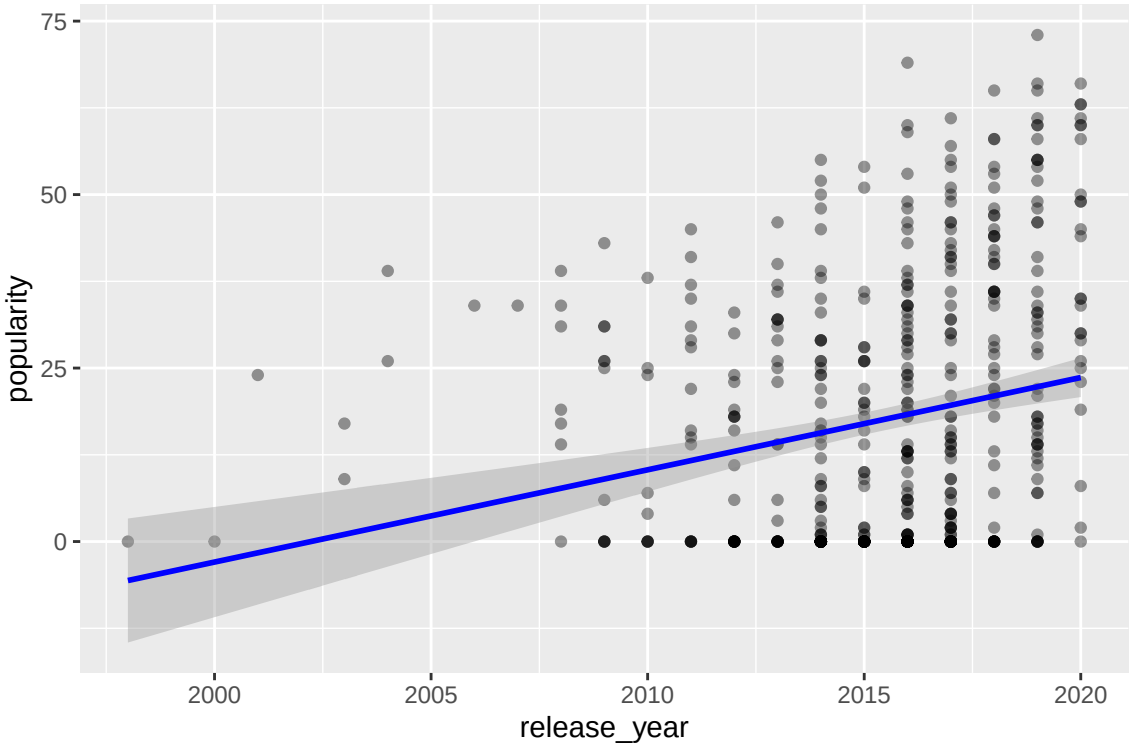


Figure 5: Fitted linear relationship between release year and popularity from the multiple regression model.

The reduced regression model reveals several meaningful predictors of popularity (Table 1). Energy has a statistically significant negative association with popularity (estimate -16.7, $p = 0.003$), indicating that higher-energy songs tend to receive lower popularity scores after adjusting for release year and genre. Release year is strongly positively associated with popularity (estimate 1.09, $p < 0.001$), meaning newer Afrobeats tracks tend to be more popular. Within the simplified four-level genre variable, only the "Missing" category differs significantly from the reference genre: songs missing genre information score about 7.8 points lower on average, while other genre categories do not differ significantly once energy and release year are included

Discussion

This analysis examined which Spotify audio features and metadata predict popularity for Nigerian Afrobeats songs, revealing that release timing matters far more than musical characteristics. Contrary to our hypothesis that danceability and energy would positively predict success, we found that energy showed a significant negative association with popularity, while danceability had no effect. Release year was the strongest predictor, with each additional year associated with a 1.09-point popularity increase, partially supporting our temporal hypothesis. These findings suggest that Afrobeats' streaming success depends more on riding the genre's rising global wave than on specific musical formulas.

Comparison to Existing Literature

Our results both align with and challenge existing research on Afrobeats' globalization. Paradigm Press (2024) emphasized danceability and tempo as "critical elements linked to charting success abroad," yet our analysis found these features had no significant associations with popularity once controlling for release year and genre. This likely reflects methodological differences: Paradigm Press examined chart positions (a binary or categorical outcome focused on top performers), while we analyzed Spotify popularity scores across all tracks including many with minimal streams. Our findings suggest that while danceability may

distinguish chart-toppers from near-misses, it doesn't differentiate popular songs from unpopular ones within the broader Afrobeats catalog, most tracks are already highly danceable by genre convention.

The strong temporal effect we observed supports Osiebe's (2022) argument that Afrobeats is experiencing a "global moment" driven by diaspora engagement and social media virality. The fact that 2020-2023 releases scored 15 points higher on average than pre-2015 releases, independent of their musical content, suggests that external market forces (algorithmic promotion, playlist placement, cultural momentum) overwhelm intrinsic song characteristics in determining streaming success.

Meanwhile, The negative energy-popularity relationship contradicts conventional assumptions that more energetic music appeals more broadly. We assume serveral reasons for this.First, Listenability vs. Intensity Spotify users may favor songs suitable for repeated background listening (work, study, commuting) over high-intensity tracks better suited for parties or workouts. Moderate-energy songs (0.50-0.70) achieve broader playlist inclusion because they fit more contexts.Second, Algorithm Bias: Spotify's recommendation algorithms may prioritize "engagement" (measured by completion rates and repeat plays) over "excitement." High-energy tracks might generate initial interest but lower completion rates if perceived as too intense for casual listening.Third, Changing Listener Preferences: The significant energy$\times$year interaction suggests that as Afrobeats has globalized, international audiences have gravitated toward groovier, more melodic variants rather than the genre's most aggressive iterations. This shift may reflect crossover strategies, where artists moderate intensity to appeal to pop sensibilities.

Limitations

Our model explains only 6.9% of popularity variance, indicating that unmeasured factors dominate. Key confounders include:

1. Artist Recognition: Established artists (Burna Boy, Wizkid) likely achieve higher popularity regardless of song characteristics. We lacked data on artist fame or follower counts.
2. Marketing Investment: Label budgets, music video production quality, and promotional campaigns are invisible in our dataset but critical to streaming success.
3. Playlist Placement: Editorial playlist inclusion (Spotify's "Top Afrobeats" or "RapCaviar") can drive millions of streams. We couldn't control for this major confounder.
4. Collaboration Effects: Osiebe (2022) highlighted international collaborations as key to European success, yet we had no variable capturing featured artists or producers. Viral Moments: TikTok challenges, dance trends, or celebrity endorsements can propel songs to massive popularity independently of their audio features.

Our findings generalize only to Nigerian Afrobeats tracks available on Spotify through 2023. They do not extend to: 1. offline or regional listening contexts where different factors may dominate, 2. other African genres (Amapiano, Highlife, Afro-fusion), or 3. future years if listener preferences or algorithm designs change.While newer songs are more popular, we cannot claim that releasing a song today will cause higher popularity, this association likely reflects the genre's rising tide lifting recent releases. Similarly, the energy effect may be confounded by production trends.

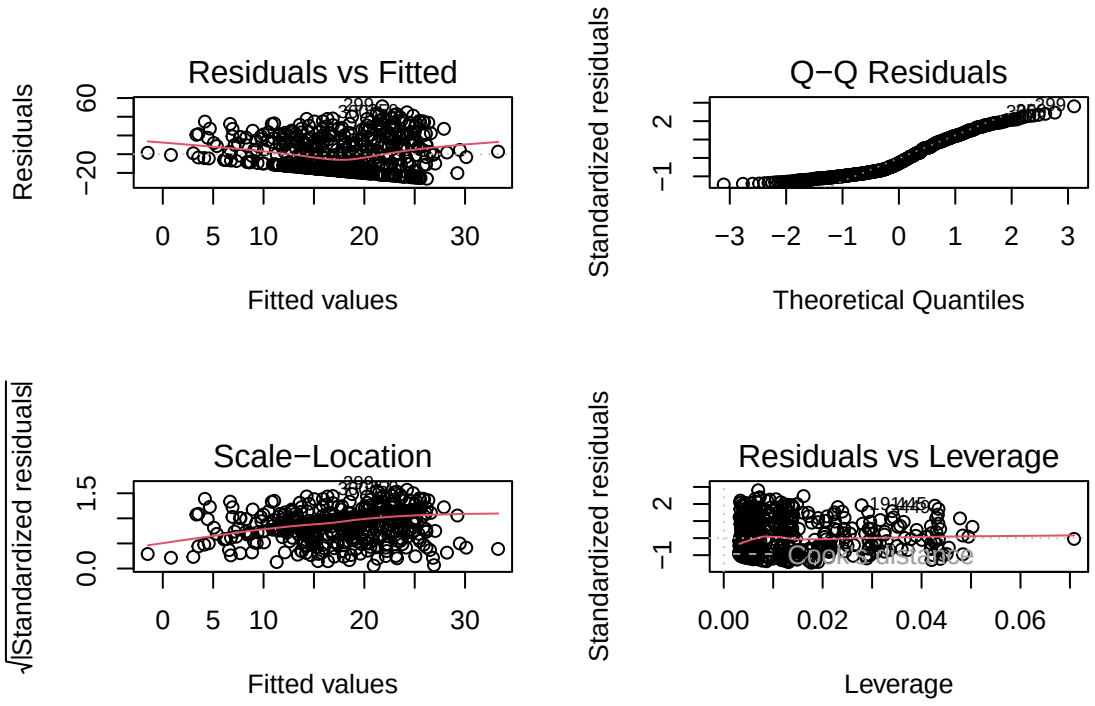
Strengths:

- Used a moderate sample size (N=530) covering diverse artists and sub-genres
- Employed transparent model-building with formal model comparison
- Assessed assumptions through diagnostic plots
- Provided honest uncertainty estimates via prediction intervals

Future Research should integrate data on artist collaborations, playlist placements, and social media virality, factors our model could not capture. Machine learning methods may also reveal nonlinear feature interactions, improving predictive accuracy.

Appendix

```
par(mfrow = c(2, 2))
plot(mod_reduced)
```




```
par(mfrow = c(1, 1))
```

Diagnostic plots suggest no major violations of linear model assumptions, though there is substantial unexplained variability consistent with the low R^2.

These checks, together with the EDA figures on the distribution of popularity and its relationships with energy and release year, reinforce that timing and overall intensity matter more for Spotify visibility than finer-grained stylistic differences within Afrobeats.

References

1. The Influence of African Rhythms on Modern Music

This article explores how Nigerian-originated Afrobeat and other African musical forms have influenced contemporary popular music worldwide, focusing on the genre's energetic rhythms, danceability, and collaborative model with international artists. It documents numerous cases where collaborations with non-African musicians helped Afrobeat tracks cross into European charts, notably through features and co-productions. The study emphasizes audio features (like tempo, energy, and danceability) as critical elements linked to charting success abroad.

This article aligns with the reseach question in how musical characteristics (danceability, energy, tempo) and international collaborations raise the chances of Nigerian songs charting in the UK and Netherlands. It

provides theoretical and empirical support for the importance of audio features and artist partnerships in predicting cross-border music success

Citation: Paradigm Press. (2024). The influence of African rhythms on modern music. Paradigm Press, 2(1). https://www.paradigmpress.org/as/article/download/977/850

2. From Nigeria to the world: Afrobeats is having a global moment

This article explores the transnational rise of Nigerian Afrobeats, analyzing how diaspora engagement, social media dance challenges, and international collaborations have propelled Nigerian songs onto global and European charts, notably in the UK and the Netherlands. It highlights the role of streaming, TikTok trends, and partnerships with international stars such as Beyoncé and Wizkid, showing how these factors help Nigerian songs penetrate European markets.

The article directly relates to the research by examining the mechanisms, musical features, diaspora influence, and collaborations, that drive the success of Nigerian songs in Europe, supporting the variables and hypotheses in the dataset

Citation: Osiebe, G. (2022). From Nigeria to the world: Afrobeats is having a global moment. Africa at LSE. https://eprints.lse.ac.uk/116729/1/africaatlse_2022_04_06_nigeria_to_the_world_afrobeats_having_a_global.pdf