

Taylor Swift's Popularity in 2024: Analyzing Spotify and YouTube Data

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Introduction

Taylor Swift is a dominant presence in the music industry; the Eras Tour, which ran from March 2023 to December 2024, grossed over \$2 billion in ticket sales. We were interested in quantifying Taylor Swift's popularity in 2024. We've analyzed a dataset of the most streamed songs in 2024 across different platforms, using Bayesian analysis to estimate and compare the proportions of total Spotify and YouTube streams that come from Taylor Swift. Our question is with the surge of popularity of Taylor Swift in 2024, just how much of the music audience did she capture. Once we understand how much of the audience she has captured, we can come to better understand how her actions have gotten her to the influence she has now. Understanding her relative share of attention helps quantify musical influence in a measurable way, which can be useful for industry analysis, marketing, or cultural commentary.

Methods

We are using Nidula Elgiriyyewithana's "Most Streamed Spotify Songs 2024" dataset, which he posted on Kaggle.¹ Each observation is a song, and the songs included are from the most streamed songs in 2024. It contains the number of streams or views that the most popular songs had on multiple platforms, including the two we are interested in, Spotify and YouTube. A summary and visualizations of the raw data is available in Table 1 and Figures 1-4 in the appendix.

In our analysis, we've used a binomial likelihood for the data. This is reasonable because for each stream, we are interested in whether it is or is not a stream of a Taylor Swift song—a binary outcome. We assume the streams are independent. While individual preferences and algorithms may introduce dependencies, our data does not allow us to identify these interactions, so we maintain this assumption. It's reasonable to assume that the probability of being a Taylor Swift song, our first parameter, is the same for each stream. We also have a fixed number of observations, our second parameter, which is the total number of streams in the dataset, which are 2,007,427 Spotify streams and 1,728,804 YouTube views. Based on all of these factors, a binomial likelihood is appropriate.

For the prior distribution of p , the proportion of streams that are Taylor Swift songs, we've used a Beta(58.8, 676.2) distribution². We obtained these parameters using the `get.beta.ab` function³ with mean 0.08 and standard deviation 0.1. We chose these values based on our prior beliefs about Taylor Swift's popularity, thinking that she would have somewhere between 5% and 11% of the total musical audience because of the Eras tour and her consistent performance on billboard charts. We used the same prior distribution for Spotify and YouTube because we had no reason to believe that there would be a difference in the proportion between the two platforms since she uploads all of her songs on both platforms.

We will use posterior distribution to estimate the proportion of total Spotify streams and YouTube views that were of Taylor Swift's content in 2024, and to predict what those proportions will be in 2025. We will also use the posterior to assess the difference in Taylor Swift's popularity on YouTube and Spotify.

¹ Full Citation: Elgiriyyewithana, N. (2024, June 15). Most Streamed Spotify Songs 2024, Kaggle, www.kaggle.com/datasets/nelgiriyyewithana/most-streamed-spotify-songs-2024.

² See Figure 5 in the appendix for more information.

³ See the appendix for details under Function 1.

Results

The posterior expected value of p for Spotify was 0.01719 with a variance of 8.4×10^{-9} . In other words, we expect that about 1.719% of Spotify streams will be Taylor Swift songs. The posterior expected value of p for YouTube was smaller; 0.01194 or about 1.2%, with a slightly bigger variance; 6.8×10^{-8} . A graph of the posterior distributions for Spotify and YouTube can be found in Figures 6-7 in the appendix. It can be seen that our prior distribution overestimated Taylor Swift's popularity since on both platforms she captured about 1% of the musical audience as opposed to our guess of somewhere between 5% and 11%.

A 95% credible interval for the posterior predictive distribution of Spotify Streams is $(0.0170, 0.0174)$ —there is a 95% probability that between 1.7% and 1.74% of Spotify streams in 2025 will be of Taylor Swift songs. A 95% credible interval for the posterior predictive distribution of YouTube views is $(0.0114, 0.0125)$. There is a 95% probability that between 1.14% and 1.25% of YouTube views will be of Taylor Swift music videos in 2025. Interestingly enough, these credible intervals were nearly identical to the credible intervals from the posterior distribution. This is most likely due to the fact that our variance is extremely small.

The difference between the proportions is relatively small but significant. The probability that $p\text{-Spotify} > p\text{-YouTube}$ is approximately 1, meaning that Spotify has a higher proportion of streams than YouTube for Taylor Swift. We used Monte Carlo simulation to estimate the difference between Spotify and YouTube, and found that there is a 95% probability that the difference in proportions is between 0.0047 and 0.0058. The posterior distribution of the difference is illustrated in Figure 8 (see appendix).

Discussion

We found that Spotify has a higher proportion of Taylor Swift streams than YouTube. One possible reason for this is that Spotify is primarily a platform for streaming music, whereas YouTube is home to many different types of content, with also the potential of people making lyrical videos of the same songs. Streams on YouTube are generally of music videos, which may be less popular than audio-only versions of the song.

We also predicted that Spotify will have a higher proportion of Taylor Swift streams than YouTube will. However, because the Eras Tour and the release of the Tortured Poets Department album generated a lot of attention in 2024, it's possible that our data about Taylor Swift's popularity in 2024 will not accurately predict her popularity in 2025.

There are definitely opportunities for additional analysis in the future. Our dataset had several songs which had data for Spotify but not for YouTube. If we were to run this analysis again we would want to find a more complete dataset. To better quantify popularity we could look at more streaming services or look at the proportion of listeners that listen to Taylor Swift instead of streams.