

# Executive Summary

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## 1 Overview

As a prominent music label, you care about artists that are truly outstanding and stand the trial of time. Out of 45 top artists, Amy Winehouse, Joni Mitchell, and Cake are those artists due to the similarity between their work and Shakespeare's timeless sonnets. By leveraging Natural Language Processing algorithms, your label can predict future success based on the proven success of the past.

## 2 Methodology

Before employing Natural Language Processing methods such as Keyword Extraction and Sentiment Analysis, we first obtained our data containing 154 Shakespeare's sonnets and songs of 45 modern top artists. The unit of observation is an artist and their work.

### 2.1 Keyword Extraction

One of the NLP methods we used is Keyword Extraction. This algorithm returns the most frequently used keywords from Shakespeare and the 45 artists. Here's an example using Keyword Extraction to detect top 10 most used keyword by Shakespeare:

We compared the similarity between keywords for Shakespeare and the artists using first the number of similar words and then the Euclidean distance of frequency of these words. The result ranking is following:

Based on this table, Adele, Nickelback and Bieber are the top 3 artists most similar to Shakespeare based on keywords.

Word Rank	Artist	Word Count	Frequency	Keyword
1	adele	3	626.00	love time heart
2	nickelback	3	11349.00	love time yet
3	bieber	2	648.00	love time
4	dolly-parton	2	685.00	love time
5	dj-khaled	2	928.00	mine time
6	amy-winehouse	2	3700.00	love time
7	bjork	2	5341.00	love yet
8	leonard-cohen	2	5972.00	love time
9	cake	2	7690.00	love time
10	paul-simon	2	8464.00	love time

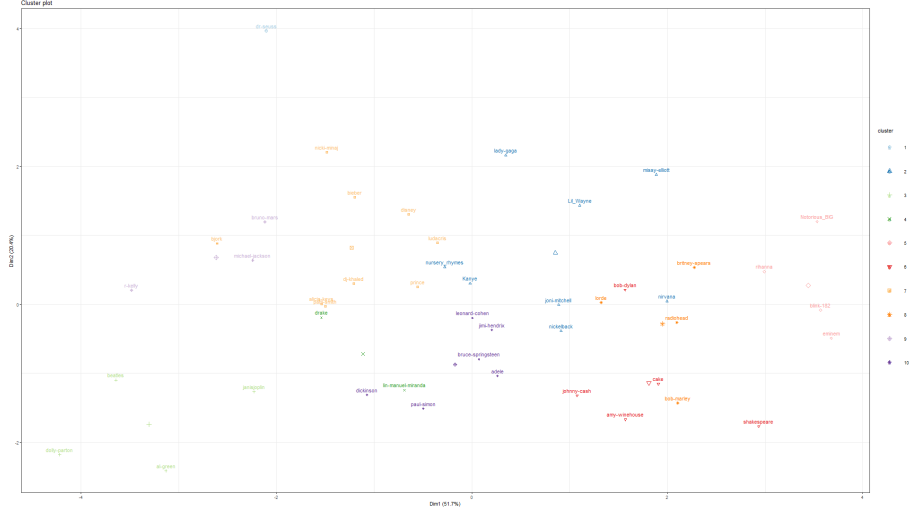
Table 1: Ranked Top 10 Most Similar Music Artist to Shakespeare Based on Keywords

Shakespeare Top Keywords Wordcloud



## 2.2 Sentiment Analysis

Another NLP method we used is Sentiment Analysis. More specifically, we analyzed Shakespeare's and artists' work using 8 emotions such as anger, anticipation, disgust, fear, joy, sadness, surprise, and trust to observe similarities and differences. Using k means clustering with 10 clusters, we observed clear trends between the artists:



Using Euclidean distance on the proportion of emotions, we found that Shakespeare's emotions through sonnets are most similar to the following artists:

Artist	Sent. Euclidean Distance	Sentiment Rank
eminem	0.00	1
nirvana	0.00	2
cake	0.00	3
amy-winehouse	0.00	4
bob-dylan	0.00	5
bob-marley	0.00	6
johnny-cash	0.00	7
nickelback	0.00	8
britney-spears	0.00	9
rihanna	0.00	10

Table 2: Ranked Top 10 Most Similar Music Artist to Shakespeare Based on Sentiments

Based on this table, Eminem, Nirvana, and Cake are the top 3 artists most similar to Shakespeare based on sentiment.

## 3 Results

Combining the rankings obtained by Keyword Extraction and Sentiment Analysis, our final ranking is following:

We show that Amy Winehouse, Joni Mitchell, Cake, Nickelback, and Bob Dylan are closest with Shakespeare using the two NLP methods. Some interesting results follow:

- Using Key Word extraction, we compared the top 10 most frequent key words in both Shakespeare sonnets and artist songs. We found that Adele and Disney both share 3 same key words: "love", "time", and "heart"

Artist	Word Rank	Sentiment Rank	Overall Rank
nickelback	2	8	10
amy-winehouse	6	4	10
cake	9	3	12
adele	1	21	22
joni-mitchell	11	11	22
leonard-cohen	8	17	25
paul-simon	10	22	32
blink-182	18	14	32
bob-marley	27	6	33
rihanna	25	10	35

Table 3: Ranked Top 10 Most Similar Music Artist to Shakespeare

- Using Sentiment Analysis, we compared emotions such as anger, anticipation, disgust, fear, joy, sadness, surprise, and trust within the sonnets and songs. We found that Bob Dylan is the closest in emotions with Shakespeare. Some of Dylan’s famous songs include “Like a Rolling Stone” and “A Hard Rain’s A-Gonna-Fall”. Dylan was also the first musician to win Nobel Prize in Literature "for having created new poetic expressions within the great American song tradition".
- Despite being number one on keyword, Adele was not amongst the top 10 closest artists to Shakespeare because Adele’s use of love is more of a fear and trust while Shakespeare uses love in a fear and sadness way.
- Amy Winehouse and Joni Mithcell are tied for number one spot closest to Shakespeare. Amy Winehouse scored 4th in Word Extraction and 5th in Sentiment, while Joni Mitchell socred 5th in Word Extraction and 4th in Sentiment. [insert the 3 ranking tables]

## 4 Limitations & Recommendations

- The R package for analyzing sentiment offers different results when used differently. We would get more accurate results analyzing each song for the artist but do not have such data.
- Shakespeare’s language usage is different from the modern day language, we would improve our result using modern translation of Shakepeare’s sonnets.
- While the analysis suggest the top ranking artists are outstanding, this does not conclude that the bottom artists are not. Beatles are ranked 43 out of 45, but are successful in their own ways and own style. We need to thus be careful when using the metric to determine which artist is not good.