

ADS 509 Sentiment Assignment

This notebook holds the Sentiment Assignment for Module 6 in ADS 509, Applied Text Mining. Work through this notebook, writing code and answering questions where required.

In a previous assignment you put together Twitter data and lyrics data on two artists. In this assignment we apply sentiment analysis to those data sets. If, for some reason, you did not complete that previous assignment, data to use for this assignment can be found in the assignment materials section of Blackboard.

General Assignment Instructions

These instructions are included in every assignment, to remind you of the coding standards for the class. Feel free to delete this cell after reading it.

One sign of mature code is conforming to a style guide. We recommend the [Google Python Style Guide](#). If you use a different style guide, please include a cell with a link.

Your code should be relatively easy-to-read, sensibly commented, and clean. Writing code is a messy process, so please be sure to edit your final submission. Remove any cells that are not needed or parts of cells that contain unnecessary code. Remove inessential `import` statements and make sure that all such statements are moved into the designated cell.

Make use of non-code cells for written commentary. These cells should be grammatical and clearly written. In some of these cells you will have questions to answer. The questions will be marked by a "Q:" and will have a corresponding "A:" spot for you. *Make sure to answer every question marked with a **Q:** for full credit.*

```
In [55]: import os
import re
import emoji
import pandas as pd
import numpy as np

from collections import Counter, defaultdict
from string import punctuation

from nltk.corpus import stopwords

sw = stopwords.words("english")
```

```
In [56]: # Add any additional import statements you need here
import json
```

```
from nltk.tokenize import word_tokenize
import seaborn as sns
import matplotlib.pyplot as plt
from collections import defaultdict
```

```
In [57]: # NOTE from KB: I decided to move the twitter and lyrics files manually
# change `data_location` to the location of the folder on your machine.
# data_location = "/users/rsadeghian/textmining/ads-tm-api-scrape/"

# These subfolders should still work if you correctly stored the
# data from the Module 1 assignment
twitter_folder = "twitter/"
lyrics_folder = "lyrics/"

positive_words_file = "positive-words.txt"
negative_words_file = "negative-words.txt"
tidy_text_file = "tidytext_sentiments.txt"
```

Data Input

Now read in each of the corpora. For the lyrics data, it may be convenient to store the entire contents of the file to make it easier to inspect the titles individually, as you'll do in the last part of the assignment. In the solution, I stored the lyrics data in a dictionary with two dimensions of keys: artist and song. The value was the file contents. A Pandas data frame would work equally well.

For the Twitter data, we only need the description field for this assignment. Feel free all the descriptions read it into a data structure. In the solution, I stored the descriptions as a dictionary of lists, with the key being the artist.

```
In [58]: # Read in the lyrics data

lyrics_data = defaultdict(lambda: defaultdict(str))

# Loop through each artist folder within the lyrics folder
for artist_folder in os.listdir(lyrics_folder):
    artist_path = os.path.join(lyrics_folder, artist_folder)
    if os.path.isdir(artist_path):
        for song_file in os.listdir(artist_path):
            if song_file.endswith(".txt"):
                song_title = song_file.replace('.txt', '')
                with open(os.path.join(artist_path, song_file), 'r', encoding=
                    lyrics_data[artist_folder][song_title] = f.read()
```

```
In [59]: # Inspecting that the lyrics data was pulled correctly
for artist, songs in list(lyrics_data.items())[:2]:
    print(f"Artist: {artist}")
    for song, lyrics in list(songs.items())[:2]:
        print(f" Song: {song}")
        print(f" Lyrics (first 100 characters): {lyrics[:100]}")
        print("\n")
```

Artist: joni
 Song: jonimitchell_ladiesofthecanyon
 Lyrics (first 100 characters): "Ladies Of The Canyon"

Trina wears her wampum beadsShe fills her drawing book with linesSewing lace

Song: jonimitchell_bothsidesnow
 Lyrics (first 100 characters): "Both Sides Now"

Rows and floes of angel hairAnd ice cream castles in the airAnd feather cany
 ons ev

Artist: kanye
 Song: kanyewest_golddigger
 Lyrics (first 100 characters): "Gold Digger"

[Jamie Foxx:]She take my money when I'm in needYeah, she's a triflin' friend
 indeedOh

Song: kanyewest_intro
 Lyrics (first 100 characters): "Intro"

[DeRay Davis:]Kanye, can I talk to you for a minute?Me and the other faculty
 members was wo

```
In [60]: # Read in the twitter data

twitter_folder = "twitter/"

# Initialize a dictionary to store the descriptions
twitter_data = defaultdict(list)

# List all files in the twitter folder that end with '_followers_data.txt'
twitter_files = [f for f in os.listdir(twitter_folder) if f.endswith('_followe

# Loop through each file in the list
for twitter_file in twitter_files:
    artist_name = twitter_file.replace('_followers_data.txt', '') # Extract
    with open(os.path.join(twitter_folder, twitter_file), 'r', encoding='utf
        for line in f:
            twitter_data[artist_name].append(line.strip()) # Read each line
```

```
In [61]: # To check if the twitter data was loaded correctly
for artist, descriptions in list(twitter_data.items())[:2]:
    print(f"Artist: {artist}")
    for description in descriptions[:5]:
        print(f"  Description: {description[:100]}")
    print("\n")
```

Artist: cher

Description:	screen_name	name	id	location	followers_count
unt	friends_count	description			

Description:	hsmcnp	Country Girl	35152213		1302	1014
--------------	--------	--------------	----------	--	------	------

Description:	horrormomy	Jeny	742153090850164742	Earth	81	
514	Proud supporter of messy buns & leggings					

Description:	anju79990584	anju	1496463006451974150		13	
140	163cm / 愛かっぶ💜26歳🍒 工〇好きな女の子💜 フォローしてくれたらDMします💛					

Description:	gallionjenna	J	3366479914		752	556
csu						

Artist: robynkonihiwa

Description:	screen_name	name	id	location	followers_count
unt	friends_count	description			

Description:	AngelxoArts	Angelxo	1424055675030806529	Zacatlan, Pu		
ebla, Mexico	29	535	"I love chill" •Facebook / I			

Description:	songsfornikola	johnny	1502717352575651840		6	
318	books, movies, music, nature & TV shows. OG Sweetee					

Description:	thibaud_lola	Thibaud Lola	1502407708246478852			
3	69	(Am)auteur en herbe 🌱 - juriste en paille 🤪 - Am				

Description:	KyleSew2112	Kyle S 🇬🇧🇺🇦	3423966821	South East L		
ondon	1258	3444	This Twitter profile is full of sarc			

```
In [62]: # Read in the positive and negative words and the
# tidytext sentiment. Store these so that the positive
# words are associated with a score of +1 and negative words
# are associated with a score of -1. You can use a dataframe or a
# dictionary for this.

# Read in positive and negative words and assign scores
positive_words = pd.read_csv('positive-words.txt', comment=';', header=None,
positive_words['score'] = 1

negative_words = pd.read_csv('negative-words.txt', comment=';', header=None,
negative_words['score'] = -1

# Combine both into a single DataFrame
```

```
sentiment_words_df = pd.concat([positive_words, negative_words])

# Read in the tidytext sentiments
tidytext_sentiments = pd.read_csv('tidytext_sentiments.txt', delimiter='\t')

# Now you can map the sentiment to scores, assuming 'positive' is +1 and 'negative' is -1
tidytext_sentiments['score'] = tidytext_sentiments['sentiment'].map({'positive': 1, 'negative': -1})
```

In [63]: *# Checking that the pandas Dataframe is set up how we want for sentiment_words*
 sentiment_words_df.head()

Out [63]:

	word	score
0	a+	1
1	abound	1
2	abounds	1
3	abundance	1
4	abundant	1

In [64]: *# Checking that the pandas Dataframe is set up how we want for tidytext_sentiments*
 tidytext_sentiments.head()

Out [64]:

	word	sentiment	lexicon	score
0	abandon	negative	nrc	-1
1	abandoned	negative	nrc	-1
2	abandonment	negative	nrc	-1
3	abba	positive	nrc	1
4	abduction	negative	nrc	-1

In [65]: *# Combining the two dataframes*
 combined_sentiments_df = pd.concat([sentiment_words_df, tidytext_sentiments])
 combined_sentiments_df.head()

Out [65]:

	word	score
0	a+	1
1	abound	1
2	abounds	1
3	abundance	1
4	abundant	1

Sentiment Analysis on Songs

In this section, score the sentiment for all the songs for both artists in your data set. Score the sentiment by manually calculating the sentiment using the combined lexicons provided in this repository.

After you have calculated these sentiments, answer the questions at the end of this section.

```
In [66]: # Defining the function to calculate sentiment
def calculate_sentiment_df(lyrics, sentiment_df):
    # Tokenize the lyrics into words
    words = lyrics.split()
    # Initialize sentiment score
    sentiment_score = 0
    # Look up each word in the sentiment DataFrame and sum their scores
    for word in words:
        if word in sentiment_df['word'].values:
            sentiment_score += sentiment_df.loc[sentiment_df['word'] == word].sentiment
    return sentiment_score
```

```
In [67]: # Applying the sentiment calculation to each song
sentiment_results = defaultdict(dict)

for artist in lyrics_data:
    for song, lyrics in lyrics_data[artist].items():
        sentiment_score = calculate_sentiment_df(lyrics, combined_sentiments)
        sentiment_results[artist][song] = sentiment_score
```

```
In [68]: # Calculating sentiment score per artist

average_sentiment_per_artist = {}

for artist, songs in sentiment_results.items():
    average_score = sum(songs.values()) / len(songs) if songs else 0
    average_sentiment_per_artist[artist] = average_score

# Display the average sentiment score per artist
for artist, avg_score in average_sentiment_per_artist.items():
    print(f"Artist: {artist}, Average Sentiment Score: {avg_score}")
```

```
Artist: joni, Average Sentiment Score: 1.84
Artist: kanye, Average Sentiment Score: 13.4
```

Questions

Q: Overall, which artist has the higher average sentiment per song?

A: The artist with the higher sentiment per song is Kanye West, by a mile. This means Kanye's songs, on average, have a higher positive sentiment. Nonetheless, Joni still has a slightly positive sentiment in her songs. The score can be less than zero, and I would imagine artists such as Korn or Slipknot would be in the negative, given that their songs are generally very negative in their lyrical content. It does crack me up that Kanye's is so

high, at least compared to Joni. It is also a little surprising, as I can think of many Kanye songs that are negative in their lyrical content.

Q: For your first artist, what are the three songs that have the highest and lowest sentiments? Print the lyrics of those songs to the screen. What do you think is driving the sentiment score?

A: Results below, starting with Kanye West. The results are close to what I was thinking, actually. The song selection is from the first 25 songs of Kanye West's catalogue, which is primarily the album "College Dropout." This is a socially conscious album, before Kanye was as experimental in his music as he became in the 2010s. The driver of the negative sentiment are "All Falls Down" and "Jesus Walks." I specifically had "Jesus Walks" and also "We Don't Care" as songs that would likely show up in the negative sentiment, though "We Don't Care" did not crack the top 3. "Jesus Walks" is a song critical of modern society and uses dramatic language from the bible to talk about the world as it was in 2004 (the fear of Terrorism being predominant). "All Falls Down" is also one of my favorites, and talks about the problems with consumer culture in America. "Slow Jamz" is the top highest sentiment song, and is very much an R&B song featuring none other than Jamie Foxx. It is a song featuring romance and is a "feel good" pleasant song to listen to.

```
In [69]: # First, need to sort the songs by sentiment score for Kanye
artist_songs = sentiment_results['kanye']

# Sort the songs by sentiment score in descending order and then in ascending order
highest_songs = sorted(artist_songs.items(), key=lambda x: x[1], reverse=True)
lowest_songs = sorted(artist_songs.items(), key=lambda x: x[1])[:3]
```

```
In [70]: # Print the lyrics of the songs
print("Songs with Highest Sentiments:")
for song, _ in highest_songs:
    print(f"\nSong: {song}\nLyrics:\n{lyrics_data['kanye'][song]}")

print("\nSongs with Lowest Sentiments:")
for song, _ in lowest_songs:
    print(f"\nSong: {song}\nLyrics:\n{lyrics_data['kanye'][song]}")
```

Songs with Highest Sentiments:

Song: kanyewest_slowjamz

Lyrics:

"Slow Jamz"

[Jamie Foxx:]Kanye, it's Foxx, manI'm just sayin' I was talkin' to the girls you knowAnd we don't put enough emphasis on the ladies sometimeYou know, I was talkin' to this girlShe was talkin' about the music all fast in the club you knowShe gotta drink water 'cause she thirstyShe danced like 92 hundred songs back to backWith ain't nobody really try to find out what she feelin'Like how she feel... you know what she told me?(Are you gonna be?) Check it out, this is what she said(Say that you're gonna be) Ooh, ooh, ooh, ooh, oohh [Luther Vandross:]Are you gonna be?Say that you're gonna be[Jamie Foxx:]Oh oh oh oh oh[Jamie Foxx:]She said she want some Marvin Gaye, some Luther Vandross, a little Anita, will definitely set this party off right(Are you gonna be, are you gonna be, are you gonna be, are you gonna be, are you gonna be? Well well well well well)She said she want some Ready for the World, some New Edition, some Minnie Riperton will definitely set this party off right(Are you gonna be, are you gonna be, are you gonna be, are you gonna be, are you gonna be? Well well well well well)[Kanye West:]It definitely will!You know what I told her?[Kanye West:]I told her to drive over in your new whipBring some friends you cool withI'm gonna bring thecool whipThen I want you to stripSee you is my new chickSo we get our grind onShe be grabbing, calling me Biggie like Shyne homeMan, I swear she fine homesWhy she always lying though Telling me them diamonds when she know they rhinestonesShe got a light skinned friend look like Michael JacksonGot a dark skinned friend look like Michael JacksonI played 'Ready for the World' - she was ready for some actionMy dog said you ain't no freak, so you're 'bout to prove my man wrongI'm a play this VandrossYou're gonna take your pants offI'm gonna play this Gladys KnightMe and you're gonna get rightShe said she want some Marvin Gaye, some Luther VandrossA little Anita will definitely set this party off right(Are you gonna be, are you gonna be, are you gonna beAre you gonna be, are you gonna be, well well well well)She said she want some Ready for the World, some New EditionSome Minnie Riperton will definitely set this party off right(Are you gonna be, are you gonna be, are you gonna beAre you gonna be, are you gonna be, well well well well)[Jamie Foxx:]Smokey Robinson, Smokey RobinsonFreddie Jackson, everything, everything (Well well well well)Smokey Robinson, Ashford & Simpson (Are you gonna be)Set the party, really set the party off rightYes it will, yes it will (Well well well well)Al Green, oh! Al Green, ohh yeah!Oooh!Whatcha know about the Isley Brothers?[Aisha Tyler & Kanye West:]Now Kanye, I know I told you to slow it down, babyIt's good, it's all good, it's beautifulBut now I need you to do it faster babyCan you please? Do it faster, baby, do it faster!Damn, baby; I can't do it that fast... but I know somebody who can, Twista!Twista:]Got you looking at the glist on my hands and wristWhile I'm laying back smoking on my cannabisWhen it come to rocking the rhythm like Marvin and LutherI can tell you ain't no messing with Kan-man and TwistaFrom the Chi and I beSipping HennessyPlay some R&BWhile I smoke a Byou can preferably find that I'm a G?And all this (well well well well well)Come with me and sip on some Evelyn ChampagneYou ain't know Twista work it like the WhispersHit the stop light, move it to some IsleysThe rims still moving so I bump a little SpinnersWhile I'm smoking on a BDipping through the streetsBumping R&BAnd I got the heat on the 23s?And I do it (well well well well well)With my Earth and the Wind smoke a FireLet me get your sheets wet listening to Keith SweatPut you in a daze with MazeFulfilling our every temptation slow jamming having deep sexYou ready for the world girlCome on go with

me I touch you all over your body baby don't say no to me And every moment you
 u controllin' me I'm loving the way you be holding me when I be listening to
 Jodeci And when I come over and bend your ass You be bumping Teddy Pendergrass
 I'd hit it from the back to the melody and rode it slow Now I gotta go up in
 it fast, but I'm 'a finish last No matter how much of a thug you see I still s
 pit it like it's R&B, come to the club with me And when some Luther come on I
 hope you feeling me and still will be in love with me Chi ride [Jamie Foxx:] Sh
 e said she want some Marvin Gaye, some Luther Vandross, a little Anita, will
 definitely set this party off right (Are you gonna be, are you gonna be, are
 you gonna be, are you gonna be, are you gonna be? Well well well well well) S
 he said she want some Ready for the World, some New Edition, some Minnie Rip
 erton will definitely set this party off right (Are you gonna be, are you gon
 na be, are you gonna be, are you gonna be, are you gonna be? Well well well
 well well) [Jamie Foxx & Tracie Spencer] [Jamie Foxx:] She said she want some
 Marvin Gaye, some Luther Vandross, a little Anita, will definitely set this
 party off right (Are you gonna be, are you gonna be, are you gonna be, are yo
 u gonna be, are you gonna be? Well well well well well) She said she want som
 e Ready for the World, some New Edition, some Minnie Riperton will definitel
 y set this party off right (Are you gonna be, are you gonna be, are you gonna
 be, are you gonna be, are you gonna be? Well well well well well)

Song: kanyewest_lastcall

Lyrics:

"Last Call"

[JAY-Z:] Aight, let's run it, let's run it Yo fuck you, Kanye, first and forem
 ost For making me do this shit. Muh'fucker Had to throw everybody out the moth
 erfucking room Cause they don't fucking [Kanye West:] I'd like to propose a toa
 st I said toast motherfucker! [Kanye West:] And I am (Here's to the Roc) And they
 ask me, they ask me, they ask me, I tell them (Here's to Roc-A-Fella) Raise yo
 ur glasses, your glasses, your glasses to the sky and (Here's to the Roc) This
 is the last call for alcohol, for the (Mr. Rockefeller) So get your ass up off
 the wall [Kanye West:] The all around the world Digital Underground Pac The Rud
 olph the red-nosed reindeer of the Roc I take my chain, my 15 seconds of fame
 And come back next year with the whole fucking game Ain't nobody expect Kanye
 to end up on top They expected that College Dropout to drop and then flop Then
 maybe he stop savin' all the good beats for himself Roc-A-Fella's only niggas
 that helped My money was thinner than Sean Paul's goatee hair Now Jean Paul Ga
 ultier cologne fill the air, here They say he bougie, he big-headed Would you
 please stop talking about how my dick head is Flow infectious, give me 10 sec
 onds I'll have a buzz bigger than insects in Texas It's funny how wasn't nobod
 y interested 'Til the night I almost killed myself in Lexus [Kanye West:] Now I
 am (Here's to the Roc) And they ask me, they ask me, they ask me, I tell them
 (Here's to Roc-A-Fella) Raise your glasses, your glasses, your glasses to the
 sky and (Here's to the Roc) This is the last call for alcohol, for the (Mr. Roc
 keffeller) So get your ass up off the wall [Kanye West:] Now was Kanye the most
 overlooked? Yes sir Now is Kanye the most overbooked? Yes sir Though the fans
 want the feeling of A Tribe Called Quest But all they got left is this guy ca
 lled West That'll take Freeway, throw him on tracks with Mos Def Call him Kwa-
 li or Kwe-li, I put him on songs with JAY-Z I'm the Gap like Banana Republic
 and Old Navy, and oooh It come out sweeter than old Sadie Nice as Bun-B when I
 met him at the Source awards Girl he had with him - ass coulda won the horse
 awards And I was almost famous, now everybody love Kanye I'm almost Raymond Som
 e say he arrogant, can y'all blame him? It was straight embarrassing how y'al
 l played him Last year shoppin' my demo, I was tryin' to shine Every motherfuc
 ker told me that I couldn't rhyme Now I could let these dream killers kill my

self-esteem Or use my arrogance as the steam to power my dreams I use it as my gas, so they say that I'm gassed But without it I'd be last, so I ought to laugh So I don't listen to the suits behind the desk no more You niggas wear suits cause you can't dress no more You can't say shit to Kanye West no more I rocked 20,000 people, I was just on tour, nigga I'm Kon, the Louis Vuitton Don Bought my mom a purse, now she Louis Vuitton Mom I ain't play the hand I was dealt, I changed my cards I prayed to the skies and I changed my stars I went to the malls and I balled too hard "Oh my god, is that a black card?" I turned around and replied, "Why yes But I prefer the term African American Express" Brains, power, and muscle, like Dame, Puffy, and Russell Your boy back on his hustle, you know what I've been up to Killin' y'all niggas on that lyrical shit Mayonnaise-colored Benz, I push Miracle Whips [Kanye West:] And I am (Here's to the Roc) And they ask me, they ask me, they ask me, I tell them (Here's to Roc-A-Fella) Raise your glasses, your glasses, your glasses to the sky and (Here's to the Roc) This is the last call for alcohol, for my niggas (Mr. Rockefeller) So get your ass up off the wall So this A&R over at Roc-A-Fella, named HipHop Picked the "Truth" beat for Beanie. And I was in the session with him. I had my demo with me. You know, like I always do. I play the songs, he's like "Who that spittin'?" I'm like "It's me." He's like "Oh, well okay." Uhh, he started talkin' to me on the phone, going back and forth Just askin' me to send him beats, and I'm thinking he's trying to get into managing producers, cause he had this other kid named Just Blaze he was messin' with So won't you raise your glass won't you So won't you raise your glass won't you So won't you raise your glass won't you So won't you raise your glass won't you And um, he was friends with my mentor, No ID. And No ID told him, "Look, man, you wanna mess with Kanye you need to tell him that you like the way he rap" [No ID:] "Yo, you wanna sign him, tell him you like how he rap" I was all, I dunno if he was gassin' me or not but he's like he wanna manage me as a rapper AND a producer [HipHop:] "I'll sign you as a producer and a rapper" I'm like oh shit. I was messin' with, uh, D-Dot also. People were like this, started talkin' about the ghost production but that's how I got in the game. If it wasn't for that, I wouldn't be here. So you know, after they picked that "Truth" beat at I was figuring I was gonna do some more work but shit just wasn't poppin' off like that. I was stayin' in Chicago, I had my own apartment, I be doin' like, just beats for local acts just to try to keep the lights on, and then to go out and buy, get a Pelle Pelle off lay-away, get some Jordans or something or get a TechnoMarine, that's what we wore back then I made this one beat where I sped up this Harold Melvin sample I played it for Hip over the phone, he's like, "Oh, yo that shit is crazy Jay might want it for this compilation album he doin', called The Dynasty. And at that time, like the drums really weren't soundin' right to me So I went and um, I was listening to Dre Chronic 2001 at that time. And really I just, like bit the drums off "Xxplosive" and put it like with a sped-up sample, and now it's kind of like my whole style, when it started, when he rapped on "This Can't Be Life." And that was like, really the first beat of that kind that was on The Dynasty album. I could say that was the the resurgence of the soul sound You know, I got to come in and track the beat and at the time I was still with my other management. I really wanted to roll with HipHop cause I, I just needed some fresh air, you know what I'm sayin' cause I been there for a while. I appreciated what they did for me but, you know there's a time in every man's life where he gotta make a change. Try to move up to the next level. And that day I came and I tracked the beat and I got to meet JAY-Z and he said, "Oh you a real soulful dude." [JAY-Z:] "Oh you a real soulful dude, man" And he, uh, played the song cause he already spit his verse by the time I got to the studio. You know how he do it, one take. And he said [JAY-Z:] "Check this out, tell me what you think of this, right here""Tell me what you think of this." And I heard

it, and I was thinking like, man, I really wanted more like of the simple type JAY-Z. I ain't want like the, the more introspective, complicated rhyme or the... in my personal opinion. So he asked me, "What you think of it?" [JAY-Z:] "So what you think of this?" And I was like, "Man that shit tight," you know what I'm sayin', man what I'ma tell him? I was on the train, man, you know. So after that, I went back home. And man I'm, I'm just in Chicago, I'm trying to do my thing. You know, I got groups. I got acts I'm trying to get on, and like there wasn't nothin' really like poppin' off the way it should have been. One of my homies that was one of my artists, he got signed. But it was supposed to really go through my production company, but he ended up going straight with the company. So, like I'm just straight holdin' the phone, gettin' the bad news that dude was tryin' to leave my company. And I got evicted at the same time. So I went down and tracked the beats from him, I took that money, came back, packed all my shit up in a U-Haul, maybe about ten days before I had to actually get out so I ain't have to deal with the landlord cause he's a jerk. Me and my mother drove to [Mother:] "Come on, let's just go"... Newark, New Jersey. I hadn't even seen my apartment. I remember I pulled up [Mother:] "Kanye, baby, we're here"... I unpacked all my shit. You know, we went to Ikea, I bought a bed, I put the bed together myself. I loaded up all my equipment, and the first beat I made was, uh, "Heart of the City." And Beans was still working on his album at that time, so I came up there to Baseline, it was Beans' birthday, matter of fact, and I played like seven beats. And, you know I guess he was in the zone, he already had the beats that he wanted, I had did "Nothing Like It" already at that time but then Jay walked in. I remember he had a Gucci bucket hat on. I remember it like, like it was yesterday. And Hiphop said, "Yo play that one beat for him." And I played "Heart of the City." And really I made "Heart of the City," I really wanted to give that beat to DMX [Hiphop:] "No I think Jay gon' like this one right here" And I played another beat, and I played another beat. And I remember that at Gucci bucket, he took it and like put it over his face and made one of them faces like '0000000000H.' Two days later I'm in Baseline and I seen Dame. Dame didn't know who I was and I was like, "Yo what's up I'm Kanye." [Dame:] "Yo, you that kid, Kanye?" "You that kid that gave all them beats to Jay? Yo, this nigga got classics to your beats" [Dame:] "Jay got classics, G." "You know I ain't talkin' shit. I'm like "oh shit." And all this time I'm starstruck, man. I'm still thinking 'bout, you know I'm picturing these niggas on the show, The Streets is Watching, I'm lookin', these were superstars in my eyes. And they still are, you know. So, Jay came in and he spit all these songs like in one day, and in two days... I gotta bring up one thing, you know, come back to the story, the day I did the 'Can't be Life' beat on track, I remember Lenny S, he had some Louis Vuitton sneakers on, he think he fly. And Hiphop was there, I think Ty-Ty, John Meneilly, a bunch of people. I didn't know all these people at the time they was in the room, and I said, "yo Jay I could rap." And I spit this rap that said, uh "I'm killin' y'all niggas on that lyrical shit. Mayonnaise colored Benz, I push miracle whips." And I saw his eyes light up when I said that line. But you know the rest, the rap was like real wack and shit, so that's all the response. He said, "Man that was tight." [JAY-Z:] "That, that was cool. That was hot." "That was it. You know, I ain't get no deal then, hehe. Okay, fast forward. So, Blueprint, "H to the Izzo," my first hit single. And I just took that proudly, built relationships with people. My relationship with Kweli I think was one of the best ones to ever happen to my career as a rapper. Because, you know, of course, later he allowed me to go on tour with him. Man, I appreciate— I love him for that. And at this time, you know I didn't have a deal, I had songs, and I had relationships with all these A&R's, and they wanted beats from me, so they'd call me up, I'd play them some beats. "Gimme a beat that sound like JAY-Z." You know

w, they dick riders. Whatever. So I'll play them these post-Blueprint beats or whatever and then I'll play my shit. I'll be like, "Yo but I rap too." He y, I guess they was lookin' at me crazy cause you know, cause I ain't have a jersey on or whatever. Everybody out there listen here: I played them 'Jesus Walks' and they didn't sign me. You know what happened, it was some A&R's th at fucked with me though, but then like the heads, it'd be somebody at the c ompany that'll say, "Naw." Like, Dave Lighty fucked with me, my nigga Mel br ought me to a bunch of labels. Jessica Rivera, man[Jessica:] "Man, you niggas is stupid if y'all don't sign Kanye, for real." "I'm not gonna say nothin' to mess my promotion up" "Y'all niggas is stupid" "Let's just say I didn't get my d eal. The nigga that was behind me, I mean, he wasn't even a nigga, you know? The person who actually kicked everything off was Joe 3H from Capitol Record s. He wanted to sign me really bad[Joe:] "We gonna change the game, buddy." "Da me was like, "Yo you got a deal with Capitol? Okay man, just make sure it's not wack." [Dame:] "You gotta make sure it's not wack." Then one day I just wen t ahead and played it, I wanted to play some songs, cause you know Cam was i n the room, Young Guru, and Dame was in the room. So I played... actually i t's a song that you'll never hear, but maybe I might use it. So, it's called 'Wow.'" "I go to Jacob with 25 thou, you go with 25 hundred, wowI got 11 plaqu es on my walls right nowYou got your first gold single, damn, nigga, wow." "Li ke the chorus went. Don't bite that chorus, I might still use it. So I play that song for him and he's like "oh shit" [Dame:] "Oh shit it's not even wac k." "I ain't gonna front, it's kinda hot." [Dame:] "It's actually kinda hot." "Li ke they still weren't looking at me like a rapper. And I'm sure Dame figure d, 'Like man. If he do a whole album, if his raps is wack at least we can th row Cam on every song and save the album, you know. So uh Dame took me into the office, and he's like "yo man, B, B, you don't want a brick, you don't w ant a brick" [Dame:] "You don't wanna catch a brick"" "You gotta be under an umb rella, you'll get rained on." I told Hiphop and Hiphop was all, "Oh, word?" Actually, even with that, I was still about to take the deal with Capitol ca use it was already on the table and cause of my relationship with 3H. That, you know, cause I told him I was gonna do it, and I'm a man of my word, I wa s gonna roll with what I said I was gonna do. Then, you know, I'm not gonna name no names, but people told me, "oh he's just a producer-rapper," and tol d 3H that told the heads of the Capitol, and right-- the day I'm talking abo ut, I planned out everything I was gonna do. Man, I had picked out clothes, I already started booking studio sessions, I started arranging my album, thi nking of marketing schemes, man I was ready to go. And they had Mel call me, they said, "yo... Capitol pulled on the deal" [Mel:] "Yo, Capitol pulled out o n the deal." And, you know I told them that Roc-A-Fella was interested and I don't know if they thought that was just something I was saying to gas them up to try to push the price up or whatever. I went up... I called G, I said, "man, you think we could still get that deal with Roc-A-Fella?" "So won't you raise your glass, won't youSo won't you raise your glass, won't youSo won't you raise your glass, won't youSo won't you raise your glass, won't you

Song: kanyewest_familybusiness

Lyrics:

"Family Business"

How's your son? (all the things)He made the team this year? (all, all, all t he things things)Aight, they said he wasn't tall enough(...all all that glit ters is not goldAnd all gold is not realityReal is what you lays on me)Ma we here we gon' cook this Sunday OK?That's a new girlfriend?This is family busi nessAnd this is for the family that can't be with usAnd this is for my cousi n locked down, know the answer's in usThis why I spit it in my songs so swee

t like a photoOf your granny's picture, now that you're gone, it hit usSuper hard on Thanksgiving and Christmas, this can't be rightYeah, you heard the t rack I did man, "This Can't Be Life"Somebody please say grace so I can save faceAnd have a reason to cover my faceI even made you a plate, soul food, kn ow how Granny do itMonkey bread on the side, know how the family do itWhen I brought it why the guard have to look all through it?As kids, we used to lau ghWho knew that life would move this fast?Who knew I'd have to look at you t hrough a glass?And look, you tell me you ain't did it then you ain't did itA nd if you did, then that's family businessAnd I don't care 'bout(All the dia mond rings all the diamond rings)They don't mean a thing (all, all, all the things)All these fancy thingsI tell you that all is my weight and gold(All t hat glitters is not gold, now gold is not reality)Now all I know I know all these things(Real is what you lease on me)This is family businessAnd this is for everybody standing with usCome on, let's take a family Grammy pictureAb i, remember when they ain't believe in me?Now she like "See, that's my cousi n on TV!"Now, we gettin' it and we gon' make itAnd they gon' hate it and I'm his favoriteI can't deny it, I'm a straight riderBut when we get together be electric slidin'Grandma, get 'em shook upAw naw, don't open the photo book u pI got an Aunt Ruth that can't remember your nameBut I bet them Polaroids'll send her down memory laneYou know that one auntie, you don't mean to be rude But every holiday nobody eating her foodAnd you don't wanna stay there cause them your worst cousinsGot roaches at their crib like them your first cousin sAct like you ain't took a bath with your cousinsFit 3 in the bed if it's 6 of y'allI'm talkin' 'bout three by the head and three by the legBut you ai n't have to tell my girl I used to pee in the bedRain, rain, rain go awayLet the sun come out and all the children sayRain, rain, rain go awayLet the sun come out and all the children sayI woke up early this morning with a new sta te of mindA creative way to rhyme without using knives and gunsKeep your nos e out the sky, keep your heart to GodAnd keep your face to the risin' sunAll my niggas from the Chi, that's my family, dogAnd my niggas ain't my guys, th ey my family, dogI feel like one day you'll understand me, dogYou can still love your man and be manly, dogYou ain't got to get heated at every house wa rmin'Sittin' here, grillin' people like George ForemanWhy Uncle Ray and Aunt Shiela always performin'?The second she storm out then he storm inY'all gon' sit down, have a good time this reunionAnd drink some wine like CommunionAnd act like everything fine and if it isn'tWe ain't letting everybody in our fa mily business, uh(All all all the diamond rings diamond rings)They don't mea n a thing (all, all, all the things)They don't mean a thing (all, all, all t he things)(All all that glitters is not gold, now gold is not reality)They d on't mean a thing a thing(All, all, all the things)They don't mean a thing a thing a thingI don't care what they don't mean a thing(All, all, all the thi ngs) all these fancy thingsI tell you that all is my weight and goldAll I kn ow, I know all these thingsAll these things, all these thingsAll these thing s, all these thingsCLK Mercedes BenzAll these things, all these thingsAll th ese things, all these thingsAll these things, all these thingsA whole lotta moneyAll these things, all these thingsAll these things, all these thingsAll these things, all these thingsMommy and Daddy, will you please stop fightin g?All these things, all these thingsAll these things, (and I don't care why) all these thingsAll these things, all these thingsAll these things, all thes e thingsLet's get Stevie outta jail

Songs with Lowest Sentiments:

Song: kanyewest_allfallsdown

Lyrics:

"All Falls Down"

[Syleena Johnson and Kanye West:] Oh, when it all, it all falls down Yeah, this the real one, baby I'm tellin' you all, it all falls down Uh, Chi-Town, stand up! Oh, when it all, it all falls down Southside, Southside We gon' set this party off right I'm tellin' you all, it all falls down Westside, Westside We gon' set this party off right Oh, when it all [Kanye West:] Man, I promise, she's so self-conscious She has no idea what she doin' in college That major that she majored in don't make no money But she won't drop out, her parents'll look at her funny Now, tell me that ain't insecure The concept of school seems so secure Sophomore, three years, ain't picked a carrier She like, "Fuck it, I'll just stay down here and do hair." 'Cause that's enough money to buy her a few pairs Of new Airs, 'cause her baby daddy don't really care She's so precious with the peer pressure Couldn't afford a car, so she named her daughter Alexis She had hair so long that it looked like weave Then she cut it all off, now she look like Eve And she be dealin' with some issues that you can't believe Single black female addicted to retail, and well [Syleena Johnson and Kanye West:] Oh, when it all, it all falls down And when it falls down, who you gon' call now? I'm tellin' you all, it all falls down C'mon, c'mon, and when it falls down Oh, when it all [Kanye West:] Man, I promise, I'm so self-conscious That's why you always see me with at least one of my watches Rollie's and Pasha's done drove me crazy I can't even pronounce nothin', pass that Ver-say-see! Then I spent four hundred bucks on this Just to be like, "Nigga, you ain't up on this." And I can't even go to the grocery store Without some Ones that's clean and a shirt with a team It seem we livin' the American Dream But the people highest up got the lowest self-esteem The prettiest people do the ugliest things For the road to riches and diamond rings We shine because they hate us, floss 'cause they degrade us We tryna buy back our 40 acres And for that paper, look how low we'll stoop Even if you in a Benz, you still a nigga in a coupe [Syleena Johnson and Kanye West:] Oh, when it all, it all falls down Come on, come on I'm tellin' you all, it all falls down And when it falls down, who you gon' call now? Oh, when it all, it all falls down Come on, come on I'm tellin' you all, it all falls down And when it all falls down [Kanye West:] I say, "Fuck the police," that's how I treat 'em We buy our way out of jail, but we can't buy freedom We'll buy a lot of clothes, but we don't really need 'em Things we buy to cover up what's inside 'Cause they made us hate ourself and love they wealth That's why shorty's hollerin', "Where the ballers at?" Drug dealer buy Jordan, crackhead buy crack And the white man get paid off of all of that But I ain't even gon' act holier than thou 'Cause fuck it, I went to Jacob with 25 thou Before I had a house and I'd do it again 'Cause I wanna be on 106 and Park, pushin' a Benz I want to act ballerific like it's all terrific I got a couple past-due bills, I won't get specific I got a problem with spendin' before I get it We all self-conscious, I'm just the first to admit it [Syleena Johnson and Kanye West:] Oh, when it all, it all falls down C'mon, c'mon And when it falls down, who you gon' call now? I'm tellin' you all, it all falls down C'mon c'mon, and when it falls down Oh, when it all, it all falls down Southside, Southside We gon' set this party off right I'm tellin' you all, it all falls down Westside, Westside We gon' set this party off right Oh when it all, it all falls down Chi-Town, Chi-Town We gon' show 'em how we get down I'm tellin' you all, it all falls down Now, Syleena, you just like a safe belt, you saved my life C'mon Oh when it all, it all falls down I'm tellin' you all, it all falls down

Song: kanyewest_jesuswalks

Lyrics:

"Jesus Walks"

We at warWe at war with terrorism, racismBut most of all we at war with ourselves(Jesus walk)God show me the way because the Devil's tryna break me down (Jesus walk with me)You know what the Midwest is? Young and restlessWhere restless (Niggas) might snatch your necklaceAnd next these (Niggas) might jack your LexusSomebody tell these (Niggas) who Kanye West isI walk through the valley of the Chi where death isTop floor the view alone will leave you breathlessTry to catch it it's kinda hardGetting choked by detectives, yeah, yeah, now check the methodThey be askin' us questions, harass and arrest usSayin' "We eat pieces of shit like you for breakfast"Huh? Y'all eat pieces of shit? What's the basis?We ain't going nowhere but got suits and casesA trunk full of coke, rental car from AvisMy mama used to say only Jesus can save usWell mama I know I act a foolBut I'll be gone 'til November, I got packs to moveI hope(Jesus walk)God show me the way because the Devil's tryna break me down(Jesus walk with me)The only thing that I pray is that my feet don't fail me now(Jesus walk)And I don't think there's nothin' I can do now to right my wrongs(Jesus walk with me)I wanna talk to God but I'm afraid 'cause we ain't spoke in so long(Jesus walk)God show me the way because the Devil's tryna break me down(Jesus walk with me)The only thing that I pray is that my feet don't fail me now(Jesus walk)And I don't think there's nothin' I can do now to right my wrongs(Jesus walk with me)I wanna talk to God but I'm afraid 'cause we ain't spoke in so longSo long, so long(Jesus walk with me)To the hustlers, killers, murderers, drug dealers, even the scrippers(Jesus walks for them)To the victims of welfare feel we livin' in Hell here, hell yeah(Jesus walks for them)Now, hear ye, hear ye, want to see Thee more clearlyI know He hear me when my feet get weary'Cause we're the almost nearly extinctWe rappers is role models: we rap, we don't thinkI ain't here to argue about His facial featuresOr here to convert atheists into believersI'm just tryna say the way school need teachersThe way Kathie Lee needed Regis, that's the way I need JesusSo here go my single, dawg, radio needs thisThey say you can rap about anything except for JesusThat means guns, sex, lies, videotapeBut if I talk about God my record won't get played, huh?Well if this take away from my spinsWhich'll probably take away from my endsThen I hope this take away from my sinsAnd bring the day that I'm dreamin' aboutNext time I'm in the club, everybody screamin' out(Jesus walk)God show me the way because the Devil's tryna break me down(Jesus walk with me)The only thing that I pray is that my feet don't fail me now

Song: kanyewest_twowords

Lyrics:

"Two Words"

[Kanye West:]We in the streets, playa, get ya mailIt's only two places you end up, either dead or in jailStill nowhere to goStill nowhere to goNow throw ya hands up, hustlers, busters, boosters, hoesEverybody, fuck thatStill nowhere to goStill nowhere to go[Mos Def:]Two words, United States, no love, no breaksLow brow, high stakes, crack smoke, black folksBig Macs, fat folks, ecstasy capsulesPresidential scandals, everybody moveTwo words, Mos Def, K. West, hot shitCalm down, get back, ghetto people, got thisGame 'pon lock shit, gun 'pon cock shitWe won't stop shit, everybody moveTwo words, BK, NY, Bed StuyToo harsh, too hungry, too many, that's whyThese streets know game, can't ball, don't playHeavy traffic, one lane, everybody moveTwo words, Mos Def, Black Jack, hot shitCalm down, get back, ghetto people, got thisGame 'pon lock, gun 'pon cockWe won't stop, everybody move[Kanye West (Harlem Boys Choir):]Now throw ya hands up, hustlers, busters, boosters, hoes(Throw your hands up high) Everybody, fuck thatStill nowhere to goStill nowhere to goAnd keep ya hands up, hustlers, busters, boostersHoes ('Til they reach the sky), ev

everybody, fuck thatStill nowhere to goStill nowhere to go[Kanye West:]Two words: Chi-Town, Southside, worldwide'Cause I rep that 'til I fuckin' dieOne neck, two chains, one waist, two gatsOne wall, twenty plaques, dues paid, gimme thatI am limelight, Blueprint, five micsGo-Getters rhyme, like, should've been signed twiceMost imitated, Grammy-nominatedHotel accommodated, cheerleader prom-datedBarbershop playa-hated, mom-and-pop bootlegged itFelt like it rained 'til the roof caved inTwo words: Chi-Town raised me, crazySo I live by two words: "Fuck you, pay me"Screaming, "Jesus, save me!"You know how the game be, I can't let 'em change me'Cause on judgment day, you gon' blame meLook, God, it's the same meAnd I basically know now, we get racially profiled'Cuffed up and hosed down, pimped up and ho'd downPlus, I got a whole city to hold downFrom the bottom, so the top's the only place to go now[Kanye West (Harlem Boys Choir):]Now throw ya hands up hustlers, busters, boosters, hoses(Throw your hands up high)Oh, everybody, fuck thatStill nowhere to goStill nowhere to go[Freeway:]Two words, Freeway, two letters, ARTurn y'all rap nig gas to two words: fast runnersLike Jackie Joyner, you better sleep with your burnerThe heat skeet, blow a reef through your car, my GodTwo words: no guns, break armsBreak necks, break backs, Steven SeagalFree, young boss, freshman of the RocWith the beef in the pot Jay sent for his dogs to brawlForget your squad, better fend for yourselfHave you screamin' out four words, "Send for the law?" ughTwo words: Freeway, slightly retardedFuck around, throw a clip in your artist, leave with his broad[Mos Def (Harlem Boys Choir):]Red, white, blue, black (Throw your hands up)Calm down, move backMotherfuckers asking, "Who is that?"You know it's the almighty Black JackMos Def, K. WestGhet to people get this shit off ya chestNorth to the south, to the east, to the westBlack Jack Johnson, it's no contest(High) And show it to 'em like

Q: For your second artist, what are the three songs that have the highest and lowest sentiments? Print the lyrics of those songs to the screen. What do you think is driving the sentiment score?

A: Joni Mitchell writes in her best albums about melancholy things. She is sort of a melancholy person who, despite her great artistry, is known to be difficult to be around. She does occasionally write about positive things. The song "Dawntreader", as well as many of her early songs before she started to find her voice on the album "Clouds", were very much inspired by the peace-loving hippies of the 1960s. Her first album "Song to a Seagull" is basically a snoozer copy of 1960s soft rock inspired by LSD. There are words about "love", "treasure", and "smiling." I am not as intimately familiar with the songs in the negative sentiment list, but I see that the top song is "Nathan La Franeer." Words like "never", "furrowed", and "burglar" seem to drive the negative sentiment of this song.

```
In [71]: # First, need to sort the songs by sentiment score for Joni
artist_songs = sentiment_results['joni']

# Sort the songs by sentiment score in descending order and then in ascending order
highest_songs = sorted(artist_songs.items(), key=lambda x: x[1], reverse=True)
lowest_songs = sorted(artist_songs.items(), key=lambda x: x[1])[:3]
```

```
In [72]: # Print the lyrics of the songs
print("Songs with Highest Sentiments:")
for song, _ in highest_songs:
    print(f"\nSong: {song}\nLyrics:\n{lyrics_data['joni'][song]}")
```



```
print("\nSongs with Lowest Sentiments:")
for song, _ in lowest_songs:
    print(f"\nSong: {song}\nLyrics:\n{lyrics_data['joni'][song]}")
```

Songs with Highest Sentiments:

Song: jonimitchell_thedawntreader

Lyrics:

"The Dawntreader"

Peridots and periwinkle blue medallions
 Gilded galleons spilled across the ocean floor
 Treasure somewhere in the sea and he will find where
 Never mind their questions there's no answer for
 The roll of the harbor wake
 The songs that the rigging makes
 The taste of the spray he takes
 And he learns to give
 He aches and he learns to live
 He stakes all his silver
 On a promise to be free
 Mermaids live in colonies
 All his seadreams come to me
 City satins left at home I will not need them
 I believe him when he tells of loving me
 Something truthful in the sea
 Your lies will find you
 Leave behind your streets he said and come to me
 Come down from the neon nights
 Come down from the tourist sights
 Run down till the rain delights you
 You do not hide
 Sunlight will renew your pride
 Skin white by skin golden
 Like a promise to be free
 Dolphins playing in the sea
 All his seadreams come to me
 Seabird I have seen you fly above the pilings
 I am smiling at your circles in the air
 I will come and sit by you while he lies sleeping
 Fold your fleet wings I have brought some dreams to share
 A dream that you love someone
 A dream that the wars are done
 A dream that you tell no one but the grey sea
 They'll say that you're crazy
 And a dream of a baby
 Like a promise to be free
 Children laughing out to sea
 All his seadreams come to me

Song: jonimitchell_forfree

Lyrics:

"For Free"

I slept last night in a good hotel
 I went shopping today for jewels
 The wind rushed around in the dirty town
 And the children let out from the schools
 I was standing on a noisy corner
 Waiting for the walking green
 Across the street he stood
 And he played real good
 On his clarinet for free
 Now me I play for fortunes
 And those velvet curtain calls
 I got a black limousine and two gentlemen
 Escorting me to the halls
 And I play if you have the money
 Or if you're a friend to me
 But the one man band
 By the quick lunch stand
 He was playing real good for free
 Nobody stopped to hear him
 Though he played so sweet and high
 They knew he had never been on their TV
 So they passed his music by
 I meant to go over and ask for a song
 Maybe put on a harmony
 I heard his refrain
 As the signal changed
 He was playing real good for free

Song: jonimitchell_tinangel

Lyrics:

"Tin Angel"

Varnished weeds in window jars
 Tarnished beads on tapestries
 Kept in satin boxes are
 Reflections of love's memories
 Letters from across the seas
 Roses dipped in sealing wax
 Valentines and maple leaves
 Tucked into a paperback
 Guess I'll throw them all away
 I found someone to love today
 Dark with darker moods is he
 Not a golden Prince who's come
 Through columbines and wizardry
 To talk of castles in the sun
 Still I'll take a chance and see
 I found someone to love today
 There's a sorrow in his eyes
 Like the angel made of tin
 What will happen if I try
 To place another heart in him
 In a Bleecker Street cafe
 I found someone to love today
 I found someone to love today

Songs with Lowest Sentiments:

Song: jonimitchell_nathanlafraneer

Lyrics:

"Nathan La Franeer"

I hired a coach to take me from confusion to the plane
And though we shared a common space I know I'll never meet again
The driver with his eyebrows furrowed in the rear-view mirror
I read his name and it was plainly written Nathan La Franeer
I asked him would he hurry
But we crawled the canyons slowly
Thru the buyers and the sellers
Thru the burglar bells and the wishing wells
With gangs and girly shows
The ghostly garden grows
The cars and buses bustled thru the bedlam of the day
I looked thru window-glass at streets and Nathan grumbled at the grey
I saw an aging cripple selling Superman balloons
The city grated thru chrome-plate
The clock struck slowly half-past-noon
Thru the tunnel tiled and turning
Into daylight once again I am escaping
Once again goodbye
To symphonies and dirty trees
With parks and plastic clothes
The ghostly garden grows
He asked me for a dollar more
He cursed me to my face
He hated everyone who paid to ride
And share his common space
I picked my bags up from the curb
And stumbled to the door
Another man reached out his hand
Another hand reached out for more
And I filled it full of silver
And I left the fingers counting
And the sky goes on forever
Without meter maids and peace parades
You feed it all your woes
The ghostly garden grows

Song: jonimitchell_ithinkiunderstand

Lyrics:

"I Think I Understand"

Daylight falls upon the path, the forest falls behind
Today I am not prey to dark uncertainty
The shadow trembles in its wrath, I've robbed its blackness blind
And tasted sunlight as my fear came clear to me
I think I understand
Fear is like a wilderland
Stepping stones or sinking sand
Now the way leads to the hills, above the steeple's chime
Below me sleepy rooftops round the harbor
It's there I'll take my thirsty fill of friendship over wine
Forgetting fear but never disregarding her
Oh, I think I understand
Fear is like a wilderland
Stepping stones and sinking sand
Sometimes voices in the night will call me back again
Back along the pathway of a troubled mind
When forests rise to block the light that keeps a traveler sane
I'll challenge them with flashes from a brighter time
Oh, I think I understand
Fear is like a wilderland
Stepping stones or sinking sand

Song: jonimitchell_cactustree

Lyrics:

"Cactus Tree"

There's a man who's been out sailing
In a decade full of dreams
And he takes her to a schooner
And he treats her like a queen
Bearing beads from California
With their amber stones and green
He has called her from the harbor
He has kissed her with his freedom
He has heard her off to starboard
In the breaking and the breathing
Of the water weeds
While she was busy being free
There's a man who's climbed a mountain
And he's calling out her name
And he hopes her heart can hear
Three thousand miles he calls again
He can think her there beside him
He can miss her just the same
He has missed her in the forest
While he showed her all the flowers
And the branches sang the chorus
As he climbed the scaly tower
Of a forest tree
While she was somewhere being free
There's a man who's sent a letter
and he's waiting for reply
He has asked her of her travels since the day they said goodbye
He writes, "Wish you were beside me, we can make it if we try."
He has seen her at the office
With her name on all these papers
Through

h the sharing of the profitsHe will find it hard to shake herFrom his memory
 And she's so busy being freeThere's a lady, in the cityAnd she thinks she lo
 ves them allThere's the one who's thinking of herThere's the one who sometim
 es callsThere's the one who writes her lettersWith his facts and figures scr
 awlShe has brought them to her sensesThey have laughed inside her laughterNo
 w she rallies her defensesFor she fears that one will ask herFor eternityAnd
 she's so busy being freeThere's a man who sends her medalsHe is bleeding fro
 m the warThere's a jousting and a jesterAnd a man who owns a storeThere's a d
 rummer, and a dreamerAnd you know there may be moreShe will love them when s
 he sees themThey will lose her if they followAnd she only means to please th
 emAnd her heart is full and hollowLike a cactus treeWhile she's so busy bein
 g freeLike a cactus treeBeing free

Q: Plot the distributions of the sentiment scores for both artists. You can use `seaborn` to plot densities or plot histograms in `matplotlib`.

```
In [73]: # First we need to create a DataFrame from the dictionary of sentiment_results

# Flatten the sentiment_results dictionary into a list of tuples
data = []
for artist, songs in sentiment_results.items():
    for song, score in songs.items():
        data.append((artist, song, score))

# Create a DataFrame from the list
sentiment_results_df = pd.DataFrame(data, columns=['Artist', 'Song', 'SentimentScore'])

# Show the first few rows to verify
print(sentiment_results_df.head())
```

	Artist	Song	SentimentScore
0	joni	jonimitchell_ladiesofthecanyon	8
1	joni	jonimitchell_bothsidesnow	0
2	joni	jonimitchell_idontknowwhereistand	-7
3	joni	jonimitchell_marcie	3
4	joni	jonimitchell_ihadaking	-6

```
In [74]: # Plotting the results
plt.figure(figsize=(10, 6))
sns.kdeplot(data=sentiment_results_df, x="SentimentScore", hue="Artist", fill=True)
plt.title('Distribution of Sentiment Scores for Both Artists')
plt.xlabel('Sentiment Score')
plt.ylabel('Density')
plt.show()
```



Sentiment Analysis on Twitter Descriptions

In this section, define two sets of emojis you designate as positive and negative. Make sure to have at least 10 emojis per set. You can learn about the most popular emojis on Twitter at [the emoji tracker](#).

Associate your positive emojis with a score of +1, negative with -1. Score the average sentiment of your two artists based on the Twitter descriptions of their followers. The average sentiment can just be the total score divided by number of followers. You do not need to calculate sentiment on non-emoji content for this section.

In [75]: *# your code here*

```
# We start by setting the emoji sets
positive_emojis = set(["😄", "😍", "❤️", "👍", "😁", "💖", "🎉", "✨", "😂",
negative_emojis = set(["😞", "😭", "💔", "👎", "😡", "😓", "😩", "😫", "😬"])

# Define a function to calculate sentiment scores
def calculate_emoji_sentiment(descriptions, positive_emojis, negative_emojis):
    score = 0
    for description in descriptions:
        for emoji in positive_emojis:
            score += description.count(emoji)
        for emoji in negative_emojis:
            score -= description.count(emoji)
    return score

# Set up a dictionary to contain the average sentiment per artist
average_sentiment_per_artist = {}
```

```

for artist, descriptions in twitter_data.items():
    total_score = calculate_emoji_sentiment(descriptions, positive_emojis, r
    average_sentiment = total_score / len(descriptions) if descriptions else
    average_sentiment_per_artist[artist] = average_sentiment

# Display the average emoji sentiment score per artist
for artist, avg_score in average_sentiment_per_artist.items():
    print(f"Artist: {artist}, Average Emoji Sentiment Score: {avg_score}")

```

Artist: cher, Average Emoji Sentiment Score: 0.03401293279970682

Artist: robynkonihiwa, Average Emoji Sentiment Score: 0.02235101416680386

Q: What is the average sentiment of your two artists?

A: The average sentiment score in the twitter data is higher for Cher than it is for Robyn, based on the emojis we defined. It is about 50% higher, indicating Cher has an overall much higher positive sentiment than Robyn.

Q: Which positive emoji is the most popular for each artist? Which negative emoji?

A: For both artists, the most popular positive emoji is the small black heart while the most popular negative emoji is the broken red heart.

```

In [77]: # First we set up a function to count the emojis
def count_emojis(descriptions, emoji_set):
    emoji_counts = defaultdict(int)
    for description in descriptions:
        for emoji in emoji_set:
            emoji_counts[emoji] += description.count(emoji)
    return emoji_counts

# Setting up a dictionary to contain the most popular emojis per artist
most_popular_emojis_per_artist = {}

for artist, descriptions in twitter_data.items():
    # Count the frequency of positive and negative emojis
    positive_emoji_counts = count_emojis(descriptions, positive_emojis)
    negative_emoji_counts = count_emojis(descriptions, negative_emojis)

    # Find the most popular positive and negative emoji
    most_popular_positive = max(positive_emoji_counts, key=positive_emoji_cc
    most_popular_negative = max(negative_emoji_counts, key=negative_emoji_cc

    most_popular_emojis_per_artist[artist] = {
        "Most Popular Positive Emoji": most_popular_positive,
        "Most Popular Negative Emoji": most_popular_negative,
        "Positive Emoji Count": positive_emoji_counts[most_popular_positive]
        "Negative Emoji Count": negative_emoji_counts[most_popular_negative]
    }

# Display the most popular emojis for each artist
for artist, info in most_popular_emojis_per_artist.items():
    print(f"Artist: {artist}")

```

```
print(f" Most Popular Positive Emoji: {info['Most Popular Positive Emoj  
print(f" Most Popular Negative Emoji: {info['Most Popular Negative Emoj
```

Artist: cher

Most Popular Positive Emoji: ♥ (Count: 55206)

Most Popular Negative Emoji: ♥♥ (Count: 2001)

Artist: robynkonihiwa

Most Popular Positive Emoji: ♥ (Count: 3461)

Most Popular Negative Emoji: ♥♥ (Count: 72)