# labassignment4bn

February 10, 2025

## 1 Lab Assignment 4: Using APIs in Python

## 1.1 DS 6001: Practice and Application of Data Science

#### 1.1.1 Instructions

Please answer the following questions as completely as possible using text, code, and the results of code as needed. Format your answers in a Jupyter notebook. To receive full credit, make sure you address every part of the problem, and make sure your document is formatted in a clean and professional way.

In this lab, you will work with the public API provided by genius.com, a website that calls itself "the world's biggest collection of song lyrics and musical knowledge." You will need to read the API documentation carefully, acquire an access key, and use it without sharing it to pull data from this API into Python. You will also practice using a library made specifically to wrap around requests to make calling from the Genius API easier.

### 1.2 Problem 0

Import the following libraries:

```
[1]: import numpy as np
  import pandas as pd
  import requests
  import json
  import os
  import dotenv
  import sys
  sys.tracebacklimit = 0 # turn off the error tracebacks
```

## 1.3 Problem 1

The Genius API documentation is here: https://docs.genius.com/#/getting-started-h1. Read through the documentation carefully. Although the Genius API is free and public, it still requires users an access key to use the API. In this case, Genius provides users with three codes: a client ID, a client ID secret, and a client access token. Use the documentation to find a way to obtain these codes for yourself. Write a paragraph that describes all of the steps you needed to take (but DO NOT list your access codes in this paragraph).

Some hints and cautions:

- 1. Before you can use the API, you will need a regular, free user account with Genius. Sign-up here: https://genius.com/signup or login
- 2. Genius's API is built to support third-party app development, not data scientists. The language is entirely geared toward app development. Under "Authentication" there are instructions to third-party developers for guiding their own users in getting access keys. That's not relevant to getting access for yourself. It's not hard to get an access key, but the guidance here is not very clear. Be patient and read everything in the Authentication section carefully.
- 3. When you arrive at the page that allows you to register for API access keys, the language is still geared toward app development. You will be prompted to name your app and provide the URLs associated with the app. It doesn't much matter what you name your app, and I just used the Collab main page (https://collab.its.virginia.edu/portal?containerLogin=true) for the URLs.
- 4. When you get your codes, copy them in a text file. In problem 2 you will copy these codes over again to a .env file. [4 points]

First sign up or sign in to Genius account. "Click New API Client" and add the app name and URLs required. It then gives you a Client ID and a Client Secret. Click "Generate Token" to create a CLient Access Token. Then copy and paste these into a .env file (problem 2) so you don't lose them because you definitely won't remember them.

#### 1.4 Problem 2

Create a .env file for this project. Open it, copy your access codes into it, and save it. Then use Python code to load the environmental variables contained in the .env file, and create variables that contain each of the three codes. (You can print these variables to make sure it worked, but do not allow your access keys to display in your notebook). [4 points]

```
[6]: dotenv.load_dotenv()
  geniusclientid = os.getenv('geniusclientid')
  geniusclientsecret = os.getenv('geniusclientsecret')
  geniusaccesstoken = os.getenv('geniusaccesstoken')
```

#### 1.5 Problem 3

The root for all Genius APIs is https://api.genius.com. Find the endpoint for the Search API. (You will have to click the "Authorize with Genius" button in the upper-right corner if you haven't already done so). Use the requests library to issue a search for Bob Dylan. Genius's API is organized in a way that every individual artist has his or her own API endpoint. Display a portion of the JSON output that displays the API endpoint path for the data on Bob Dylan.

Hint: to authenticate, specify your access token (not your client ID or client secret) as the access\_token parameter. You will have to dig around the JSON output to find the artist ID, but it is listed under primary artist several branches down the JSON tree. [4 points]

```
b = requests.get(root + endpoint, params=params)
b
```

[40]: <Response [200]>

```
[41]: bobdylanjson = json.loads(b.text) bobdylanjson['response']['hits'][0]['result']['primary_artist']['id']
```

[41]: 181

#### 1.6 Problem 4

Add /songs to the end of the endpoint path you found in problem 3 and use this path to request the 20 most popular Bob Dylan songs. Organize these data in a pandas data frame. [4 points]

[42]: <Response [200]>

```
[43]: bdjson = c.json()
bd_df = pd.json_normalize(bdjson['response']['songs'])
bd_df
```

```
[43]:
                                    api path
                                                              artist names
          annotation count
      0
                         15
                               /songs/96286
                                                            USA For Africa
                                                                  Bob Dylan
      1
                         12
                               /songs/79424
      2
                               /songs/68146
                                                                      Adele
                          1
      3
                         19
                               /songs/62605
                                                                  Bob Dylan
                                                                  Bob Dylan
      4
                         31
                               /songs/54784
      5
                          7
                              /songs/103982
                                                             Guns N' Roses
      6
                                                                  Bob Dylan
                         15
                               /songs/98664
      7
                        128
                             /songs/5393247
                                                                  Bob Dylan
      8
                               /songs/84846
                                                                 Bob Dylan
                         10
                                                                 Bob Dylan
      9
                         31
                               /songs/87402
      10
                         10
                               /songs/63341
                                              The Jimi Hendrix Experience
      11
                         10
                               /songs/79749
                                                                 Bob Dylan
                                                                 Bob Dylan
      12
                         20
                                  /songs/224
                         41
                              /songs/105186
                                                                 Bob Dylan
      13
      14
                         22
                                                                 Bob Dylan
                               /songs/75446
      15
                         14
                              /songs/154239
                                                             Darius Rucker
      16
                         35
                              /songs/118799
                                                                  Bob Dylan
```

```
17
                   6
                       /songs/199531
                                                          Bob Dylan
18
                  51
                        /songs/75463
                                                          Bob Dylan
19
                  78
                        /songs/92350
                                                          Bob Dylan
                                            full_title \
0
                   We Are the World by USA For Africa
                     Blowin' in the Wind by Bob Dylan
1
2
                       Make You Feel My Love by Adele
3
           The Times They Are A-Changin' by Bob Dylan
4
                    Like a Rolling Stone by Bob Dylan
5
           Knockin' on Heaven's Door by Guns N' Roses
6
                All Along the Watchtower by Bob Dylan
7
                        Murder Most Foul by Bob Dylan
8
       Don't Think Twice, It's All Right by Bob Dylan
9
                                Hurricane by Bob Dylan
    All Along the Watchtower by The Jimi Hendrix E...
10
11
                   Make You Feel My Love by Bob Dylan
12
             Subterranean Homesick Blues by Bob Dylan
13
              A Hard Rain's A-Gonna Fall by Bob Dylan
                      Mr. Tambourine Man by Bob Dylan
14
15
                          Wagon Wheel by Darius Rucker
16
                      Tangled Up in Blue by Bob Dylan
17
               Knockin' on Heaven's Door by Bob Dylan
18
    It's Alright, Ma (I'm Only Bleeding) by Bob Dylan
19
                          Desolation Row by Bob Dylan
                           header_image_thumbnail_url \
0
   https://images.genius.com/d328397b28953bd84465...
1
    https://images.genius.com/84e1705bc64495197216...
2
    https://images.genius.com/f248cc85ccaab603ce88...
    https://images.genius.com/3f8af2a0b75202890de6...
3
4
    https://images.genius.com/a31244adf46435e0a958...
5
    https://images.genius.com/cb2614550098bf753ab3...
6
    https://images.genius.com/40169c4a86e479f32e7a...
    https://images.genius.com/7fbaf838ffdf99315408...
7
8
    https://images.genius.com/84e1705bc64495197216...
    https://images.genius.com/2df91ca57456e44cf67e...
9
10
   https://images.genius.com/ff55dd642026ce236b24...
11
   https://images.genius.com/cd0a26733cc459710d09...
   https://images.genius.com/fccb3cb2608c837461dd...
   https://images.genius.com/84e1705bc64495197216...
   https://images.genius.com/051afc779ad250f5a1f7...
   https://images.genius.com/06957cdf4a75a96e581f...
15
16
   https://images.genius.com/9146ba54ed06288f10b2...
   https://images.genius.com/e0a7ce8aae657ee022f1...
17
   https://images.genius.com/e4013e376bc0912bdb9b...
18
   https://images.genius.com/b67cf8e6822a6ec84ea9...
```

```
id \
                                       header_image_url
0
    https://images.genius.com/d328397b28953bd84465...
                                                          96286
1
    https://images.genius.com/84e1705bc64495197216...
                                                          79424
2
    https://images.genius.com/f248cc85ccaab603ce88...
                                                          68146
3
    https://images.genius.com/3f8af2a0b75202890de6...
                                                          62605
4
    https://images.genius.com/a31244adf46435e0a958...
                                                          54784
5
    https://images.genius.com/cb2614550098bf753ab3...
                                                         103982
6
    https://images.genius.com/40169c4a86e479f32e7a...
                                                          98664
7
    https://images.genius.com/7fbaf838ffdf99315408...
                                                       5393247
8
    https://images.genius.com/84e1705bc64495197216...
                                                          84846
9
    https://images.genius.com/2df91ca57456e44cf67e...
                                                          87402
10
   https://images.genius.com/ff55dd642026ce236b24...
                                                          63341
11
    https://images.genius.com/cd0a26733cc459710d09...
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12
    https://images.genius.com/fccb3cb2608c837461dd...
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13
    https://images.genius.com/84e1705bc64495197216...
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14
    https://images.genius.com/051afc779ad250f5a1f7...
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15
    https://images.genius.com/06957cdf4a75a96e581f...
                                                         154239
16
    https://images.genius.com/9146ba54ed06288f10b2...
                                                         118799
                                                         199531
17
    https://images.genius.com/e0a7ce8aae657ee022f1...
18
    https://images.genius.com/e4013e376bc0912bdb9b...
                                                          75463
                                                          92350
19
    https://images.genius.com/b67cf8e6822a6ec84ea9...
    lyrics_owner_id lyrics_state \
0
                         complete
            4733728
1
              73267
                         complete
              82481
                         complete
2
3
              49202
                         complete
4
                   7
                         complete
5
             168784
                         complete
6
                 779
                         complete
7
            3360167
                         complete
8
             125524
                         complete
9
             132320
                         complete
10
              31298
                         complete
11
                5307
                         complete
12
                  4
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13
                  16
                         complete
14
              74226
                         complete
15
                         complete
              10380
16
                1850
                         complete
17
             225680
                         complete
18
              74226
                         complete
19
             145715
                         complete
                                                          ... stats.pageviews
0
              /Usa-for-africa-we-are-the-world-lyrics
                                                                      699345
```

```
1
                 /Bob-dylan-blowin-in-the-wind-lyrics
                                                                     651518
2
                   /Adele-make-you-feel-my-love-lyrics
                                                                     642580
3
       /Bob-dylan-the-times-they-are-a-changin-lyrics
                                                                     558298
4
                /Bob-dylan-like-a-rolling-stone-lyrics
                                                                     525523
5
         /Guns-n-roses-knockin-on-heavens-door-lyrics
                                                                     524596
6
           /Bob-dylan-all-along-the-watchtower-lyrics
                                                                     521737
7
                    /Bob-dylan-murder-most-foul-lyrics
                                                                     513000
8
     /Bob-dylan-dont-think-twice-its-all-right-lyrics
                                                                     454334
9
                           /Bob-dylan-hurricane-lyrics
                                                                     409547
10
    /The-jimi-hendrix-experience-all-along-the-wat...
                                                                   400453
               /Bob-dylan-make-you-feel-my-love-lyrics
11
                                                                     381591
12
        /Bob-dylan-subterranean-homesick-blues-lyrics
                                                                     364233
13
          /Bob-dylan-a-hard-rains-a-gonna-fall-lyrics
                                                                     345612
14
                   /Bob-dylan-mr-tambourine-man-lyrics
                                                                     314654
15
                     /Darius-rucker-wagon-wheel-lyrics
                                                                     299122
16
                  /Bob-dylan-tangled-up-in-blue-lyrics
                                                                     268825
17
            /Bob-dylan-knockin-on-heavens-door-lyrics
                                                                     238545
18
    /Bob-dylan-its-alright-ma-im-only-bleeding-lyrics
                                                                     234533
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                      /Bob-dylan-desolation-row-lyrics
                                                                     233477
    primary_artist.api_path
0
            /artists/370890
1
               /artists/181
2
               /artists/2300
3
                /artists/181
4
               /artists/181
               /artists/637
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9
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            /artists/634985
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               /artists/181
15
             /artists/21867
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               /artists/181
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                       primary_artist.header_image_url primary_artist.id \
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    https://images.genius.com/e87fb11dd7f33cc7fd1a...
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4
    https://images.genius.com/e87fb11dd7f33cc7fd1a...
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   https://images.genius.com/e87fb11dd7f33cc7fd1a...
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   https://images.genius.com/6a629cf1a4b6fec5b21a...
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   https://images.genius.com/e87fb11dd7f33cc7fd1a...
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   https://images.genius.com/e87fb11dd7f33cc7fd1a...
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19 https://images.genius.com/e87fb11dd7f33cc7fd1a...
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                              primary_artist.image_url \
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    https://images.genius.com/a94817af6c91a49c07fa...
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    https://images.genius.com/8a23ab928ccfce13accf...
3
   https://images.genius.com/a94817af6c91a49c07fa...
4
    https://images.genius.com/a94817af6c91a49c07fa...
5
   https://images.genius.com/d8c0421f5938f6666ed4...
6
    https://images.genius.com/a94817af6c91a49c07fa...
7
   https://images.genius.com/a94817af6c91a49c07fa...
8
    https://images.genius.com/a94817af6c91a49c07fa...
9
   https://images.genius.com/a94817af6c91a49c07fa...
10
   https://images.genius.com/ca64447350d06d6dc144...
   https://images.genius.com/a94817af6c91a49c07fa...
11
12
   https://images.genius.com/a94817af6c91a49c07fa...
13
   https://images.genius.com/a94817af6c91a49c07fa...
   https://images.genius.com/a94817af6c91a49c07fa...
   https://images.genius.com/6009b412250fcc9da909...
15
   https://images.genius.com/a94817af6c91a49c07fa...
17
   https://images.genius.com/a94817af6c91a49c07fa...
18 https://images.genius.com/a94817af6c91a49c07fa...
   https://images.genius.com/a94817af6c91a49c07fa...
   primary_artist.is_meme_verified primary_artist.is_verified \
0
                                                          False
                              False
1
                              False
                                                          False
2
                              False
                                                          False
3
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6
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```

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7
                               False
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8
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16
                               False
                                                           False
17
                               False
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18
                               False
                                                           False
19
                               False
                                                           False
            primary_artist.name
0
                  USA For Africa
1
                       Bob Dylan
2
                           Adele
3
                       Bob Dylan
4
                       Bob Dylan
5
                   Guns N' Roses
6
                       Bob Dylan
7
                       Bob Dylan
8
                       Bob Dylan
9
                       Bob Dylan
10
    The Jimi Hendrix Experience
                       Bob Dylan
11
12
                       Bob Dylan
13
                       Bob Dylan
14
                       Bob Dylan
15
                   Darius Rucker
16
                       Bob Dylan
17
                       Bob Dylan
18
                       Bob Dylan
19
                       Bob Dylan
                                     primary_artist.url stats.concurrents
0
            https://genius.com/artists/Usa-for-africa
                                                                        NaN
1
                  https://genius.com/artists/Bob-dylan
                                                                        3.0
2
                      https://genius.com/artists/Adele
                                                                        NaN
3
                  https://genius.com/artists/Bob-dylan
                                                                        2.0
4
                  https://genius.com/artists/Bob-dylan
                                                                        2.0
5
              https://genius.com/artists/Guns-n-roses
                                                                        NaN
6
                  https://genius.com/artists/Bob-dylan
                                                                        NaN
7
                  https://genius.com/artists/Bob-dylan
                                                                        NaN
8
                  https://genius.com/artists/Bob-dylan
                                                                        2.0
9
                  https://genius.com/artists/Bob-dylan
                                                                        2.0
```

10	https://genius.com/artists/The-jimi-hendrix-ex	NaN
11	https://genius.com/artists/Bob-dylan	NaN
12	https://genius.com/artists/Bob-dylan	2.0
13	https://genius.com/artists/Bob-dylan	2.0
14	https://genius.com/artists/Bob-dylan	NaN
15	https://genius.com/artists/Darius-rucker	NaN
16	https://genius.com/artists/Bob-dylan	2.0
17	https://genius.com/artists/Bob-dylan	NaN
18	https://genius.com/artists/Bob-dylan	NaN
19	https://genius.com/artists/Bob-dylan	NaN

[20 rows x 37 columns]

#### 1.7 Problem 5

[47]: import lyricsgenius

Install and import the lyricsgenius library in Python, which is a wrapper around requests that works specifically with the Genius API. Follow the guide on the GitHub repository for this library (https://github.com/johnwmillr/LyricsGenius) for instructions on using the library. Use the lyricsgenius library to download and display the lyrics to "Tangled Up in Blue" by Bob Dylan. [4 points]

```
genius = lyricsgenius.Genius(geniusaccesstoken)
song = genius.search_song('Tangled Up in Blue', 'Bob Dylan')
print(song.lyrics)
Searching for "Tangled Up in Blue" by Bob Dylan...
103 ContributorsTangled Up in Blue Lyrics[Verse 1]
Early one morning the sun was shining
I was laying in bed
Wondering if she'd changed at all
If her hair was still red
Her folks they said our lives together
Sure was going to be rough
They never did like Mama's homemade dress
Papa's bankbook wasn't big enough
And I was standing on the side of the road
Rain falling on my shoes
Heading out for the East Coast
Lord knows I've paid some dues
Getting through
Tangled up in blue
[Verse 2]
She was married when we first met
Soon to be divorced
I helped her out of a jam, I guess
```

We drove that car as far as we could Abandoned it out west Split up on a dark sad night Both agreeing it was best She turned around to look at me As I was walking away I heard her say over my shoulder "We'll meet again someday On the avenue" Tangled up in blue See Bob Dylan LiveGet tickets as low as \$41You might also like[Verse 3] I had a job in the great north woods Working as a cook for a spell But I never did like it all that much And one day the ax just fell So I drifted down to New Orleans Where I lucky was to be employed Working for a while on a fishing boat Right outside of Delacroix But all the while I was alone The past was close behind I seen a lot of women But she never escaped my mind And I just grew Tangled up in blue

#### [Verse 4]

She was working in a topless place And I stopped in for a beer I just kept looking at the side of her face In the spotlight, so clear And later on, when the crowd thinned out I was just about to do the same She was standing there, in back of my chair Said, "Tell me, don't I know your name?" I muttered something underneath my breath She studied the lines on my face I must admit, I felt a little uneasy When she bent down to tie the laces Of my shoe Tangled up in blue [Verse 5] She lit a burner on the stove And offered me a pipe "I thought you'd never say hello," she said "You look like the silent type" Then she opened up a book of poems

But I used a little too much force

And handed it to me
Written by an Italian poet
From the thirteenth century
And every one of them words rang true
And glowed like burning coal
Pouring off of every page
Like it was written in my soul
From me to you
Tangled up in blue

#### [Verse 6]

I lived with them on Montague Street In a basement down the stairs There was music in the cafes at night And revolution in the air Then he started into dealing with slaves And something inside of him died She had to sell everything she owned And froze up inside And when it finally, the bottom fell out I became withdrawn The only thing I knew how to do Was to keep on keeping on Like a bird that flew Tangled up in blue [Verse 7] So now I'm going back again I got to get to her somehow All the people we used to know They're an illusion to me now Some are mathematicians Some are carpenter's wives Don't know how it all got started I don't know what they're doing with their lives But me, I'm still on the road A-heading for another joint We always did feel the same We just saw it from a different point Of view Tangled up in blue27Embed [Verse 1] Early one morning the sun was shining I was laying in bed Wondering if she'd changed at all If her hair was still red Her folks they said our lives together Sure was going to be rough They never did like Mama's homemade dress

Papa's bankbook wasn't big enough
And I was standing on the side of the road
Rain falling on my shoes
Heading out for the East Coast
Lord knows I've paid some dues
Getting through
Tangled up in blue

#### [Verse 2]

She was married when we first met
Soon to be divorced
I helped her out of a jam, I guess
But I used a little too much force
We drove that car as far as we could
Abandoned it out west
Split up on a dark sad night
Both agreeing it was best
She turned around to look at me
As I was walking away
I heard her say over my shoulder
"We'll meet again someday
On the avenue"
Tangled up in blue

#### [Verse 3]

I had a job in the great north woods
Working as a cook for a spell
But I never did like it all that much
And one day the ax just fell
So I drifted down to New Orleans
Where I lucky was to be employed
Working for a while on a fishing boat
Right outside of Delacroix
But all the while I was alone
The past was close behind
I seen a lot of women
But she never escaped my mind
And I just grew
Tangled up in blue

#### [Verse 4]

She was working in a topless place
And I stopped in for a beer
I just kept looking at the side of her face
In the spotlight, so clear
And later on, when the crowd thinned out
I was just about to do the same
She was standing there, in back of my chair

Said, "Tell me, don't I know your name?"
I muttered something underneath my breath
She studied the lines on my face
I must admit, I felt a little uneasy
When she bent down to tie the laces
Of my shoe
Tangled up in blue

#### [Verse 5]

She lit a burner on the stove
And offered me a pipe
"I thought you'd never say hello," she said
"You look like the silent type"
Then she opened up a book of poems
And handed it to me
Written by an Italian poet
From the thirteenth century
And every one of them words rang true
And glowed like burning coal
Pouring off of every page
Like it was written in my soul
From me to you
Tangled up in blue

#### [Verse 6]

I lived with them on Montague Street
In a basement down the stairs
There was music in the cafes at night
And revolution in the air
Then he started into dealing with slaves
And something inside of him died
She had to sell everything she owned
And froze up inside
And when it finally, the bottom fell out
I became withdrawn
The only thing I knew how to do
Was to keep on keeping on
Like a bird that flew
Tangled up in blue

#### [Verse 7]

So now I'm going back again
I got to get to her somehow
All the people we used to know
They're an illusion to me now
Some are mathematicians
Some are carpenter's wives
Don't know how it all got started

I don't know what they're doing with their lives
But me, I'm still on the road
A-heading for another joint
We always did feel the same
We just saw it from a different point
Of view
Tangled up in blue