

# lab04

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](https://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:

```
[2]: 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](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 I went to the provided docs link, and under *Registering Your Application* I learned that I need to go the *API Client management page* in order to obtain my `client_id` and `client_secret`. On [this](#) page I clicked the *New API Client*, it's hard to miss. I then provided an app name and for the URLs, I provided the collab main page, then clicked save. After this, I was provided with the necessary keys for this API. Finally, I saved these keys in my `.env` file.

## 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]

```
[3]: dotenv.load_dotenv()
    clientid = os.getenv('genius')
    clientsecret = os.getenv('geniussecret')
```

## 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]

```
[24]: url = 'https://httpbin.org/user-agent'
    r = requests.get(url)
    mjson = r.json()
```

```
useragent = mjson['user-agent']
```

```
[25]: root = 'https://api.genius.com/'
      endpoint = 'search?q=Bob%20Dylan'

      dotenv.load_dotenv()

      tok = 'Bearer '+os.getenv('geniustok')

      headers = {'Authorization':tok,
                 'User-Agent':useragent}

      r = requests.get(root+endpoint,headers=headers)
```

```
[26]: gjson = json.loads(r.text)
      gjson['response']['hits'][0]['result']['primary_artist']
```

```
[26]: {'api_path': '/artists/181',
      'header_image_url':
      'https://images.genius.com/e87fb11dd7f33cc7fd1a8915ad36f7c9.1000x667x1.png',
      'id': 181,
      'image_url':
      'https://images.genius.com/a94817af6c91a49c07fad51829d30f4e.640x640x1.jpg',
      'is_meme_verified': False,
      'is_verified': False,
      'name': 'Bob Dylan',
      'url': 'https://genius.com/artists/Bob-dylan'}
```

```
[28]: artistendpoint =
      ↪gjson['response']['hits'][0]['result']['primary_artist']['api_path']
```

## 1.6 Problem 4

Add /songs to the end of the 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]

```
[29]: headers = {'Authorization':tok,
                 'User-Agent':useragent}

      params = {'sort':'popularity'}

      newend = artistendpoint+'/songs'
      r = requests.get(root+newend,headers=headers,params=params)
      bobjson = json.loads(r.text)
```

```
[30]: bobdf = pd.json_normalize(bobjson,record_path=['response','songs'])
      bobdf
```

```
[30]:      annotation_count      api_path      artist_names \
0          15      /songs/96286      USA For Africa
1          12      /songs/79424      Bob Dylan
2           1      /songs/68146      Adele
3          19      /songs/62605      Bob Dylan
4          31      /songs/54784      Bob Dylan
5           7      /songs/103982      Guns N' Roses
6          15      /songs/98664      Bob Dylan
7         128      /songs/5393247      Bob Dylan
8          10      /songs/84846      Bob Dylan
9          31      /songs/87402      Bob Dylan
10         10      /songs/63341      The Jimi Hendrix Experience
11         10      /songs/79749      Bob Dylan
12         20      /songs/224      Bob Dylan
13         41      /songs/105186      Bob Dylan
14         22      /songs/75446      Bob Dylan
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
1      Blowin' in the Wind by Bob Dylan
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
10     All Along the Watchtower by The Jimi Hendrix E...
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
14      Mr. Tambourine Man by Bob Dylan
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...  
3 https://images.genius.com/3f8af2a0b75202890de6...  
4 https://images.genius.com/a31244adf46435e0a958...  
5 https://images.genius.com/cb2614550098bf753ab3...  
6 https://images.genius.com/40169c4a86e479f32e7a...  
7 https://images.genius.com/7fbaf838ffdf99315408...  
8 https://images.genius.com/84e1705bc64495197216...  
9 https://images.genius.com/2df91ca57456e44cf67e...  
10 https://images.genius.com/ff55dd642026ce236b24...  
11 https://images.genius.com/cd0a26733cc459710d09...  
12 https://images.genius.com/fccb3cb2608c837461dd...  
13 https://images.genius.com/84e1705bc64495197216...  
14 https://images.genius.com/051afc779ad250f5a1f7...  
15 https://images.genius.com/06957cdf4a75a96e581f...  
16 https://images.genius.com/9146ba54ed06288f10b2...  
17 https://images.genius.com/e0a7ce8aae657ee022f1...  
18 https://images.genius.com/e4013e376bc0912bdb9b...  
19 https://images.genius.com/b67cf8e6822a6ec84ea9...

	header_image_url	id \
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...	79749
12	https://images.genius.com/fccb3cb2608c837461dd...	224
13	https://images.genius.com/84e1705bc64495197216...	105186
14	https://images.genius.com/051afc779ad250f5a1f7...	75446
15	https://images.genius.com/06957cdf4a75a96e581f...	154239
16	https://images.genius.com/9146ba54ed06288f10b2...	118799
17	https://images.genius.com/e0a7ce8aae657ee022f1...	199531
18	https://images.genius.com/e4013e376bc0912bdb9b...	75463
19	https://images.genius.com/b67cf8e6822a6ec84ea9...	92350

	lyrics_owner_id	lyrics_state \
0	4733728	complete
1	73267	complete
2	82481	complete
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	complete
13	16	complete
14	74226	complete
15	10380	complete
16	1850	complete
17	225680	complete
18	74226	complete
19	145715	complete

	path	...	stats.hot	\
0	/Usa-for-africa-we-are-the-world-lyrics	...	False	
1	/Bob-dylan-blowin-in-the-wind-lyrics	...	False	
2	/Adele-make-you-feel-my-love-lyrics	...	False	
3	/Bob-dylan-the-times-they-are-a-changin-lyrics	...	False	
4	/Bob-dylan-like-a-rolling-stone-lyrics	...	False	
5	/Guns-n-roses-knockin-on-heavens-door-lyrics	...	False	
6	/Bob-dylan-all-along-the-watchtower-lyrics	...	False	
7	/Bob-dylan-murder-most-foul-lyrics	...	False	
8	/Bob-dylan-dont-think-twice-its-all-right-lyrics	...	False	
9	/Bob-dylan-hurricane-lyrics	...	False	
10	/The-jimi-hendrix-experience-all-along-the-wat...	...	False	
11	/Bob-dylan-make-you-feel-my-love-lyrics	...	False	
12	/Bob-dylan-subterranean-homesick-blues-lyrics	...	False	
13	/Bob-dylan-a-hard-rains-a-gonna-fall-lyrics	...	False	
14	/Bob-dylan-mr-tambourine-man-lyrics	...	False	
15	/Darius-rucker-wagon-wheel-lyrics	...	False	
16	/Bob-dylan-tangled-up-in-blue-lyrics	...	False	
17	/Bob-dylan-knockin-on-heavens-door-lyrics	...	False	
18	/Bob-dylan-its-alright-ma-im-only-bleeding-lyrics	...	False	
19	/Bob-dylan-desolation-row-lyrics	...	False	

	stats.pageviews	primary_artist.api_path	\
0	699630	/artists/370890	
1	652032	/artists/181	
2	642925	/artists/2300	
3	558655	/artists/181	
4	526260	/artists/181	
5	524718	/artists/637	
6	521964	/artists/181	
7	513064	/artists/181	

8	454673	/artists/181
9	409750	/artists/181
10	400538	/artists/634985
11	381680	/artists/181
12	364632	/artists/181
13	346127	/artists/181
14	315141	/artists/181
15	299275	/artists/21867
16	269316	/artists/181
17	238900	/artists/181
18	234855	/artists/181
19	233607	/artists/181

	primary_artist.header_image_url	primary_artist.id	\
0	https://images.genius.com/3fb2d9f68c911b547339...	370890	
1	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
2	https://images.genius.com/87aa5d8c32965a10e0e7...	2300	
3	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
4	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
5	https://images.genius.com/9127ece8b46f708fcc16...	637	
6	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
7	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
8	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
9	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
10	https://images.genius.com/2631895179875ea7541b...	634985	
11	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
12	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
13	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
14	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
15	https://images.genius.com/6a629cf1a4b6fec5b21a...	21867	
16	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
17	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
18	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	
19	https://images.genius.com/e87fb11dd7f33cc7fd1a...	181	

	primary_artist.image_url	\
0	https://images.genius.com/3fb2d9f68c911b547339...	
1	https://images.genius.com/a94817af6c91a49c07fa...	
2	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...	

11 <https://images.genius.com/a94817af6c91a49c07fa...>  
 12 <https://images.genius.com/a94817af6c91a49c07fa...>  
 13 <https://images.genius.com/a94817af6c91a49c07fa...>  
 14 <https://images.genius.com/a94817af6c91a49c07fa...>  
 15 <https://images.genius.com/6009b412250fcc9da909...>  
 16 <https://images.genius.com/a94817af6c91a49c07fa...>  
 17 <https://images.genius.com/a94817af6c91a49c07fa...>  
 18 <https://images.genius.com/a94817af6c91a49c07fa...>  
 19 <https://images.genius.com/a94817af6c91a49c07fa...>

	primary_artist.is_meme_verified	primary_artist.is_verified \
0	False	False
1	False	False
2	False	False
3	False	False
4	False	False
5	False	False
6	False	False
7	False	False
8	False	False
9	False	False
10	False	False
11	False	False
12	False	False
13	False	False
14	False	False
15	False	False
16	False	False
17	False	False
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
11	Bob Dylan
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
0         https://genius.com/artists/Usa-for-africa
1         https://genius.com/artists/Bob-dylan
2         https://genius.com/artists/Adele
3         https://genius.com/artists/Bob-dylan
4         https://genius.com/artists/Bob-dylan
5         https://genius.com/artists/Guns-n-roses
6         https://genius.com/artists/Bob-dylan
7         https://genius.com/artists/Bob-dylan
8         https://genius.com/artists/Bob-dylan
9         https://genius.com/artists/Bob-dylan
10        https://genius.com/artists/The-jimi-hendrix-ex...
11        https://genius.com/artists/Bob-dylan
12        https://genius.com/artists/Bob-dylan
13        https://genius.com/artists/Bob-dylan
14        https://genius.com/artists/Bob-dylan
15        https://genius.com/artists/Darius-rucker
16        https://genius.com/artists/Bob-dylan
17        https://genius.com/artists/Bob-dylan
18        https://genius.com/artists/Bob-dylan
19        https://genius.com/artists/Bob-dylan

```

[20 rows x 37 columns]

## 1.7 Problem 5

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]

```

[36]: import lyricsgenius as lg

genius = lg.Genius(os.getenv('geniustok'))
song = genius.search_song('Tangled Up in Blue', 'Bob Dylan')
print(song.lyrics)

```

```

Searching for "Tangled Up in Blue" by Bob Dylan...
Done.
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  
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  
See Bob Dylan Live Get tickets as low as \$41 You 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  
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<sup>27</sup>Embed

[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]

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Abandoned it out west  
Split up on a dark sad night  
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As I was walking away  
I heard her say over my shoulder  
"We'll meet again someday  
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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  
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[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