

# Lab Assignment 4: Using APIs in Python

## DS 6001: Practice and Application of Data Science

### 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.

### Problem 0

Import the following libraries:

```
In [68]: 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
os.chdir('C:\\Users\\Jacqueline\\OneDrive\\Documents\\MSDS\\CW\\lab4_6001')
```

### 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]

## Answer 1

I clicked "manage clients" and signed up with Google; took me straight to "Index API Client". Went back to the documentation to finish reading how to get all three codes. Clicked on "New API Client" and named my app "Jacqui App" and put all three urls as <https://collab.its.virginia.edu/portal?containerLogin=true>. I got the client ID and client key from doing just that. I saved both codes into my `.env`. Then after going back to the documentation page and authorizing by linking my Genius account, I scrolled down a little and found "Authorization: Bearer" and copied the access code there and put that as my access token.

## 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]

```
In [69]: dotenv.load_dotenv()
```

```
Out[69]: True
```

```
In [70]: os.getcwd()
```

```
Out[70]: 'C:\\Users\\Jacqueline\\OneDrive\\Documents\\MSDS\\CW\\lab4_6001'
```

```
In [71]: gid=os.getenv("gid")
         gsecret=os.getenv("gsecret")
         gaccess=os.getenv("gaccess")
```

## 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]

```
In [73]: r = requests.get("https://httpbin.org/user-agent")
user_agent = json.loads(r.text)["user-agent"]
headers = {"User-Agent": user_agent,
           "From": "jdu5sq@virginia.edu"}
headers
```

```
Out[73]: {'User-Agent': 'python-requests/2.28.1', 'From': 'jdu5sq@virginia.edu'}
```

```
In [78]: ## Genius API
root = "https://api.genius.com"
endpt = "/search"
parameters = {"access_token": gaccess,
              "q": "Bob Dylan"}
r = requests.get(root+endpt, params = parameters, headers = headers)
r
```

```
Out[78]: <Response [200]>
```

```
In [79]: dgenius = json.loads(r.text)["response"]
dgenius["hits"][0]
```

```

Out[79]: {'highlights': [],
          'index': 'song',
          'type': 'song',
          'result': {'annotation_count': 12,
                    'api_path': '/songs/79424',
                    'artist_names': 'Bob Dylan',
                    'full_title': "Blowin' in the Wind by\x0Bob\x0Dylan",
                    'header_image_thumbnail_url': 'https://images.genius.com/afd28edb1b2d6d5d556a7b01b108c716.300x300x1.jpg',
                    'header_image_url': 'https://images.genius.com/afd28edb1b2d6d5d556a7b01b108c716.500x500x1.jpg',
                    'id': 79424,
                    'lyrics_owner_id': 73267,
                    'lyrics_state': 'complete',
                    'path': '/Bob-dylan-blowin-in-the-wind-lyrics',
                    'pyongs_count': 48,
                    'relationships_index_url': 'https://genius.com/Bob-dylan-blowin-in-the-wind-sample',
                    'release_date_components': {'year': 1963, 'month': 5, 'day': 27},
                    'release_date_for_display': 'May 27, 1963',
                    'release_date_with_abbreviated_month_for_display': 'May. 27, 1963',
                    'song_art_image_thumbnail_url': 'https://images.genius.com/afd28edb1b2d6d5d556a7b01b108c716.300x300x1.jpg',
                    'song_art_image_url': 'https://images.genius.com/afd28edb1b2d6d5d556a7b01b108c716.500x500x1.jpg',
                    'stats': {'unreviewed_annotations': 0, 'hot': False, 'pageviews': 551210},
                    'title': 'Blowin' in the Wind',
                    'title_with_featured': "Blowin' in the Wind",
                    'url': 'https://genius.com/Bob-dylan-blowin-in-the-wind-lyrics',
                    'featured_artists': [],
                    'primary_artist': {'api_path': '/artists/181',
                                       'header_image_url': 'https://images.genius.com/e87fb11dd7f33cc7fd1a8915ad36f7c9.1000x667x1.png',
                                       'id': 181,
                                       'image_url': 'https://images.genius.com/571780cc8959528e8166e5894ab13d6f.1000x1000x1.jpg',
                                       'is_meme_verified': False,
                                       'is_verified': False,
                                       'name': 'Bob Dylan',
                                       'url': 'https://genius.com/artists/Bob-dylan'}}}

```

```

In [80]: artist_id = dgenius["hits"][0]["result"]["primary_artist"]["id"]
         artist_id

```

```

Out[80]: 181

```

## 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]

### Answer 4

```

In [84]: endpt = f"/artists/{artist_id}/songs"
         parameters = {"access_token": gaccess}

```

```
r = requests.get(root+endpt, params=parameters, headers=headers)
r
```

Out[84]: <Response [200]>

```
In [110... songs = json.loads(r.text)["response"]["songs"]
songsdf = pd.json_normalize(songs)
songsdf
```

Out[110]:

	annotation_count	api_path	artist_names	full_title	header_i
<b>0</b>	0	/songs/200681	Bob Dylan	10,000 Men by Bob Dylan	<a href="https://images.genius.com/9a0c">https://images.genius.com/9a0c</a>
<b>1</b>	0	/songs/7105561	Bob Dylan & The Band	2 Dollars and 99 Cents by Bob Dylan & The Band	<a href="https://images.genius.com/84a">https://images.genius.com/84a</a>
<b>2</b>	1	/songs/200682	Bob Dylan	2 X 2 by Bob Dylan	<a href="https://images.genius.com/9a0c">https://images.genius.com/9a0c</a>
<b>3</b>	1	/songs/1686914	Bob Dylan	32-20 Blues by Bob Dylan	<a href="https://images.genius.com/dec">https://images.genius.com/dec</a>
<b>4</b>	15	/songs/105774	Bob Dylan	4th Time Around by Bob Dylan	<a href="https://images.genius.com/f96e">https://images.genius.com/f96e</a>
<b>5</b>	1	/songs/994912	Robyn Hitchcock	4th Time Around by Robyn Hitchcock	<a href="https://images.genius.com/4476">https://images.genius.com/4476</a>
<b>6</b>	1	/songs/1493543	Traveling Wilburys	7 Deadly Sins by Traveling Wilburys	<a href="https://images.genius.com/eda5">https://images.genius.com/eda5</a>
<b>7</b>	0	/songs/7103550	Bob Dylan & The Band	900 Miles from My Home by Bob Dylan & The Band	<a href="https://images.genius.com/84a">https://images.genius.com/84a</a>
<b>8</b>	1	/songs/1994655	Bob Dylan	900 Miles from My Home by Bob Dylan	<a href="https://images.genius.com/5711">https://images.genius.com/5711</a>
<b>9</b>	0	/songs/7105812	Bob Dylan & The Band	900 Miles From My Home / Confidential (Hidden ...	<a href="https://images.genius.com/84a">https://images.genius.com/84a</a>
<b>10</b>	3	/songs/118651	Bob Dylan (Ft. George Harrison)	Abandoned Love by Bob Dylan (Ft. George Harrison)	<a href="https://images.genius.com/3471">https://images.genius.com/3471</a>
<b>11</b>	0	/songs/5754536	Gillian Welch	Abandoned Love by Gillian Welch	<a href="https://images.genius.com/9c51">https://images.genius.com/9c51</a>
<b>12</b>	1	/songs/2234570	Paul Rodgers (Ft. Nils Lofgren)	Abandoned Love by Paul Rodgers (Ft. Nils Lofgren)	<a href="https://images.genius.com/546">https://images.genius.com/546</a>

	annotation_count	api_path	artist_names	full_title	header_i
13	1	/songs/1390070	The Everly Brothers	Abandoned Love by The Everly Brothers	https://images.genius.com/bc5
14	1	/songs/7236491	Bob Dylan	Abraham, Martin, and John (Rehearsal) by Bob D...	https://images.genius.com/046
15	7	/songs/105773	Bob Dylan	Absolutely Sweet Marie by Bob Dylan	https://images.genius.com/f96e
16	1	/songs/941697	George Harrison	Absolutely Sweet Marie by George Harrison	https://images.genius.com/a10
17	0	/songs/3303535	The Flamin' Groovies	Absolutely Sweet Marie by The Flamin' Groovies	https://images.genius.com/205
18	0	/songs/6223061	Bob Dylan	Absolutely Sweet Marie (Take 1) by Bob Dylan	https://images.genius.com/2b3l
19	1	/songs/2042558	Björn Afzelius	Absolut solar plexus by Björn Afzelius	https://images.genius.com/e0b

20 rows × 35 columns

For this next part, I just wanted to see if I could get the songs where Bob Dylan was the primary artist.

In [107...

```
songsd = json.loads(r.text)["response"]["songs"]
songsd_1 = [x for x in songsd if x["primary_artist"]["id"]==181]
songsd_1[1]
```

```

Out[107]: {'annotation_count': 1,
  'api_path': '/songs/200682',
  'artist_names': 'Bob Dylan',
  'full_title': '2 X 2 by\xa0Bob\xa0Dylan',
  'header_image_thumbnail_url': 'https://images.genius.com/9a0da499b7383ddf232734cfb860d33b.300x301x1.jpg',
  'header_image_url': 'https://images.genius.com/9a0da499b7383ddf232734cfb860d33b.500x501x1.jpg',
  'id': 200682,
  'lyrics_owner_id': 225680,
  'lyrics_state': 'complete',
  'path': '/Bob-dylan-2-x-2-lyrics',
  'pyongs_count': None,
  'relationships_index_url': 'https://genius.com/Bob-dylan-2-x-2-sample',
  'release_date_components': {'year': 1990, 'month': 9, 'day': 10},
  'release_date_for_display': 'September 10, 1990',
  'release_date_with_abbreviated_month_for_display': 'Sep. 10, 1990',
  'song_art_image_thumbnail_url': 'https://images.genius.com/9a0da499b7383ddf232734cfb860d33b.300x301x1.jpg',
  'song_art_image_url': 'https://images.genius.com/9a0da499b7383ddf232734cfb860d33b.500x501x1.jpg',
  'stats': {'unreviewed_annotations': 0, 'hot': False},
  'title': '2 X 2',
  'title_with_featured': '2 X 2',
  'url': 'https://genius.com/Bob-dylan-2-x-2-lyrics',
  'featured_artists': [],
  'primary_artist': {'api_path': '/artists/181',
    'header_image_url': 'https://images.genius.com/e87fb11dd7f33cc7fd1a8915ad36f7c9.1000x667x1.png',
    'id': 181,
    'image_url': 'https://images.genius.com/571780cc8959528e8166e5894ab13d6f.1000x1000x1.jpg',
    'is_meme_verified': False,
    'is_verified': False,
    'name': 'Bob Dylan',
    'url': 'https://genius.com/artists/Bob-dylan'}}

```

```

In [106... songsd2 = pd.json_normalize(songsd_1)
songsd2

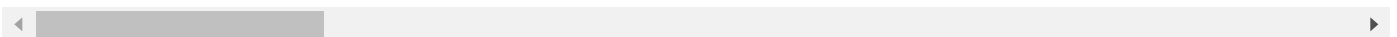
```



Out[106]:

	annotation_count	api_path	artist_names	full_title	header_image
0	0	/songs/200681	Bob Dylan	10,000 Men by Bob Dylan	https://images.genius.com/9a0da4
1	1	/songs/200682	Bob Dylan	2 X 2 by Bob Dylan	https://images.genius.com/9a0da4
2	1	/songs/1686914	Bob Dylan	32-20 Blues by Bob Dylan	https://images.genius.com/dec36
3	15	/songs/105774	Bob Dylan	4th Time Around by Bob Dylan	https://images.genius.com/f96e17
4	1	/songs/1994655	Bob Dylan	900 Miles from My Home by Bob Dylan	https://images.genius.com/57178
5	3	/songs/118651	Bob Dylan (Ft. George Harrison)	Abandoned Love by Bob Dylan (Ft. George Harrison)	https://images.genius.com/3473e
6	1	/songs/7236491	Bob Dylan	Abraham, Martin, and John (Rehearsal) by Bob D...	https://images.genius.com/046f5
7	7	/songs/105773	Bob Dylan	Absolutely Sweet Marie by Bob Dylan	https://images.genius.com/f96e17
8	0	/songs/6223061	Bob Dylan	Absolutely Sweet Marie (Take 1) by Bob Dylan	https://images.genius.com/2b3b3

9 rows × 35 columns



## 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]

## Answer 5

In [112... `# !pip install lyricsgenius`

In [113... `import lyricsgenius  
genius = lyricsgenius.Genius(gaccess)`

In [114... `song = genius.search_song("Tangled Up in Blue", "Bob Dylan")  
print(song.lyrics)`

Searching for "Tangled Up in Blue" by Bob Dylan...  
Done.

91 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 LiveGet tickets as low as \$124You 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

In [ ]: