Automating API Pull using Python

(1) Import Python Libraries

In [1]:

```python
from requests import Request, Session
from requests.exceptions import ConnectionError, Timeout, TooManyRedirects
import json

import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

import os
from time import time
from time import sleep
```

(2) Using an API Key with Python

In [3]:

```python
url = 'https://pro-api.coinmarketcap.com/v1/cryptocurrency/listings/latest'

parameters = {
  'start':'1',
  'limit':'15',
  'convert':'USD'
}

headers = {
  'Accepts': 'application/json',
  'X-CMC_PRO_API_KEY': '0d11cefa-2730-441a-b86e-d5bc32d407d7',
}
```

In [4]:

```python
session = Session()
session.headers.update(headers)
```

In [5]:

```
try:
    response = session.get(url, params=parameters)
    data = json.loads(response.text)
    print(data)
except (ConnectionError, Timeout, TooManyRedirects) as e:
    print(e)
```

```
{'status': {'timestamp': '2023-08-18T07:38:54.184Z', 'error_code': 0,
'error_message': None, 'elapsed': 22, 'credit_count': 1, 'notice': Non
e, 'total_count': 9580}, 'data': [{'id': 1, 'name': 'Bitcoin', 'symbo
l': 'BTC', 'slug': 'bitcoin', 'num_market_pairs': 10392, 'date_added':
'2010-07-13T00:00:00.000Z', 'tags': ['mineable', 'pow', 'sha-256', 'st
ore-of-value', 'state-channel', 'coinbase-ventures-portfolio', 'three-
arrows-capital-portfolio', 'polychain-capital-portfolio', 'binance-lab
s-portfolio', 'blockchain-capital-portfolio', 'boostvc-portfolio', 'cm
s-holdings-portfolio', 'dcg-portfolio', 'dragonfly-capital-portfolio',
'electric-capital-portfolio', 'fabric-ventures-portfolio', 'framework-
ventures-portfolio', 'galaxy-digital-portfolio', 'huobi-capital-portfo
lio', 'alameda-research-portfolio', 'a16z-portfolio', '1confirmation-p
ortfolio', 'winklevoss-capital-portfolio', 'usv-portfolio', 'placehold
er-ventures-portfolio', 'pantera-capital-portfolio', 'multicoin-capita
l-portfolio', 'paradigm-portfolio', 'bitcoin-ecosystem'], 'max_suppl
y': 21000000, 'circulating_supply': 19460781, 'total_supply': 1946078
1, 'infinite_supply': False, 'platform': None, 'cmc_rank': 1, 'self_re
ported_circulating_supply': None, 'self_reported_market_cap': None, 't
vl_ratio': None, 'last_updated': '2023-08-18T07:37:00.000Z', 'quote':
{'USD': {'price': 26447.451621449774, 'volume_24h': 24037794064.33198
```

In [6]:

```
type(data)
```

Out[6]:

```
dict
```

(3) API JSON format to Dataframe

In [7]:

```
pd.json_normalize(data['data'])
```

Out[7]:

	id	name	symbol	slug	num_market_pairs	date_added	tags
0	1	Bitcoin	BTC	bitcoin	10392	2010-07-13T00:00:00.000Z	[mineable, pow, sha-256, store-of-value, state...
1	1027	Ethereum	ETH	ethereum	7236	2015-08-07T00:00:00.000Z	[pos, smart-contracts, ethereum-ecosystem, coi...
2	825	Tether USDt	USDT	tether	59628	2015-02-25T00:00:00.000Z	[payments, stablecoin, asset-backed-stablecoin...
3	1839	BNB	BNB	bnb	1571	2017-07-25T00:00:00.000Z	[marketplace, centralized-exchange, payments, ...
4	52	XRP	XRP	xrp	1032	2013-08-04T00:00:00.000Z	[medium-of-exchange, enterprise-solutions, arr...
5	3408	USD Coin	USDC	usd-coin	13653	2018-10-08T00:00:00.000Z	[medium-of-exchange, stablecoin, asset-backed-...
6	2010	Cardano	ADA	cardano	892	2017-10-01T00:00:00.000Z	[dpos, pos, platform, research, smart-contract...
7	5426	Solana	SOL	solana	498	2020-04-10T00:00:00.000Z	[pos, platform, solana-ecosystem, cms-holdings...
8	74	Dogecoin	DOGE	dogecoin	770	2013-12-15T00:00:00.000Z	[mineable, pow, scrypt, medium-of-exchange, me...
9	1958	TRON	TRX	tron	809	2017-09-13T00:00:00.000Z	[media, payments, tron-ecosystem, sec-security...

	id	name	symbol	slug	num_market_pairs	date_added	tags
10	6636	Polkadot	DOT	polkadot-new	554	2020-08-19T00:00:00.000Z	[substrate, polkadot, binance-chain, polkadot-...
11	3890	Polygon	MATIC	polygon	809	2019-04-28T00:00:00.000Z	[pos, platform, enterprise-solutions, zero-kno...
12	4943	Dai	DAI	multi-collateral-dai	2506	2019-11-22T00:00:00.000Z	[defi, stablecoin, asset-backed-stablecoin, et...
13	5994	Shiba Inu	SHIB	shiba-inu	606	2020-08-01T00:00:00.000Z	[memes, ethereum-ecosystem, doggone-doggerel]
14	2	Litecoin	LTC	litecoin	970	2013-04-28T00:00:00.000Z	[mineable, pow, scrypt, medium-of-exchange]

15 rows × 36 columns

In [8]:

```
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)
```

In [9]:

```
df = pd.json_normalize(data['data'])
df['timestamp'] = pd.to_datetime('now')
df.head()
```

Out[9]:

	id	name	symbol	slug	num_market_pairs	date_added	tags
0	1	Bitcoin	BTC	bitcoin	10392	2010-07-13T00:00:00.000Z	[mineable, pow, sha-256, store-of-value, state...
1	1027	Ethereum	ETH	ethereum	7236	2015-08-07T00:00:00.000Z	[pos, smart-contracts, ethereum-ecosystem, coi...
2	825	Tether USDt	USDT	tether	59628	2015-02-25T00:00:00.000Z	[payments, stablecoin, asset-backed-stablecoin...
3	1839	BNB	BNB	bnb	1571	2017-07-25T00:00:00.000Z	[marketplace, centralized-exchange, payments, ...
4	52	XRP	XRP	xrp	1032	2013-08-04T00:00:00.000Z	[medium-of-exchange, enterprise-solutions, arr...

(4) Automating the Data Pull

In [10]:

```
def api_runner():

    global df

    url = 'https://pro-api.coinmarketcap.com/v1/cryptocurrency/listings/latest'

    parameters = {
      'start':'1',
      'limit':'15',
      'convert':'USD'
    }

    headers = {
      'Accepts': 'application/json',
      'X-CMC_PRO_API_KEY': '0d11cefa-2730-441a-b86e-d5bc32d407d7',
    }

    session = Session()
    session.headers.update(headers)

    try:
      response = session.get(url, params=parameters)
      data = json.loads(response.text)
      #print(data)
    except (ConnectionError, Timeout, TooManyRedirects) as e:
      print(e)

    # Use this if you just want to keep it in a dataframe
    df2 = pd.json_normalize(data['data'])
    df2['timestamp'] = pd.to_datetime('now')
    df = df.append(df2)

    # Use this if you want to create a csv and append data to it
    '''
    df = pd.json_normalize(data['data'])
    df['timestamp'] = pd.to_datetime('now')
    df

    if not os.path.isfile(r'D:\IITG\portfolio_projects\api_automation\API.csv'):
        df.to_csv(r'D:\IITG\portfolio_projects\api_automation\API.csv', header='column
    else:
        df.to_csv(r'D:\IITG\portfolio_projects\api_automation\API.csv', mode='a', head
    '''
```

In [11]:

```
for i in range(333):
    api_runner()
    print('API Runner completed')
    sleep(60)
exit()
```

```
API Runner completed
API Runner completed
API Runner completed
API Runner completed
API Runner completed

-------------------------------------------------------------------------
--
KeyboardInterrupt                         Traceback (most recent call las
t)
<ipython-input-11-d6baece82c3b> in <module>
      2     api_runner()
      3     print('API Runner completed')
----> 4     sleep(60)
      5 exit()

KeyboardInterrupt:
```

In [22]:

```
# Use this to read in the data from the created csv
# df72 = pd.read_csv(r'D:\IITG\portfolio_projects\api_automation\API.csv')
# df72
```

In [12]:

```
df
```

Out[12]:

	id	name	symbol	slug	num_market_pairs	date_added	tags	max_supply
0	1	Bitcoin	BTC	bitcoin	10392	2010-07-13T00:00:00.000Z	[mineable, pow, sha-256, store-of-value, state...	2.100000e+
1	1027	Ethereum	ETH	ethereum	7236	2015-08-07T00:00:00.000Z	[pos, smart-contracts, ethereum-ecosystem, coi...	N
2	825	Tether USDt	USDT	tether	59628	2015-02-25T00:00:00.000Z	[payments, stablecoin, asset-	N

(5) Transforming the Data

In [13]:

```
pd.set_option('display.float_format', lambda x: '%.5f' % x)
df.head()
```

Out[13]:

	id	name	symbol	slug	num_market_pairs	date_added	tags
0	1	Bitcoin	BTC	bitcoin	10392	2010-07-13T00:00:00.000Z	[mineable, pow, sha-256, store-of-value, state...
1	1027	Ethereum	ETH	ethereum	7236	2015-08-07T00:00:00.000Z	[pos, smart-contracts, ethereum-ecosystem, coi...
2	825	Tether USDt	USDT	tether	59628	2015-02-25T00:00:00.000Z	[payments, stablecoin, asset-backed-stablecoin...
3	1839	BNB	BNB	bnb	1571	2017-07-25T00:00:00.000Z	[marketplace, centralized-exchange, payments, ...
4	52	XRP	XRP	xrp	1032	2013-08-04T00:00:00.000Z	[medium-of-exchange, enterprise-solutions, arr...

In [14]:

```
df3 = df.groupby('name', sort=False)[['quote.USD.percent_change_1h','quote.USD.percent
df3
```

Out[14]:

	quote.USD.percent_change_1h	quote.USD.percent_change_24h	quote.USD.perc
name			
Bitcoin	-0.40364	-7.45195	
Ethereum	-0.30895	-6.05881	
Tether USDt	-0.00984	0.10810	
BNB	-0.05823	-5.53148	
XRP	0.13087	-13.69195	
USD Coin	-0.00073	0.01151	
Cardano	-0.21501	-4.56540	
Solana	-0.34285	-5.03644	
Dogecoin	0.01707	-8.26741	
TRON	0.26655	-2.41224	
Polkadot	0.41150	-5.08404	
Polygon	-0.18483	-6.23230	
Dai	-0.10688	0.00342	
Shiba Inu	0.62967	-8.73826	
Litecoin	-0.19141	-13.38706	

In [15]:

```
df4 = df3.stack()
df4
```

```
Out[15]:
```

```
name
Bitcoin       quote.USD.percent_change_1h      -0.40364
              quote.USD.percent_change_24h     -7.45195
              quote.USD.percent_change_7d      -9.98055
              quote.USD.percent_change_30d    -11.93245
              quote.USD.percent_change_60d      0.17689
              quote.USD.percent_change_90d     -1.48900
Ethereum      quote.USD.percent_change_1h      -0.30895
              quote.USD.percent_change_24h     -6.05881
              quote.USD.percent_change_7d      -8.56953
              quote.USD.percent_change_30d    -11.58795
              quote.USD.percent_change_60d     -2.02177
              quote.USD.percent_change_90d     -6.74963
Tether USDt   quote.USD.percent_change_1h      -0.00984
              quote.USD.percent_change_24h      0.10810
              quote.USD.percent_change_7d       0.12654
              quote.USD.percent_change_30d     -0.04080
              quote.USD.percent_change_60d      0.01238
              quote.USD.percent_change_90d     -0.05063
BNB           quote.USD.percent_change_1h      -0.05823
              quote.USD.percent_change_24h     -5.53148
              quote.USD.percent_change_7d      -9.03999
              quote.USD.percent_change_30d    -10.01122
              quote.USD.percent_change_60d    -10.19917
              quote.USD.percent_change_90d    -29.07819
XRP           quote.USD.percent_change_1h       0.13087
              quote.USD.percent_change_24h    -13.69195
              quote.USD.percent_change_7d     -19.71165
              quote.USD.percent_change_30d    -35.68696
              quote.USD.percent_change_60d      3.39751
              quote.USD.percent_change_90d      9.29168
USD Coin      quote.USD.percent_change_1h      -0.00073
              quote.USD.percent_change_24h      0.01151
              quote.USD.percent_change_7d       0.00512
              quote.USD.percent_change_30d      0.00610
              quote.USD.percent_change_60d     -0.00082
              quote.USD.percent_change_90d      0.00787
Cardano       quote.USD.percent_change_1h      -0.21501
              quote.USD.percent_change_24h     -4.56540
              quote.USD.percent_change_7d     -11.00401
              quote.USD.percent_change_30d    -16.84636
              quote.USD.percent_change_60d      1.09312
              quote.USD.percent_change_90d    -27.77821
Solana        quote.USD.percent_change_1h      -0.34285
              quote.USD.percent_change_24h     -5.03644
              quote.USD.percent_change_7d     -10.00891
              quote.USD.percent_change_30d    -16.31701
              quote.USD.percent_change_60d     42.83651
              quote.USD.percent_change_90d      9.32966
Dogecoin      quote.USD.percent_change_1h       0.01707
              quote.USD.percent_change_24h     -8.26741
              quote.USD.percent_change_7d     -17.69884
              quote.USD.percent_change_30d    -10.19283
              quote.USD.percent_change_60d      0.36942
              quote.USD.percent_change_90d    -15.23315
TRON          quote.USD.percent_change_1h       0.26655
              quote.USD.percent_change_24h     -2.41224
              quote.USD.percent_change_7d      -5.58609
              quote.USD.percent_change_30d     -8.80894
              quote.USD.percent_change_60d      4.20245
              quote.USD.percent_change_90d      2.88930
```

In [16]:

```
type(df3)
```

Out[16]:

```
pandas.core.frame.DataFrame
```

In [17]:

```
type(df4)
```

Out[17]:

```
pandas.core.series.Series
```

```
Polkadot     quote.USD.percent_change_1h       0.41150
             quote.USD.percent_change_24h     -5.08404
             quote.USD.percent_change_7d      -9.93047
             quote.USD.percent_change_30d    -14.03743
             quote.USD.percent_change_60d     -0.93471
             quote.USD.percent_change_90d    -16.18176
Polygon      quote.USD.percent_change_1h      -0.18483
             quote.USD.percent_change_24h     -6.23230
                                             -15.19025
                                             -22.28879
                                              -2.99917
                                             -32.90834
                                              -0.10688
                                               0.00342
                                               0.02969
                                              -0.00472
                                              -0.00185
                                              -0.00738
                                               0.62967
                                              -8.73826
                                             -16.70246
                                               7.74143
                                              16.48531
                                              -3.07186
                                              -0.19141
             quote.USD.percent_change_24h    -13.38706
             quote.USD.percent_change_7d     -21.41339
             quote.USD.percent_change_30d    -30.13591
             quote.USD.percent_change_60d    -15.65292
             quote.USD.percent_change_90d    -28.20093
dtype: float64
```

In [18]:

```
df5 = df4.to_frame(name='values')
df5
```

Out[18]:

		values
name		
Bitcoin	**quote.USD.percent_change_1h**	-0.40364
	quote.USD.percent_change_24h	-7.45195
	quote.USD.percent_change_7d	-9.98055
	quote.USD.percent_change_30d	-11.93245
	quote.USD.percent_change_60d	0.17689
	quote.USD.percent_change_90d	-1.48900
Ethereum	**quote.USD.percent_change_1h**	-0.30895
	quote.USD.percent_change_24h	-6.05881

In [19]:

```
type(df5)
```

Out[19]:

```
pandas.core.frame.DataFrame
```

In [20]:

```
df5.count()
```

Out[20]:

```
values    90
dtype: int64
```

In [21]:

```
index = pd.Index(range(90))
```

In [22]:

```
df6 = df5.reset_index()
df6
```

Out[22]:

	name	level_1	values
0	Bitcoin	quote.USD.percent_change_1h	-0.40364
1	Bitcoin	quote.USD.percent_change_24h	-7.45195
2	Bitcoin	quote.USD.percent_change_7d	-9.98055
3	Bitcoin	quote.USD.percent_change_30d	-11.93245
4	Bitcoin	quote.USD.percent_change_60d	0.17689
5	Bitcoin	quote.USD.percent_change_90d	-1.48900
6	Ethereum	quote.USD.percent_change_1h	-0.30895
7	Ethereum	quote.USD.percent_change_24h	-6.05881
8	Ethereum	quote.USD.percent_change_7d	-8.56953

In [23]:

```
df7 = df6.rename(columns={'level_1':'percent_change'})
df7
```

Out[23]:

	name	percent_change	values
0	Bitcoin	quote.USD.percent_change_1h	-0.40364
1	Bitcoin	quote.USD.percent_change_24h	-7.45195
2	Bitcoin	quote.USD.percent_change_7d	-9.98055
3	Bitcoin	quote.USD.percent_change_30d	-11.93245
4	Bitcoin	quote.USD.percent_change_60d	0.17689
5	Bitcoin	quote.USD.percent_change_90d	-1.48900
6	Ethereum	quote.USD.percent_change_1h	-0.30895
7	Ethereum	quote.USD.percent_change_24h	-6.05881
8	Ethereum	quote.USD.percent_change_7d	-8.56953

In [24]:

```
df7['percent_change'] = df7['percent_change'].replace(['quote.USD.percent_change_1h','
df7
```

Out[24]:

	name	percent_change	values
0	Bitcoin	1h	-0.40364
1	Bitcoin	24h	-7.45195
2	Bitcoin	7d	-9.98055
3	Bitcoin	30d	-11.93245
4	Bitcoin	60d	0.17689
5	Bitcoin	90d	-1.48900
6	Ethereum	1h	-0.30895
7	Ethereum	24h	-6.05881
8	Ethereum	7d	-8.56953

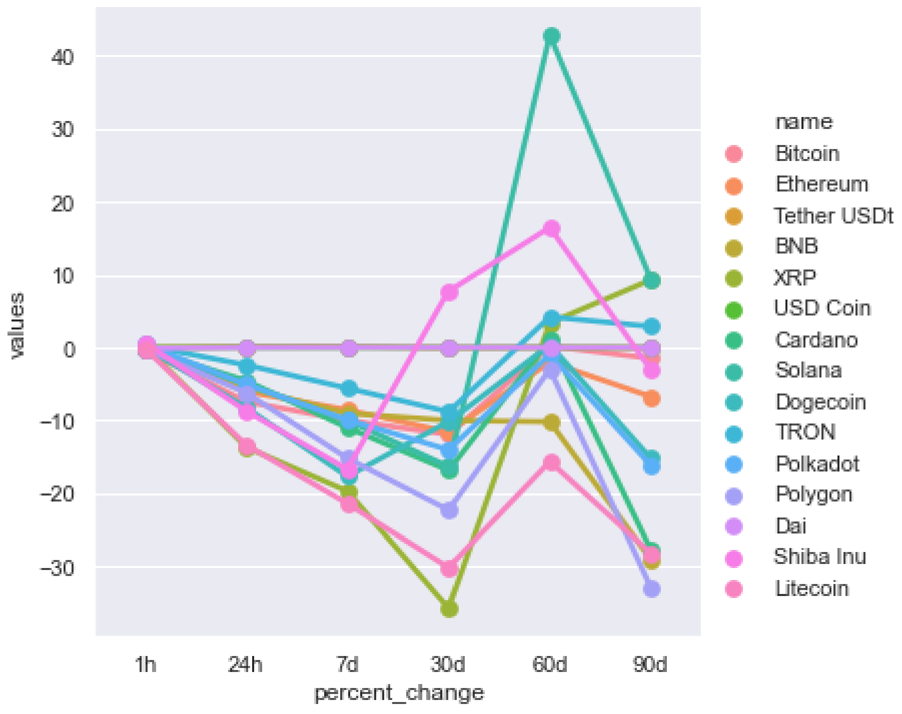
(6) Visualizing the Data

In [25]:

```
sns.catplot(x='percent_change', y='values', hue='name', data=df7, kind='point')
```

Out[25]:

```
<seaborn.axisgrid.FacetGrid at 0x2145e8536a0>
```



In [26]:

```
df8 = df[['name', 'quote.USD.price', 'timestamp']]
df8
```

Out[26]:

	name	quote.USD.price	timestamp
0	Bitcoin	26447.45162	2023-08-18 07:39:07.630322
1	Ethereum	1687.95924	2023-08-18 07:39:07.630322
2	Tether USDt	0.99975	2023-08-18 07:39:07.630322
3	BNB	218.44129	2023-08-18 07:39:07.630322
4	XRP	0.50797	2023-08-18 07:39:07.630322
5	USD Coin	1.00004	2023-08-18 07:39:07.630322
6	Cardano	0.26339	2023-08-18 07:39:07.630322
7	Solana	22.05945	2023-08-18 07:39:07.630322
8	Dogecoin	0.06223	2023-08-18 07:39:07.630322

In [27]:

```
df9 = df8.query("name == 'Bitcoin'")
df9
```

Out[27]:

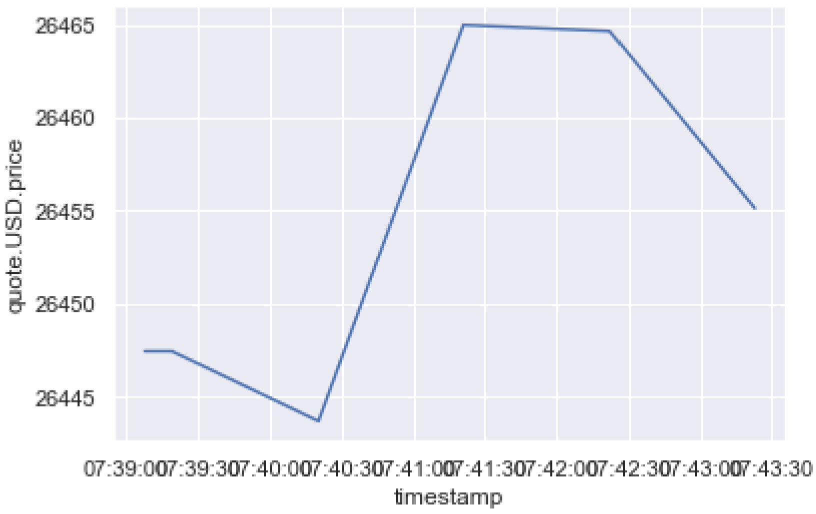
	name	quote.USD.price	timestamp
0	Bitcoin	26447.45162	2023-08-18 07:39:07.630322
0	Bitcoin	26447.45162	2023-08-18 07:39:18.949811
0	Bitcoin	26443.69331	2023-08-18 07:40:20.355608
0	Bitcoin	26464.99743	2023-08-18 07:41:21.055115
0	Bitcoin	26464.66639	2023-08-18 07:42:22.258739
0	Bitcoin	26455.13874	2023-08-18 07:43:22.917310

In [28]:

```
sns.set_theme(style='darkgrid')
sns.lineplot(x='timestamp', y='quote.USD.price', data=df9)
```

Out[28]:

```
<AxesSubplot:xlabel='timestamp', ylabel='quote.USD.price'>
```


quote.USD.price
07:39:00
07:39:30
07:40:00
07:40:30
07:41:00
07:41:30
07:42:00
07:42:30
07:43:00
07:43:30
timestamp