Covid19Data

June 11, 2025

[12]:
```
# Getting airports data from apis
import requests
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import json
```

[7]:
```
#Fet COVID-19 Data for All countries
url='https://disease.sh/v3/covid-19/countries'
response = requests.get(url)
```

[10]:
```
#fetch data
data = response.json()
```

[13]:
```
 # Convert JSON to DataFrame
df = pd.json_normalize(data)
```

[14]:
```
# Display first few rows
df.head()
```

[14]:
```
         updated      country   cases  todayCases  deaths  todayDeaths  \
0  1749641696057  Afghanistan  234174           0    7996            0
1  1749641696049      Albania  334863           0    3605            0
2  1749641696052      Algeria  272010           0    6881            0
3  1749641696113      Andorra   48015           0     165            0
4  1749641696083       Angola  107327           0    1937            0

   recovered  todayRecovered  active  critical  …  oneTestPerPeople  \
0     211080               0   15098         0  …                29
1     330233               0    1025         0  …                 1
2     183061               0   82068         0  …               196
3          0               0   47850         0  …                 0
4     103419               0    1971         0  …                23

   activePerOneMillion  recoveredPerOneMillion  criticalPerOneMillion  \
0               370.46                 5179.32                    0.0
1               357.59               115209.32                    0.0
2              1809.65                 4036.61                    0.0
```

```
3          617714.26                    0.00                     0.0
4              56.27                 2952.52                     0.0

   countryInfo._id countryInfo.iso2  countryInfo.iso3  countryInfo.lat  \
0              4.0               AF               AFG             33.0
1              8.0               AL               ALB             41.0
2             12.0               DZ               DZA             28.0
3             20.0               AD               AND             42.5
4             24.0               AO               AGO            -12.5

   countryInfo.long                           countryInfo.flag
0              65.0  https://disease.sh/assets/img/flags/af.png
1              20.0  https://disease.sh/assets/img/flags/al.png
2               3.0  https://disease.sh/assets/img/flags/dz.png
3               1.6  https://disease.sh/assets/img/flags/ad.png
4              18.5  https://disease.sh/assets/img/flags/ao.png

[5 rows x 28 columns]
```

Data Cleaning and Preparation

[15]:
```python
# Check for missing values
print(df.isnull().sum())
```

```
updated                   0
country                   0
cases                     0
todayCases                0
deaths                    0
todayDeaths               0
recovered                 0
todayRecovered            0
active                    0
critical                  0
casesPerOneMillion        0
deathsPerOneMillion       0
tests                     0
testsPerOneMillion        0
population                0
continent                 0
oneCasePerPeople          0
oneDeathPerPeople         0
oneTestPerPeople          0
activePerOneMillion       0
recoveredPerOneMillion    0
criticalPerOneMillion     0
countryInfo._id           2
countryInfo.iso2          2
countryInfo.iso3          2
countryInfo.lat           0
countryInfo.long          0
countryInfo.flag          0
dtype: int64
```

[17]:
```
# Select relevant columns
columns_to_keep = [
    'country', 'cases', 'todayCases', 'deaths', 'todayDeaths',
    'recovered', 'todayRecovered', 'active', 'critical',
    'casesPerOneMillion', 'deathsPerOneMillion', 'tests',
    'testsPerOneMillion', 'population', 'continent'
]
df = df[columns_to_keep]
```

[18]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 231 entries, 0 to 230
Data columns (total 15 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   country              231 non-null    object
 1   cases                231 non-null    int64
 2   todayCases           231 non-null    int64
 3   deaths               231 non-null    int64
 4   todayDeaths          231 non-null    int64
 5   recovered            231 non-null    int64
 6   todayRecovered       231 non-null    int64
 7   active               231 non-null    int64
 8   critical             231 non-null    int64
 9   casesPerOneMillion   231 non-null    int64
 10  deathsPerOneMillion  231 non-null    int64
 11  tests                231 non-null    int64
 12  testsPerOneMillion   231 non-null    int64
 13  population           231 non-null    int64
 14  continent            231 non-null    object
dtypes: int64(13), object(2)
memory usage: 27.2+ KB
```

[19]:
```
# Convert numeric columns (some might be strings)
numeric_cols = ['cases', 'todayCases', 'deaths', 'todayDeaths',
               'recovered', 'todayRecovered', 'active', 'critical',
               'casesPerOneMillion', 'deathsPerOneMillion', 'tests',
               'testsPerOneMillion', 'population']
df[numeric_cols] = df[numeric_cols].apply(pd.to_numeric, errors='coerce')

# Fill missing values if needed
```

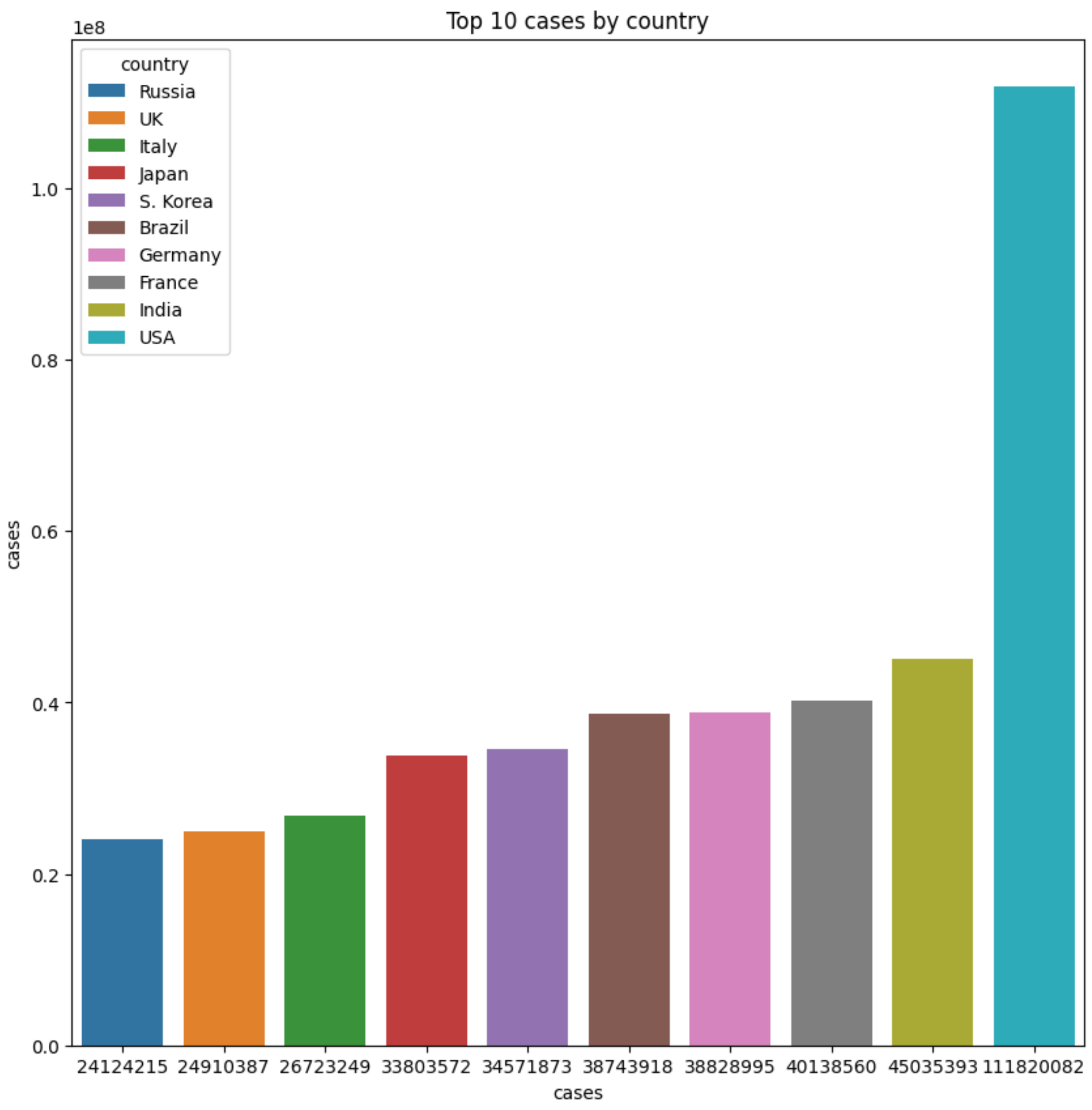
```
df.fillna(0, inplace=True)
```

Exploratory Data Analysis

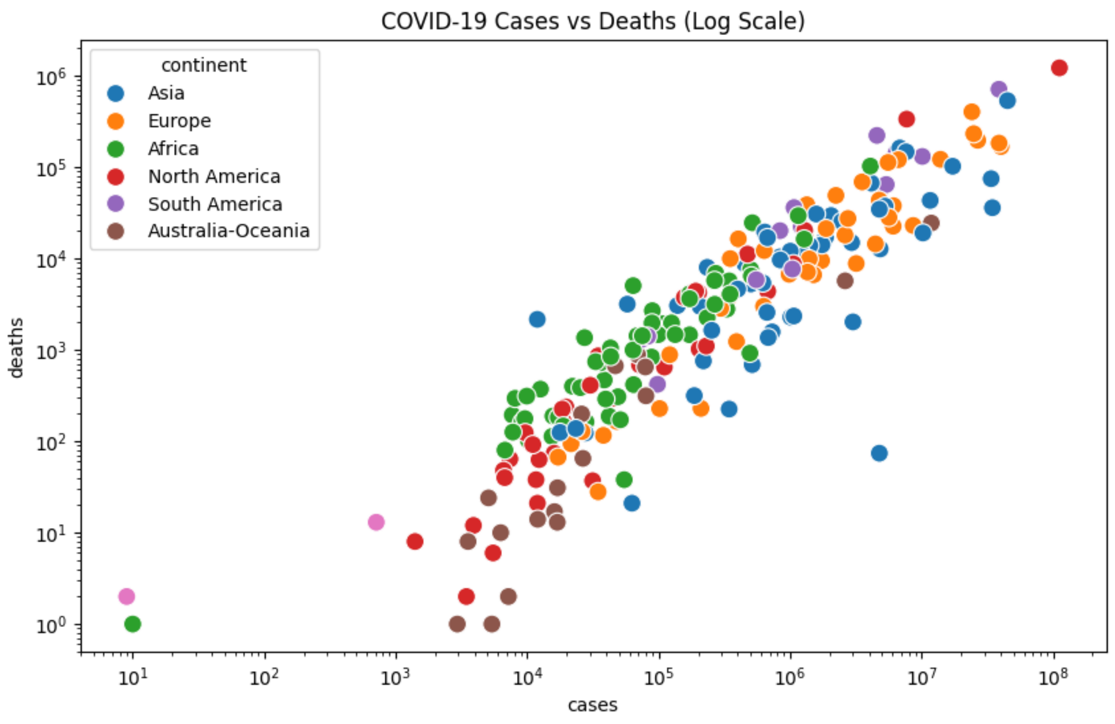
[20]:
```
# Basic Statistics

df.describe()
```

[20]:
```
              cases  todayCases        deaths  todayDeaths     recovered  \
count  2.310000e+02       231.0  2.310000e+02        231.0  2.310000e+02
mean   3.050883e+06         0.0  3.034927e+04          0.0  2.426700e+06
std    1.002125e+07         0.0  1.092314e+05          0.0  9.196220e+06
min    9.000000e+00         0.0  0.000000e+00          0.0  0.000000e+00
25%    2.636600e+04         0.0  1.855000e+02          0.0  2.189500e+03
50%    2.068970e+05         0.0  1.974000e+03          0.0  5.894700e+04
75%    1.348198e+06         0.0  1.428700e+04          0.0  1.032544e+06
max    1.118201e+08         0.0  1.219487e+06          0.0  1.098144e+08

       todayRecovered        active    critical  casesPerOneMillion  \
count      231.000000  2.310000e+02  231.000000          231.000000
mean         3.567100  5.938335e+05   12.454545       201193.108225
std         34.562905  3.893881e+06   71.172396       206119.715817
min          0.000000  0.000000e+00    0.000000            0.000000
25%          0.000000  6.750000e+01    0.000000        17656.500000
50%          0.000000  1.283000e+03    0.000000       128681.000000
75%          0.000000  2.775550e+04    0.000000       328620.500000
max        390.000000  4.450182e+07  940.000000       771655.000000

       deathsPerOneMillion         tests  testsPerOneMillion    population
count           231.000000  2.310000e+02        2.310000e+02  2.310000e+02
mean           1238.640693  3.041777e+07        1.987980e+06  3.439366e+07
std            1308.862565  1.154321e+08        3.549881e+06  1.380709e+08
min               0.000000  0.000000e+00        0.000000e+00  0.000000e+00
25%             133.500000  2.260585e+05        8.465900e+04  4.281115e+05
50%             783.000000  1.690934e+06        7.173800e+05  5.554960e+06
75%            2040.000000  1.169128e+07        2.126400e+06  2.183934e+07
max            6595.000000  1.186852e+09        2.330212e+07  1.448471e+09
```

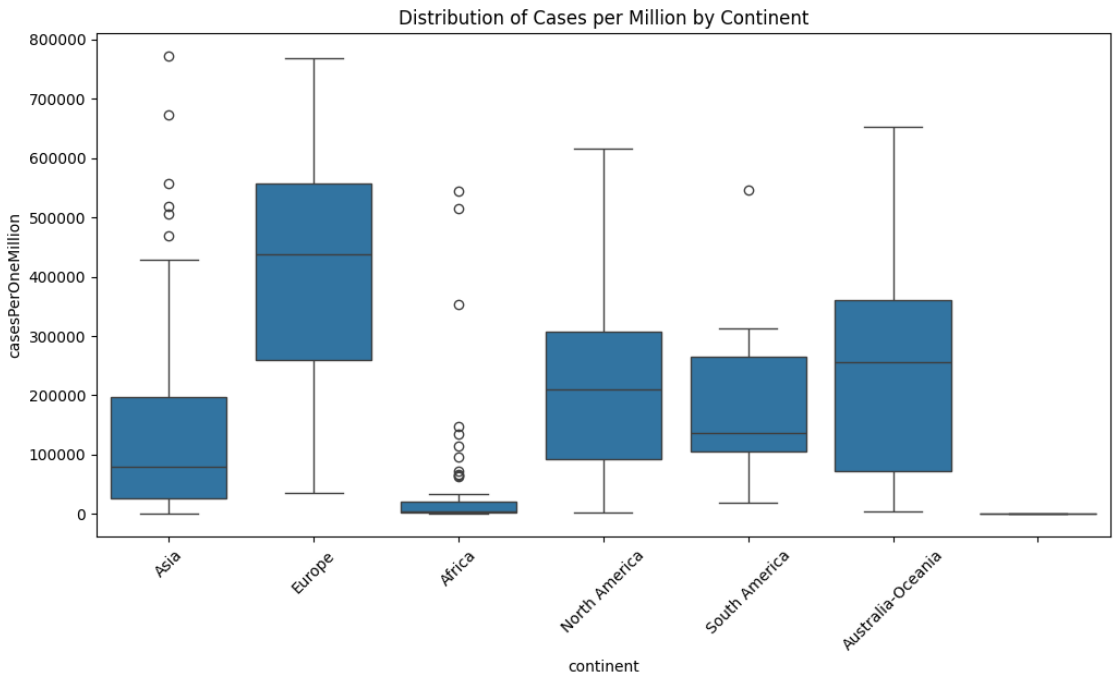
[26]:
```
#top 10 Countries by Cases
top_cases = df.sort_values('cases', ascending=False).head(10)

plt.figure(figsize = (10,10))
sns.barplot(x='cases', y='cases', hue='country', data=top_cases)
plt.title('Top 10 cases by country')
plt.show()
```



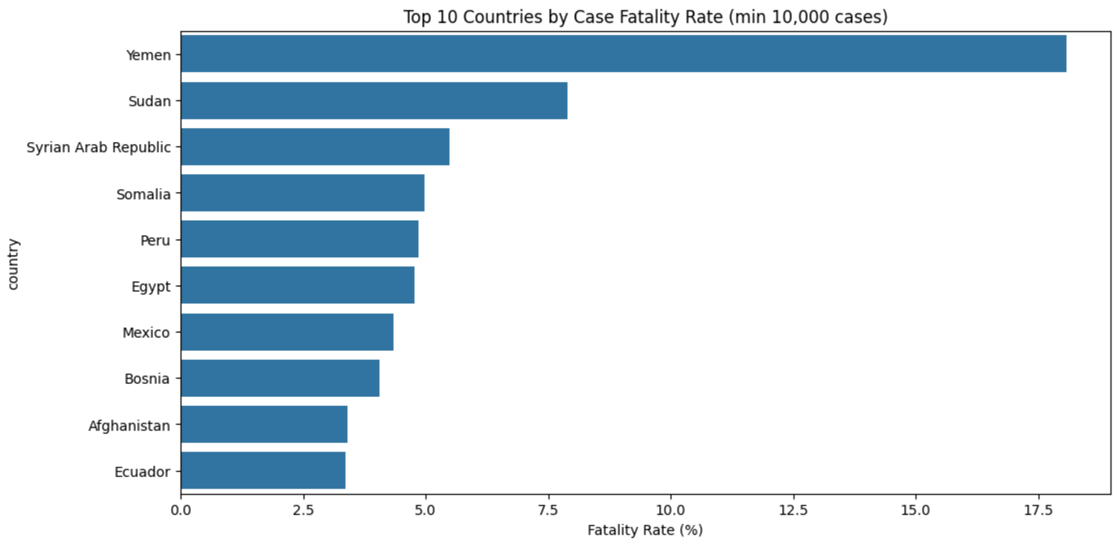
[27]:
```
#Cases vs Deaths Scatter Plot
plt.figure(figsize=(10,6))
sns.scatterplot(x='cases', y='deaths', hue='continent', data=df, s=100)
plt.xscale('log')
plt.yscale('log')
plt.title('COVID-19 Cases vs Deaths (Log Scale)')
plt.show()
```



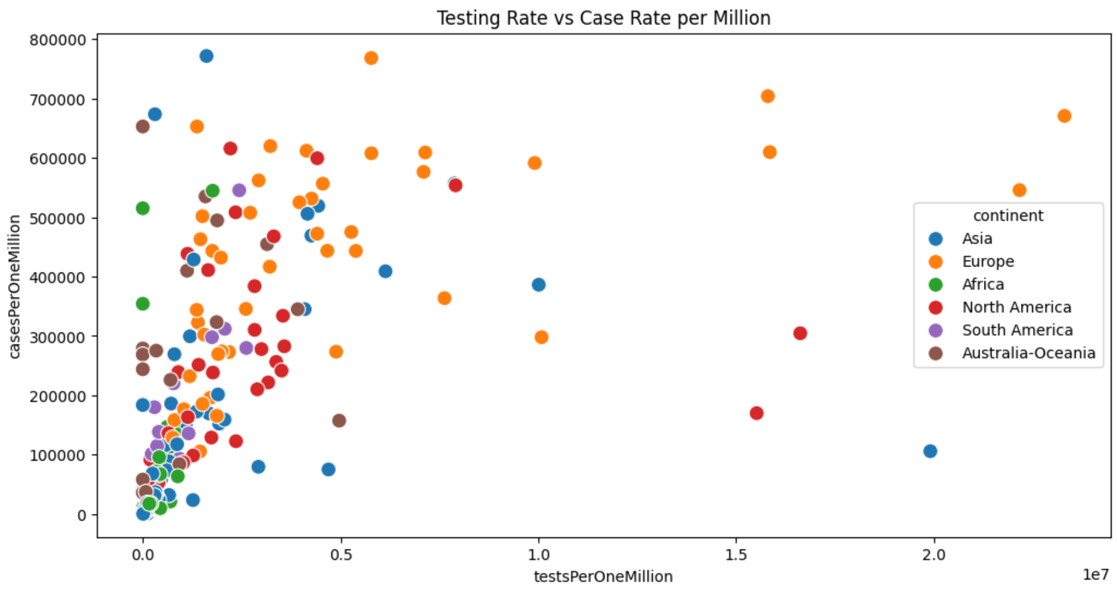
[28]:
```
# Cases per Million by Continent
plt.figure(figsize=(12,6))
sns.boxplot(x='continent', y='casesPerOneMillion', data=df)
plt.title('Distribution of Cases per Million by Continent')
plt.xticks(rotation=45)
plt.show()
```



```
[29]: df['case_fatality_rate'] = (df['deaths'] / df['cases']) * 100

      # Top 10 countries by CFR (with at least 10,000 cases)
      cfr_top = df[df['cases'] > 10000].sort_values('case_fatality_rate',␣
       ↪ascending=False).head(10)
      plt.figure(figsize=(12,6))
      sns.barplot(x='case_fatality_rate', y='country', data=cfr_top)
      plt.title('Top 10 Countries by Case Fatality Rate (min 10,000 cases)')
      plt.xlabel('Fatality Rate (%)')
      plt.show()
```



[30]:
```
df['test_positivity_rate'] = (df['cases'] / df['tests']) * 100

plt.figure(figsize=(12,6))
sns.scatterplot(x='testsPerOneMillion', y='casesPerOneMillion',␣
  ↪hue='continent', data=df, s=100)
plt.title('Testing Rate vs Case Rate per Million')
plt.show()
```



[32]:
```
# Fetch historical data for a Kenya
ts_url = "https://disease.sh/v3/covid-19/historical/KENYA?lastdays=all"
ts_response = requests.get(ts_url)
```

[35]:
```
ts_data = ts_response.json()
```

[43]:
```
ts_df = pd.DataFrame(ts_data['timeline'])

ts_df.head()
```

[43]:
```
         cases  deaths  recovered
1/22/20      0       0          0
1/23/20      0       0          0
1/24/20      0       0          0
1/25/20      0       0          0
1/26/20      0       0          0
```

[44]:
```
ts_df['date'] = pd.to_datetime(ts_df['date'])
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
File ~\PyCharmMiscProject\.venv\Lib\site-packages\pandas\core\indexes\base.py:
↪3805, in Index.get_loc(self, key)
   3804 try:
-> 3805     return self._engine.get_loc(casted_key)
   3806 except KeyError as err:

File index.pyx:167, in pandas._libs.index.IndexEngine.get_loc()

File index.pyx:196, in pandas._libs.index.IndexEngine.get_loc()

File pandas\\_libs\\hashtable_class_helper.pxi:7081, in pandas._libs.hashtable.
↪PyObjectHashTable.get_item()

File pandas\\_libs\\hashtable_class_helper.pxi:7089, in pandas._libs.hashtable.
↪PyObjectHashTable.get_item()

KeyError: 'date'

The above exception was the direct cause of the following exception:

KeyError                                  Traceback (most recent call last)
Cell In[44], line 1
----> 1 ts_df['date'] = pd.to_datetime(ts_df[      ])

File ~\PyCharmMiscProject\.venv\Lib\site-packages\pandas\core\frame.py:4102, in
↪DataFrame.__getitem__(self, key)
```

```
   4100 if self.columns.nlevels > 1:
   4101     return self._getitem_multilevel(key)
-> 4102 indexer = self.columns.get_loc(key)
   4103 if is_integer(indexer):
   4104     indexer = [indexer]

File ~\PyCharmMiscProject\.venv\Lib\site-packages\pandas\core\indexes\base.py:
 ↪3812, in Index.get_loc(self, key)
   3807     if isinstance(casted_key, slice) or (
   3808         isinstance(casted_key, abc.Iterable)
   3809         and any(isinstance(x, slice) for x in casted_key)
   3810     ):
   3811         raise InvalidIndexError(key)
-> 3812     raise KeyError(key) from err
   3813 except TypeError:
   3814     # If we have a listlike key, _check_indexing_error will raise
   3815     #  InvalidIndexError. Otherwise we fall through and re-raise
   3816     #  the TypeError.
   3817     self._check_indexing_error(key)

KeyError: 'date'
```