Python Project Nelson Tran

August 25, 2023

1 Python Project

1.0.1 Nelson Tran

1.0.2 8/24/23

[81]:

```
#Importing libraries and data needed
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

cost_of_living_df = pd.read_csv('cost_of_living.csv')
levels_fyi_salary_df = pd.read_csv('Levels_Fyi_Salary_Data.csv')
ds_salaries_df = pd.read_csv('ds_salaries.csv')
country_codes_df = pd.read_excel('country_codes.xlsx')

#to get an idea with what im working with
print(cost_of_living_df.describe().round(2))
print(ds_salaries_df.describe().round(2))
```

```
       Rank  Cost of Living Index  Rent Index  Cost of Living Plus Rent Index  \
count   0.0                578.00      578.00                          578.00
mean    NaN                 57.54       26.65                           43.06
std     NaN                 21.66       17.84                           18.90
min     NaN                 18.55        2.37                           10.97
25%     NaN                 38.02       12.26                           26.14
50%     NaN                 62.40       23.28                           44.99
75%     NaN                 73.03       36.62                           55.72
max     NaN                149.02      108.42                          124.22

       Groceries Index  Restaurant Price Index  Local Purchasing Power Index
count           578.00                  578.00                        578.00
mean             53.57                   54.35                         71.50
std              22.13                   25.86                         34.21
min              15.22                   11.39                          1.62
25%              34.02                   30.45                         42.76
50%              52.74                   59.14                         70.94
75%              68.94                   73.54                         95.68
```

```
max              157.89                   155.22                        172.98
       Unnamed: 0  work_year       salary  salary_in_usd  remote_ratio
count      607.00     607.00       607.00         607.00        607.00
mean       303.00    2021.41    324000.06      112297.87         70.92
std        175.37       0.69   1544357.49       70957.26         40.71
min          0.00    2020.00      4000.00        2859.00          0.00
25%        151.50    2021.00     70000.00       62726.00         50.00
50%        303.00    2022.00    115000.00      101570.00        100.00
75%        454.50    2022.00    165000.00      150000.00        100.00
max        606.00    2022.00  30400000.00      600000.00        100.00
```

[30]:

```
#Taking the mean of the median salaries of each work year, taking the median␣
 ↪first would try to eliminate outliers (in USD)
median_ds_salaries = ds_salaries_df.groupby('work_year')['salary_in_usd'].
 ↪agg([np.mean, np.median, np.std])
avg_salary = median_ds_salaries['median'].mean()
avg_salary = np.round(avg_salary)
print(avg_salary)
#assigning the printed value to a variable (in USD)
avg_ds_salary = 92691
```

```
92691.0
```

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```
#For simplicity each cost of living index will be weighted equally
cost_of_living_df['composite_score'] = (cost_of_living_df['Cost of Living␣
 ↪Index']+
                                       cost_of_living_df['Rent Index']+
                                       cost_of_living_df['Cost of Living Plus␣
 ↪Rent Index']+
                                       cost_of_living_df['Groceries Index']+
                                       cost_of_living_df['Restaurant Price␣
 ↪Index']+
                                       cost_of_living_df['Local Purchasing␣
 ↪Power Index'])/6

cost_of_living_df = cost_of_living_df.sort_values(by='composite_score',␣
 ↪ascending=False)
print((cost_of_living_df).tail(6))
```

```
     Rank                  City  Cost of Living Index  Rent Index  \
574   NaN     Karachi, Pakistan                 20.75        4.84
569   NaN      Lahore, Pakistan                 21.53        4.03
575   NaN  Rawalpindi, Pakistan                 20.52        4.78
571   NaN     Kabul, Afghanistan                21.35        3.17
577   NaN    Peshawar, Pakistan                 18.55        2.37
576   NaN      Multan, Pakistan                 18.68        2.94

     Cost of Living Plus Rent Index  Groceries Index  Restaurant Price Index  \
574                           13.29            18.48                  15.21
569                           13.33            18.48                  17.34
575                           13.14            18.51                  16.18
571                           12.83            15.22                  14.85
577                           10.97            16.62                  14.39
576                           11.30            18.37                  11.80

     Local Purchasing Power Index  composite_score  location_index
574                         29.16        16.955000             572
569                         24.42        16.521667             573
575                         22.91        16.006667             574
571                         22.79        15.035000             575
577                         26.00        14.816667             576
576                         25.09        14.696667             577
```

[79]:
```
#Looking at the salary-to-index ratio for each location
low_comp_score_df = cost_of_living_df[cost_of_living_df["composite_score"]<16.6]
print(low_comp_score_df)

salary_to_index_ratio = (avg_ds_salary) / low_comp_score_df['composite_score']
print(salary_to_index_ratio)
#Seeing this salary-to-index ratio shows that our salary would go the farthest␣
 ↪in these 5 locations
```

```
     Rank                  City  Cost of Living Index  Rent Index  \
569   NaN      Lahore, Pakistan                 21.53        4.03
575   NaN  Rawalpindi, Pakistan                 20.52        4.78
571   NaN    Kabul, Afghanistan                 21.35        3.17
577   NaN    Peshawar, Pakistan                 18.55        2.37
576   NaN      Multan, Pakistan                 18.68        2.94

     Cost of Living Plus Rent Index  Groceries Index  Restaurant Price Index  \
569                           13.33            18.48                   17.34
575                           13.14            18.51                   16.18
571                           12.83            15.22                   14.85
577                           10.97            16.62                   14.39
576                           11.30            18.37                   11.80

     Local Purchasing Power Index  composite_score  location_index
569                         24.42        16.521667             573
575                         22.91        16.006667             574
571                         22.79        15.035000             575
577                         26.00        14.816667             576
576                         25.09        14.696667             577
569    5610.269343
575    5790.774677
571    6165.014965
577    6255.860517
```

```
576    6306.940349
Name: composite_score, dtype: float64
```

[47]:

```
#Checking to see if there is any city id from 'Levels_Fyi_Salary_Data' matches␣
 ↪our 5 locations
locations_to_check = ('Lahore', 'Rawalpindi', 'Kabul', 'Peshawar', 'Multan')

city_id_check = levels_fyi_salary_df['location'].isin(locations_to_check)

for value, result in zip(locations_to_check, city_id_check):
    if result:
        print(f"{value} is in the 'location' column.")
    else:
        print(f"{value} is not in 'location' column.")
#from this we can see that there is no city id that match any of our 5 locations
```

```
Lahore is not in 'location' column.
Rawalpindi is not in 'location' column.
Kabul is not in 'location' column.
Peshawar is not in 'location' column.
Multan is not in 'location' column.
```

[51]:

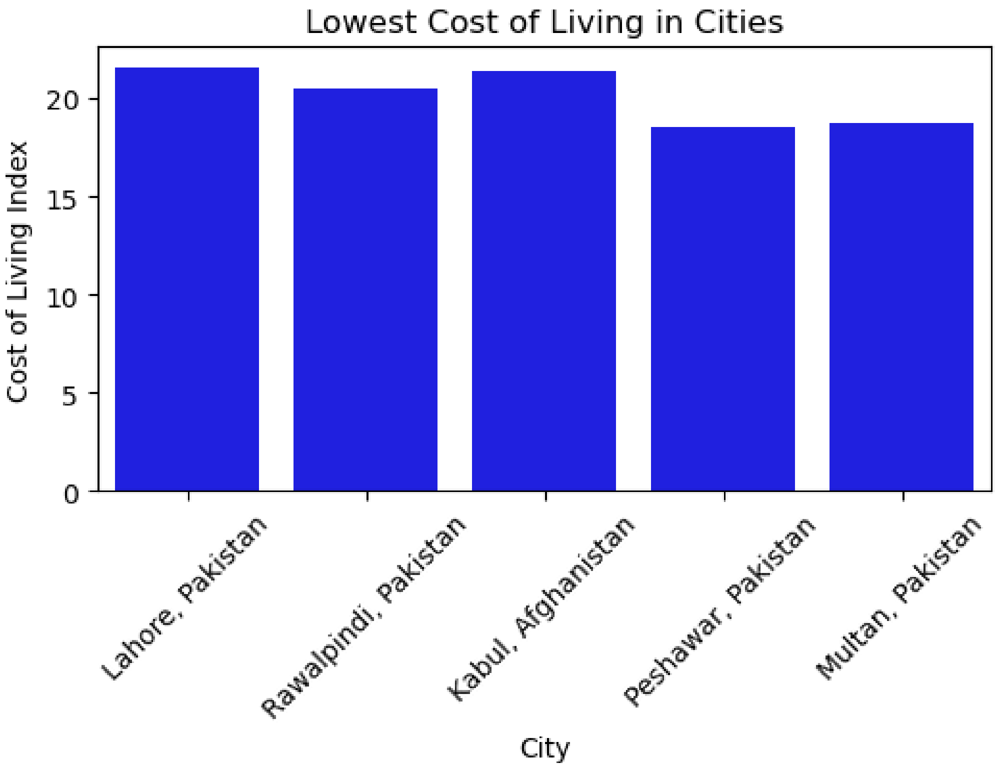
```
#Checking to see if any of 5 locations country codes show up in␣
 ↪"country_codes_df"
country_num_id = country_codes_df[(country_codes_df['Country'] ==␣
 ↪'Afghanistan') |
                                  (country_codes_df['Country'] == 'Pakistan')]
print(country_num_id)
#Countries codes for AFG and PAK shown but since 4 out of 5 locations are in␣
 ↪AFG, we use city names instead to avoid confusion
```

```
         Country Alpha-2 code Alpha-3 code  Numeric
0    Afghanistan           AF          AFG        4
166     Pakistan           PK          PAK      586
```

[88]:

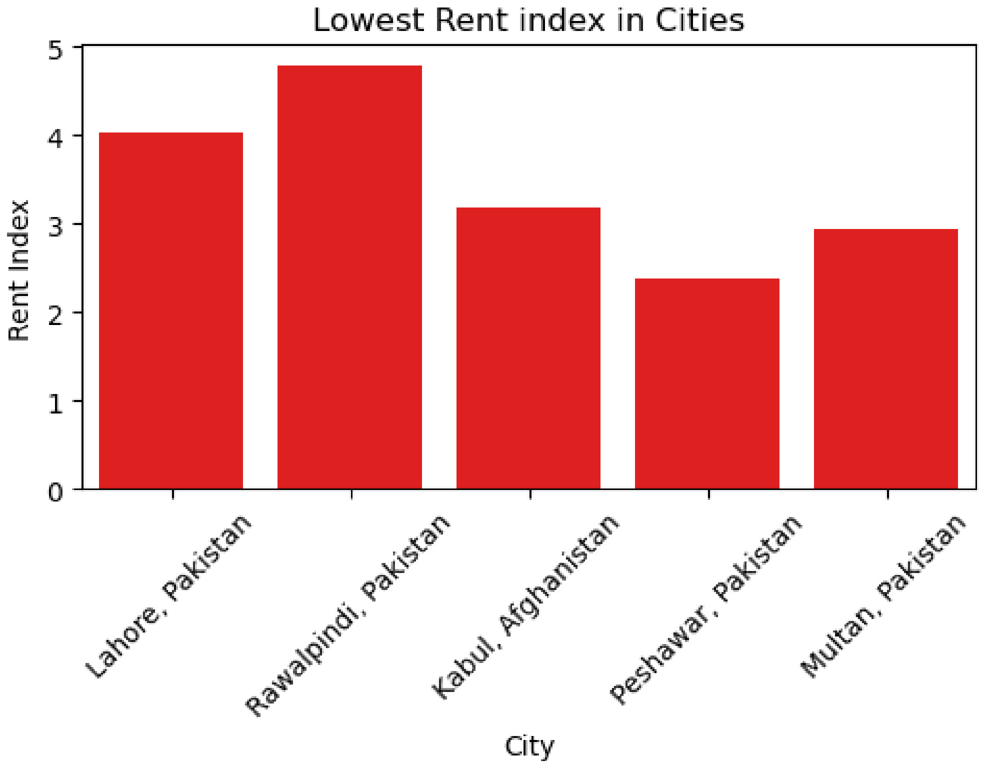
```
#Graphs showing the individual indexes within the cost of living (COL) index

#COL index
plt.figure(figsize=(6,3))
sns.barplot(x=low_comp_score_df['City'],
            y=low_comp_score_df['Cost of Living Index'],
           color = 'blue')
plt.xlabel('City')
plt.ylabel('Cost of Living Index')
plt.title('Lowest Cost of Living in Cities')
plt.xticks(rotation=45)
plt.show()
```



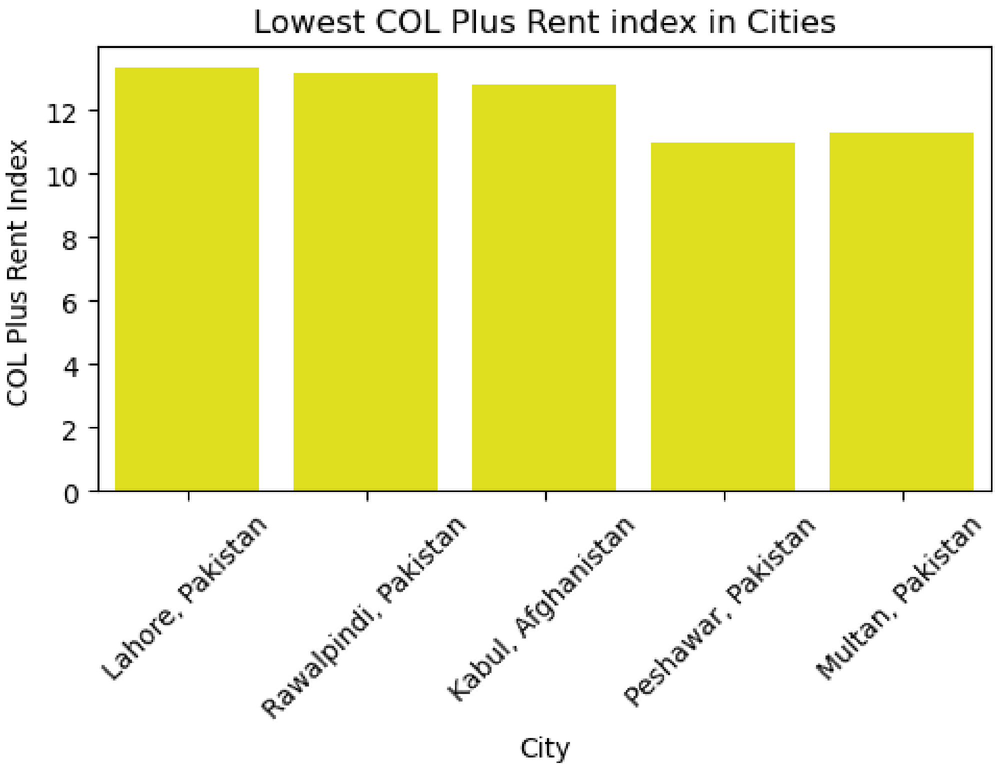
[87]:

```
#Rent Index
plt.figure(figsize=(6,3))
sns.barplot(x=low_comp_score_df['City'],
            y=low_comp_score_df['Rent Index'],
           color = 'red')
plt.xlabel('City')
plt.ylabel('Rent Index')
plt.title('Lowest Rent index in Cities')
plt.xticks(rotation=45)
plt.show()
```



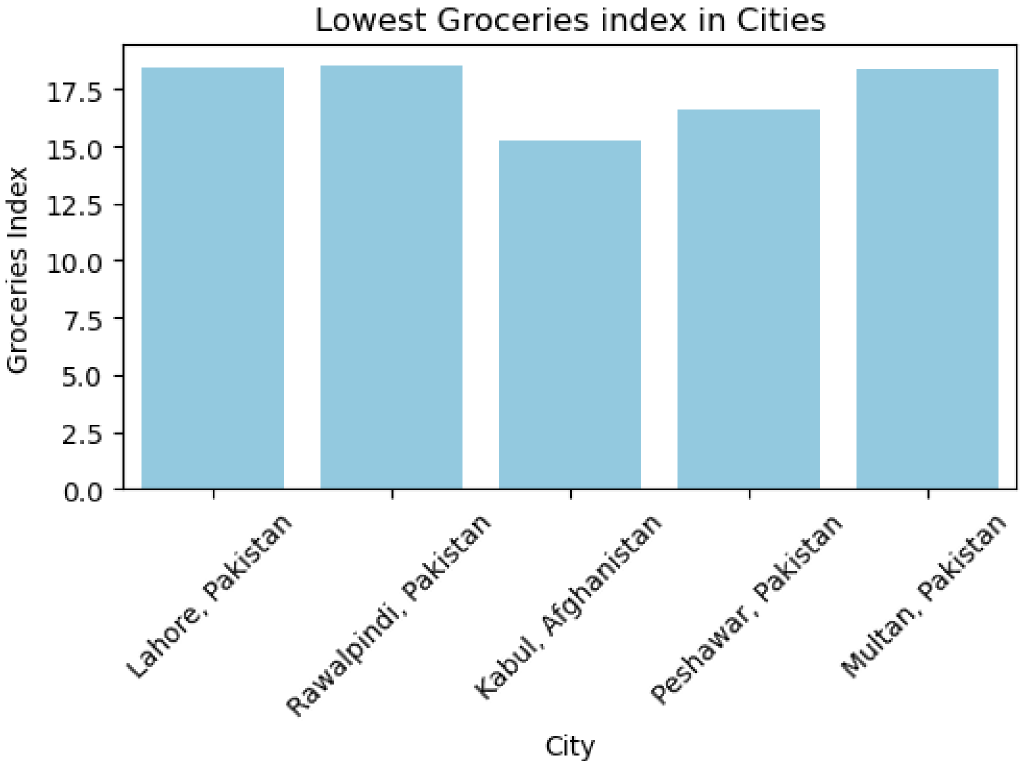
[89]:

```
#COL plus Rent index
plt.figure(figsize=(6,3))
sns.barplot(x=low_comp_score_df['City'],
            y=low_comp_score_df['Cost of Living Plus Rent Index'],
           color = 'yellow')
plt.xlabel("City")
plt.ylabel("COL Plus Rent Index")
plt.title('Lowest COL Plus Rent index in Cities')
plt.xticks(rotation=45)
plt.show()
```



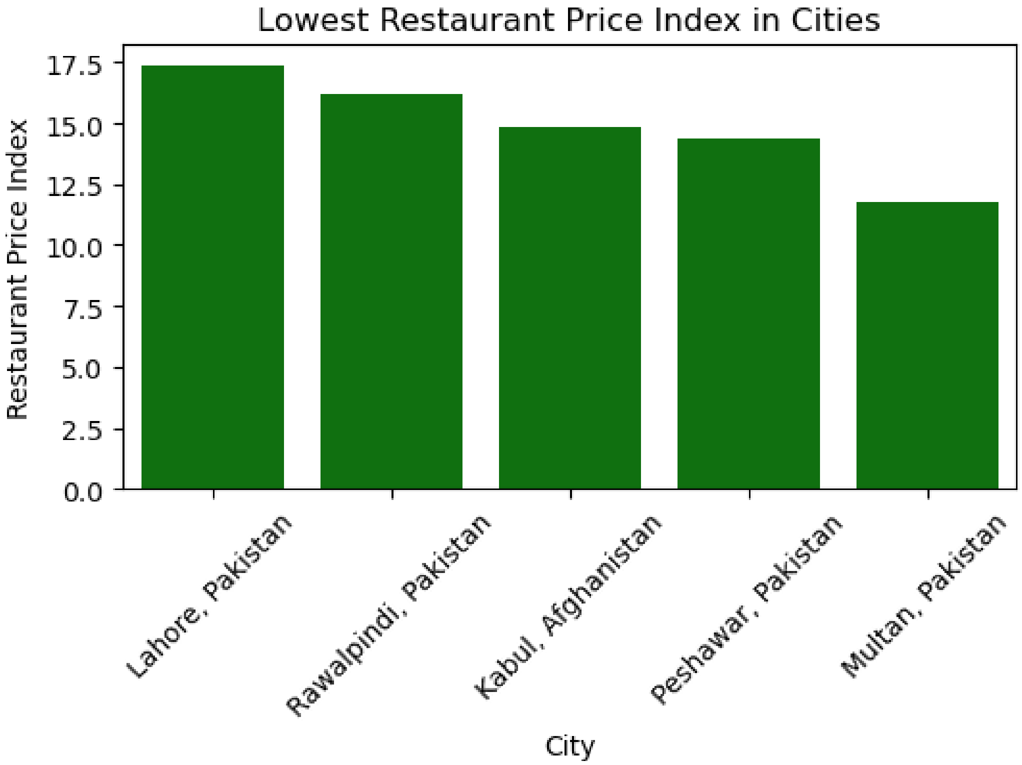
[90]:

```
#Goceries Index
plt.figure(figsize=(6,3))
sns.barplot(x=low_comp_score_df['City'],
            y=low_comp_score_df['Groceries Index'],
           color = 'skyblue')
plt.xlabel('City')
plt.ylabel('Groceries Index')
plt.title('Lowest Groceries index in Cities')
plt.xticks(rotation=45)
plt.show()
```



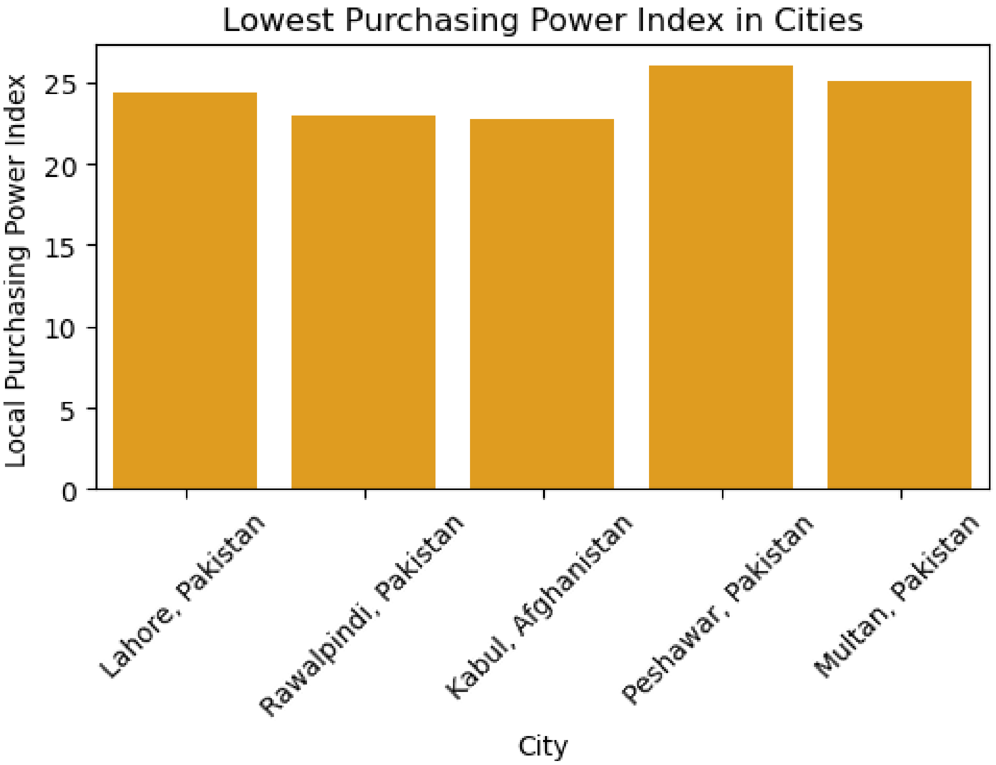
[91]:

```
#Restaurant Price Index
plt.figure(figsize=(6,3))
sns.barplot(x=low_comp_score_df['City'],
            y=low_comp_score_df['Restaurant Price Index'],
           color = 'green')
plt.xlabel('City')
plt.ylabel('Restaurant Price Index')
plt.title('Lowest Restaurant Price Index in Cities')
plt.xticks(rotation=45)
plt.show()
```



[92]:

```
#Local Purchasing Power Index
plt.figure(figsize=(6,3))
sns.barplot(x=low_comp_score_df['City'],
            y=low_comp_score_df['Local Purchasing Power Index'],
           color = 'orange')
plt.xlabel('City')
plt.ylabel('Local Purchasing Power Index')
plt.title('Lowest Purchasing Power Index in Cities')
plt.xticks(rotation=45)
plt.show()
```


Lowest Purchasing Power Index in Cities
Local Purchasing Power Index
0
5
10
15
20
25
City
Lahore, Pakistan
Rawalpindi, Pakistan
Kabul, Afghanistan
Peshawar, Pakistan
Multan, Pakistan