SDS Assignment 1 - Digital Nomad

- **First of all i import the packeages that I need and download the data.**
- **Take a look at the data using head and info.**
- **Then open the files and assigning them to variables.**

In [ ]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [ ]:

```
#!wget  https://sds-aau.github.io/SDS-master/M1/data/trips.csv
```

In [ ]:

```
!wget https://sds-aau.github.io/SDS-master/M1/data/people.csv
```

In [ ]:

```
!wget https://sds-aau.github.io/SDS-master/M1/data/countrylist.csv
```

In [ ]:

```
tripdata = pd.read_csv('trips.csv')
peopledata = pd.read_csv('people.csv')
countrydata = pd.read_csv('countrylist.csv')
```

In [ ]:

```
#taking a look at each file and see how the data looks
print(peopledata.head())
#tripdata.head()
countrydata.head()
#Could also use this
#peopledata.info()
#peopledata.describe()
```

```
   Unnamed: 0  ...                     education_raw
0           0  ...  High School, Bachelor's Degree
1           1  ...                               NaN
2           2  ...                               NaN
3           3  ...                               NaN
4           4  ...                               NaN

[5 rows x 6 columns]
```

Out[ ]:

	alpha_2	region	sub_region
0	AF	Asia	Southern Asia
1	AX	Europe	Northern Europe
2	AL	Europe	Southern Europe
3	DZ	Africa	Northern Africa
4	AS	Oceania	Polynesia

Part 1 Preprocessing

Preprocessing 1A

a. Transform dates into timestamps in the Trips data.

In [ ]:

```
# the code from 1A
#tripdata.info()
tripdata['date_end'] = pd.to_datetime(tripdata.date_end, errors = 'coerce')
tripdata['date_start'] = pd.to_datetime(tripdata.date_start, errors = 'coerce')
tripdata.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 46510 entries, 0 to 46509
Data columns (total 11 columns):
 #   Column        Non-Null Count  Dtype         
---  ------        --------------  -----         
 0   Unnamed: 0    46510 non-null  int64         
 1   username      46510 non-null  object        
 2   country       46473 non-null  object        
 3   country_code  45909 non-null  object        
 4   country_slug  46473 non-null  object        
 5   date_end      46292 non-null  datetime64[ns]
 6   date_start    46499 non-null  datetime64[ns]
 7   latitude      46510 non-null  int64         
 8   longitude     46510 non-null  int64         
 9   place         46510 non-null  object        
 10  place_slug    46473 non-null  object        
dtypes: datetime64[ns](2), int64(3), object(6)
memory usage: 3.9+ MB
```

Preprocessing 1B

b. Calculate trip duration in days and create a column with a numerical value.

In [ ]:

```
#tripdata.describe()
tripdata['duration'] = tripdata.apply(lambda row: row.date_end - row.date_start, axis=1)
tripdata.describe()
#tripdata.head()
```

Out[ ]:

	Unnamed: 0	latitude	longitude	duration
count	46510.000000	46510.000000	46510.000000	46282
mean	23254.500000	28.931477	11.912750	50 days 13:04:52.312346052
std	13426.424847	23.551976	78.767316	658 days 14:15:01.267546536
min	0.000000	-79.000000	-175.000000	-16831 days +00:00:00
25%	11627.250000	14.000000	-68.000000	3 days 00:00:00
50%	23254.500000	37.000000	9.000000	7 days 00:00:00
75%	34881.750000	47.000000	98.000000	23 days 00:00:00
max	46509.000000	78.000000	178.000000	74633 days 00:00:00

In [ ]:

```
tripdata.head()
```

Out[ ]:

Unnamed: 0	username	country	country_code	country_slug	date_end	date_start	latitude	longitude	place	pl

	Unnamed: 0	username	country	country_code	country_slug	date_end	date_start	latitude	longitude	place	pl
0	0	@lewellenmichael	Mexico	MX	mexico	2018-06-19	2018-06-04	21	101	Guanajuato	
1	1	@lewellenmichael	Mexico	MX	mexico	2018-06-03	2018-05-31	19	-99	Mexico City	
2	2	@lewellenmichael	Mexico	MX	mexico	2017-11-05	2017-11-01	21	-86	Cancun	
3	3	@lewellenmichael	Jordan	JO	jordan	2017-08-07	2017-07-24	31	35	Amman	
4	4	@waylandchin	China	CN	china	2017-03-18	2017-02-17	40	122	Yingkou	

Preprocessing 1C

c. Filter the extreme observations, make sure minimum duration is 1 day!

In [ ]:

```
#this give info about the quantiles
tripdata.describe()
```

Out[ ]:

	Unnamed: 0	latitude	longitude	duration
count	46510.000000	46510.000000	46510.000000	46282
mean	23254.500000	28.931477	11.912750	50 days 13:04:52.312346052
std	13426.424847	23.551976	78.767316	658 days 14:15:01.267546536
min	0.000000	-79.000000	-175.000000	-16831 days +00:00:00
25%	11627.250000	14.000000	-68.000000	3 days 00:00:00
50%	23254.500000	37.000000	9.000000	7 days 00:00:00
75%	34881.750000	47.000000	98.000000	23 days 00:00:00
max	46509.000000	78.000000	178.000000	74633 days 00:00:00

In [ ]:

```
#code for 1c
# this will create a np array and give quantile in duration duration
extrem = pd.DataFrame(tripdata)
percentiles = np.array([0.05, 0.25, 0.50, 0.75, 0.975])
extrem.duration.quantile(percentiles)
#tripdata.groupby('duration').quantile(.68)
#my_DataFrame.groupby(['AGGREGATE']).agg({'duration': [q50, q90, 'max']})
```

Out[ ]:

```
0.050      1 days
0.250      3 days
0.500      7 days
0.750     23 days
0.975    261 days
Name: duration, dtype: timedelta64[ns]
```

In [ ]:

```
# deleting the trips lower than 1 day and more than upper quantile
tripdata = tripdata[tripdata['duration'].dt.days >=1]
tripdata = tripdata[tripdata['duration'].dt.days <=660]
```

In [ ]:

```
tripdata.duration.max()
```

Out[ ]:

```
Timedelta('660 days 00:00:00')
```

In [ ]:

```
tripdata['date_end'].dt.year.max()
```

Out[ ]:

```
2106
```

In [ ]:

```
tripdata = tripdata[tripdata['date_start'].dt.year > 2010]
```

In [ ]:

```
tripdata.date_start.min()
```

Out[ ]:

```
Timestamp('2011-01-01 00:00:00')
```

In [ ]:

```
tripdata = tripdata[tripdata['date_end'].dt.year < 2022]
```

In [ ]:

```
tripdata.date_end.max()
```

Out[ ]:

```
Timestamp('2021-11-30 00:00:00')
```

In [ ]:

```
tripdata.describe()
```

Out[ ]:

	Unnamed: 0	latitude	longitude	duration
count	42309.000000	42309.000000	42309.000000	42309
mean	23080.457090	28.483183	13.540571	23 days 20:34:03.139757498
std	13470.733227	23.603071	78.985590	53 days 06:02:51.296091224
min	0.000000	-79.000000	-175.000000	1 days 00:00:00
25%	11389.000000	13.000000	-61.000000	3 days 00:00:00
50%	22988.000000	37.000000	11.000000	7 days 00:00:00
75%	34695.000000	47.000000	98.000000	23 days 00:00:00
max	46509.000000	78.000000	178.000000	660 days 00:00:00

Preprocessing 1D

d. Join the countrylist data to the trips data. Use the countrycode as a key.

In [ ]:

```
#code for 1d
#tripdata.head()
#tripdata.country_code.value_counts()
#tripdata.country_code.unique()
#countrydata.alpha_2.value_counts()

trips_merged = pd.merge(tripdata, countrydata, left_on="country_code", right_on="alpha_2
")
```

In [ ]:

```
countrydata.alpha_2.unique()
```

Out[ ]:

```
array(['AF', 'AX', 'AL', 'DZ', 'AS', 'AD', 'AO', 'AI', 'AQ', 'AG', 'AR',
       'AM', 'AW', 'AU', 'AT', 'AZ', 'BS', 'BH', 'BD', 'BB', 'BY', 'BE',
       'BZ', 'BJ', 'BM', 'BT', 'BO', 'BQ', 'BA', 'BW', 'BV', 'BR', 'IO',
       'BN', 'BG', 'BF', 'BI', 'CV', 'KH', 'CM', 'CA', 'KY', 'CF', 'TD',
       'CL', 'CN', 'CX', 'CC', 'CO', 'KM', 'CG', 'CD', 'CK', 'CR', 'CI',
       'HR', 'CU', 'CW', 'CY', 'CZ', 'DK', 'DJ', 'DM', 'DO', 'EC', 'EG',
       'SV', 'GQ', 'ER', 'EE', 'SZ', 'ET', 'FK', 'FO', 'FJ', 'FI', 'FR',
       'GF', 'PF', 'TF', 'GA', 'GM', 'GE', 'DE', 'GH', 'GI', 'GR', 'GL',
       'GD', 'GP', 'GU', 'GT', 'GG', 'GN', 'GW', 'GY', 'HT', 'HM', 'VA',
       'HN', 'HK', 'HU', 'IS', 'IN', 'ID', 'IR', 'IQ', 'IE', 'IM', 'IL',
       'IT', 'JM', 'JP', 'JE', 'JO', 'KZ', 'KE', 'KI', 'KP', 'KR', 'KW',
       'KG', 'LA', 'LV', 'LB', 'LS', 'LR', 'LY', 'LI', 'LT', 'LU', 'MO',
       'MG', 'MW', 'MY', 'MV', 'ML', 'MT', 'MH', 'MQ', 'MR', 'MU', 'YT',
       'MX', 'FM', 'MD', 'MC', 'MN', 'ME', 'MS', 'MA', 'MZ', 'MM', nan,
       'NR', 'NP', 'NL', 'NC', 'NZ', 'NI', 'NE', 'NG', 'NU', 'NF', 'MK',
       'MP', 'NO', 'OM', 'PK', 'PW', 'PS', 'PA', 'PG', 'PY', 'PE', 'PH',
       'PN', 'PL', 'PT', 'PR', 'QA', 'RE', 'RO', 'RU', 'RW', 'BL', 'SH',
       'KN', 'LC', 'MF', 'PM', 'VC', 'WS', 'SM', 'ST', 'SA', 'SN', 'RS',
       'SC', 'SL', 'SG', 'SX', 'SK', 'SI', 'SB', 'SO', 'ZA', 'GS', 'SS',
       'ES', 'LK', 'SD', 'SR', 'SJ', 'SE', 'CH', 'SY', 'TW', 'TJ', 'TZ',
       'TH', 'TL', 'TG', 'TK', 'TO', 'TT', 'TN', 'TR', 'TM', 'TC', 'TV',
       'UG', 'UA', 'AE', 'GB', 'US', 'UM', 'UY', 'UZ', 'VU', 'VE', 'VN',
       'VG', 'VI', 'WF', 'EH', 'YE', 'ZM', 'ZW'], dtype=object)
```

Part 2 People

People 2a

a. find how many people have at least high school diploma.

In [ ]:

```
#Count the different values in education raw, this sort on type
print(peopledata.education_raw.value_counts())
#summerize the string in that contains high in education
print("\npeople with High School diploma :")
#looking at what the string contains, and try to find High
print(peopledata.education_raw.str.contains("High").sum())

#Not using the string function you only get high school with one value and not multiple.
#len(peopledata.loc[peopledata['education_raw'] == 'High School'])
```

```
Bachelor's Degree                                  197
Master's Degree                                    115
High School                                         58
High School, Bachelor's Degree                      43
High School, Bachelor's Degree, Master's Degree     29
Bachelor's Degree, Master's Degree                   9
Name: education_raw, dtype: int64

people with High School diploma :
130
```

People 2b

b. How many “Startup Founders” have attained a “Master’s Degree”?

b. How many "Startup Founders" have attained a "Master's Degree"?

In [ ]:

```
# making a new data frame with name master_start and str contain with 2 condiftion
master_start = peopledata[peopledata.education_raw.str.contains("Master\'s") & peopledat
a.work_raw.str.contains("Startup Founder")]

#take the length of this dataframe
len(master_start)
#Master_startup = peopledata[(peopledata.work_raw == 'Startup Founder') & (peopledata.edu
cation_raw == 'Masters Degree')]
```

Out[ ]:

```
53
```

People 2c

c. Who is the person with a Master's Degree that has the highest number of followers? Bonus: Explore the individual further, what else can you find out?

In [ ]:

```
#code for 2c
#her just sorting the values from max to low in followers
peopledata.sort_values(by=['followers'],ascending=False)

# the 2 person was having a master' degree
```

Out[ ]:

	Unnamed: 0	username	followers	following	work_raw	education_raw
3096	3096	@nomadlist_	2228	1	NaN	NaN
2043	2043	@levelsio	2182	353	Software Dev, Startup Founder, Creative	High School, Bachelor's Degree, Master's Degree
3631	3631	@vanschneider	520	13	NaN	NaN
494	494	@joelgascoigne	503	123	Startup Founder	NaN
1909	1909	@marc	429	57	Web Dev, Software Dev, UI/UX Design, Startup F...	High School, Bachelor's Degree
...	...	...	...	...	...	...
2979	2979	@cargix1	0	1	Software Dev	NaN
1620	1620	@kutniy	0	2	NaN	NaN
2974	2974	@mastinkipp	0	0	NaN	NaN
2971	2971	@pahoda	0	0	NaN	NaN
3198	3198	@tanjas	0	0	NaN	NaN

4016 rows × 6 columns

In [ ]:

```
print(peopledata.iloc[2043])
```

```
Unnamed: 0                                                 2043
username                                              @levelsio
followers                                                  2182
following                                                   353
work_raw                  Software Dev, Startup Founder, Creative
education_raw    High School, Bachelor's Degree, Master's Degree
Name: 2043, dtype: object
```

Part 3 Trips

Trips 3a

a. Which country received the highest number of trips? – And which the lowest?

In [ ]:

```
# code for 3a
#tripdata.head()
#tripdata.info()
#tripdata.shape

#save the value count in a new frame
max_travel = tripdata.country.value_counts()
print(max_travel)
```

```
United States     6771
Thailand          3255
United Kingdom    1977
Spain             1853
Germany           1800
                  ...
45230                1
630 72               1
Mayotte              1
Andaman Sea          1
Lake Titicaca        1
Name: country, Length: 234, dtype: int64
```

the most travel to country is USA and lowest is some small islands

Trips 3b

b. Which region received the highest number of trips in 2017? Use the start of trips as a time reference.

In [ ]:

```
tripdata.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 42309 entries, 0 to 46509
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Unnamed: 0    42309 non-null  int64
 1   username      42309 non-null  object
 2   country       42276 non-null  object
 3   country_code  41796 non-null  object
 4   country_slug  42276 non-null  object
 5   date_end      42309 non-null  datetime64[ns]
 6   date_start    42309 non-null  datetime64[ns]
 7   latitude      42309 non-null  int64
 8   longitude     42309 non-null  int64
 9   place         42309 non-null  object
 10  place_slug    42276 non-null  object
 11  duration      42309 non-null  timedelta64[ns]
dtypes: datetime64[ns](2), int64(3), object(6), timedelta64[ns](1)
memory usage: 4.2+ MB
```

In [ ]:

```
trip_2017 = trips_merged.groupby('region')['date_start'].count()
```

```
#newframe.sort_values(['region', ['date_start'] <='2017-01-01'], ascending=[True, False],
inplace=True)
#newframe.loc[newframe["date_start"] <= "2017-01-01", "region"]
#newframe.sort_values(['region', 'date_start'], ascending=[True, False], inplace=True)

#newframe = newframe.groupby('region')['date_start'] <= '2017-01-01' #+ #df.groupby('away
_team')['away_score'].sum()
```

In [ ]:

```
trips_2017 =trips_merged[trips_merged.date_end.dt.year<=2017]
trips_2017 =trips_2017[trips_2017.date_start.dt.year>=2017]
```

In [ ]:

```
trips_2017.date_start.min()
```

Out[ ]:

```
Timestamp('2017-01-01 00:00:00')
```

In [ ]:

```
trips_2017.date_end.max()
```

Out[ ]:

```
Timestamp('2017-12-31 00:00:00')
```

In [ ]:

```
trips_2017 = trips_2017.groupby('region')['duration'].count()
```

In [ ]:

```
trips_2017.sort_values(ascending=False)
```

Out[ ]:

```
region
Europe      4099
Asia        3255
Americas    3114
Africa       415
Oceania      357
Name: duration, dtype: int64
```

Most trips in Europe in 2017

Trips 3c

c. Which country in “Western Europe” did travelers spent least time?

In [ ]:

```
#new frame is the merged frame with country and trips
trip_euro = trips_merged.groupby('sub_region')['duration'].count()
trip_euro.sort_values(ascending=False)
trip_eurowest = trips_merged[trips_merged.sub_region == 'Western Europe']
trip_eurowest.sort_values(by="duration",ascending=False)
trip_eurowest.groupby("country")["duration"].sum()
```

Out[ ]:

```
country
Austria           5331 days
Belgium           4473 days
France           40115 days
Germany          49991 days
Liechtenstein        1 days
Liechtenstein        1 days
Luxembourg        3350 days
Monaco              64 days
Netherlands      35199 days
Switzerland      14283 days
Name: duration, dtype: timedelta64[ns]
```

people spend the least time in liechtenstein on ly 1 day

In [ ]:

```
trip_eurowest = trip_eurowest.groupby("country")['duration'].sum()
```

In [ ]:

```
trip_eurowest.plot(kind='bar', title="Western Europe days in total")
```

Trips 3d

d. Do nomad Startup Founders tend to have shorter or longer trips on average?

In [ ]:

```
people_merged = peopledata.merge(trips_merged,how='left', on="username")


#peoplemerge = peopledata(newframe,how='left', on="username")

#not_startup_founders = peopledata[~peopledata['work_raw'].str.contains('Startup Founder'
)]
```

In [ ]:

```
people_merged.duration.mean()
```

Out[ ]:

```
Timedelta('24 days 22:20:12.908085206')
```

In [ ]:

```
people_SF = people_merged[people_merged['work_raw'].str.contains('Startup Founder',na=Fal
se)]
```

In [ ]:

```
people_SF.duration.mean()
```

Out[ ]:

```
Timedelta('23 days 13:02:42.688296639')
```

Start up Founders tend to have shorter trips

Trips 3e

e. visualize over-time median trip duration overall (bonus: and split by world-region) The plot will look weird ^^. PyHint: Resample by week (‘W’) and calculate the size of observations. RHint: Use the floor_date function to reset dates by week

In [ ]:

```
import seaborn as sns
import altair as alt

sns.set(color_codes = True)
```

```
import matplotlib.pyplot as plt
```

In [ ]:

```
people_merged['duration'] = people_merged['duration'].dt.days
```

In [ ]:

```
people_merged= people_merged[people_merged.date_start.dt.year<=2018]
```

In [ ]:

```
people_mg =people_merged.groupby(by=[people_merged.date_start.dt.year, people_merged.regi
on]) ['duration'].median()
```

In [ ]:

```
print(people_mg)
```

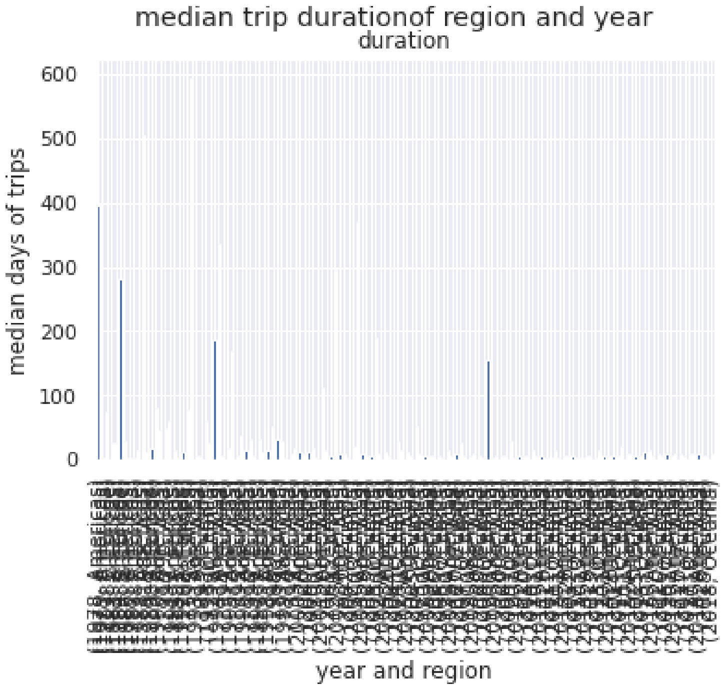
```
date_start  region
1978        Americas    395.0
1979        Americas      3.0
1981        Americas     76.5
            Europe       27.0
1983        Americas     27.0
                        ...
2018        Africa        9.0
            Americas      8.0
            Asia          7.0
            Europe        6.0
            Oceania       9.0
Name: duration, Length: 138, dtype: float64
```

In [ ]:

```
people_mg.plot(stacked=True, kind='bar', subplots=True, ylabel='median days of trips', t
itle='median trip durationof region and year', xlabel='year and region')
```

Out[ ]:

```
array([<matplotlib.axes._subplots.AxesSubplot object at 0x7f087eb48b90>],
      dtype=object)
```



filter issue, it included all of the years

In [ ]:

```
people_mgr = people_mg.reset_index()
```

In [ ]:

```
people_mgr.info()
```

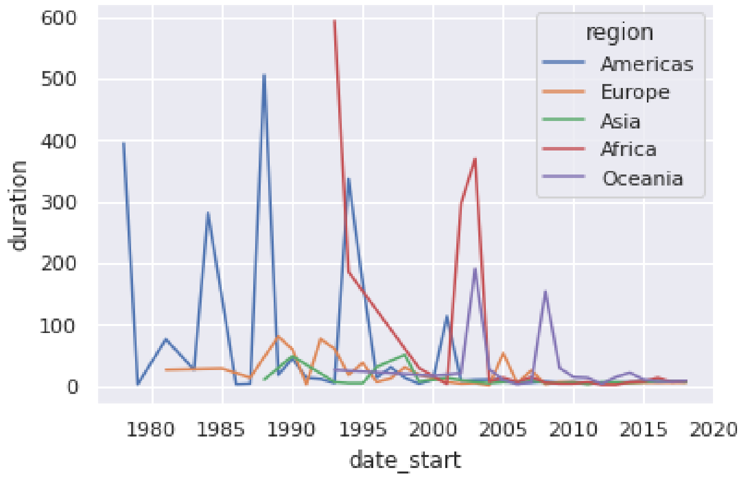
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 138 entries, 0 to 137
Data columns (total 3 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   date_start  138 non-null    int64  
 1   region      138 non-null    object 
 2   duration    138 non-null    float64
dtypes: float64(1), int64(1), object(1)
memory usage: 3.4+ KB
```

In [ ]:

```
sns.lineplot(data=people_mgr, x='date_start', y='duration',hue='region')
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f087ea454d0>
```



In [2]:

```
jupyter nbconvert --to html Assignment.ipynb
```

```
  File "<ipython-input-2-89c24475e90b>", line 1
    jupyter nbconvert --to html Assignment.ipynb
                    ^
SyntaxError: invalid syntax
```