In [1]:
```
import scipy.io
mat = scipy.io.loadmat('../data/tasmax_tasmin_imd_1951_2020.mat')
```

In [2]:
```
mat
```

Out[2]:

```
{'__header__': b'MATLAB 5.0 MAT-file, Platform: PCWIN64, Created on: Mon Jul
26 19:02:44 2021',
 '__version__': '1.0',
 '__globals__': [],
 'tasmax_imd_1951_2020': array([[[99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        ...,
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9]],

       [[99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
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        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        ...,
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9]],

       [[99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        ...,
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9]],

       ...,

       [[ nan,  nan,  nan, ...,  nan,  nan,  nan],
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        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        ...,
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan]],

       [[ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        ...,
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan]],

       [[ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        ...,
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan],
        [ nan,  nan,  nan, ...,  nan,  nan,  nan]]]),
 'tasmin_imd_1951_2020': array([[[99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
        ...,
```

```
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9]],

      [[99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       ...,
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9]],

      [[99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       ...,
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9],
       [99.9, 99.9, 99.9, ..., 99.9, 99.9, 99.9]],

      ...,

      [[ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       ...,
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan]],

      [[ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       ...,
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan]],

      [[ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       ...,
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan],
       [ nan,  nan,  nan, ...,  nan,  nan,  nan]]])}
```

In [3]:
```
mat['tasmax_imd_1951_2020'].shape
```

Out[3]:
```
(25568, 31, 31)
```

In [4]:
```
import pandas as pd
```

In [5]:
```
# Latitude range
import numpy as np
np.arange(7.5, 38.5, 1)
```

Out[5]:
```
array([ 7.5,  8.5,  9.5, 10.5, 11.5, 12.5, 13.5, 14.5, 15.5, 16.5, 17.5,
       18.5, 19.5, 20.5, 21.5, 22.5, 23.5, 24.5, 25.5, 26.5, 27.5, 28.5,
       29.5, 30.5, 31.5, 32.5, 33.5, 34.5, 35.5, 36.5, 37.5])
```

In [6]:
```
# Longitude range
np.arange(67.5, 98.5, 1)
```

Out[6]:
```
array([67.5, 68.5, 69.5, 70.5, 71.5, 72.5, 73.5, 74.5, 75.5, 76.5, 77.5,
       78.5, 79.5, 80.5, 81.5, 82.5, 83.5, 84.5, 85.5, 86.5, 87.5, 88.5,
       89.5, 90.5, 91.5, 92.5, 93.5, 94.5, 95.5, 96.5, 97.5])
```

In [7]:
```
# 28.5 N, 78.5 E --> Index is (21, 11)
```

In [8]:
```
tasmax_imd_1951_2020_lat21_long11 = mat['tasmax_imd_1951_2020'][:,21,11]
```

In [9]:
```
len(tasmax_imd_1951_2020_lat21_long11)
```

Out[9]:
```
25568
```

In [10]:
```
tasmax_imd_1951_2020_lat21_long11
```

Out[10]:
```
array([29.52      , 28.41      , 28.04      , ..., 29.83602905,
       29.30597496, 28.85953522])
```

In [11]:
```
import calendar
```

In [12]:
```
df_tasmax_imd_1951_2020_lat21_long11 = pd.DataFrame()
```

In [13]:
```
start = 0

for year in range(1951, 2021):
    if calendar.isleap(year):
        end = start + 366
        col_tmp = list(tasmax_imd_1951_2020_lat21_long11[start:end])
        df_tasmax_imd_1951_2020_lat21_long11[str(year)] = col_tmp
        start = start + 366
    else:
        end = start + 365
        col_tmp = list(tasmax_imd_1951_2020_lat21_long11[start:end]) + ['NA']
        df_tasmax_imd_1951_2020_lat21_long11[str(year)] = col_tmp
        start = start + 365
```

In [14]:
```
df_tasmax_imd_1951_2020_lat21_long11
```

Out[14]:

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	...	2011	2012	201
0	29.52	29.17	28.78	27.41	29.77	29.17	30.01	29.38	28.65	28.78	...	29.86	30.51	32.5
1	28.41	29.05	28.4	27.32	28.87	29.05	29.55	30.26	28.09	26.52	...	29.83	31.66	32.8
2	28.04	28.85	29.11	27.3	28.76	28.85	29.05	30.18	28.56	27.46	...	30.09	32.35	33.1
3	28.21	29.01	28.89	27.96	28.15	29.01	28.51	29.52	29.01	29.31	...	29.52	33.17	33.5
4	28.96	29.15	28.63	28.49	27.61	29.15	29.49	29.74	29.93	30.72	...	29.35	32.99	33.7
...	...	...	...	...	...	...	...	...	...	...	...	...	...	..
361	28.95	29.17	29.22	31.03	27.56	27.85	30.14	30.04	27.24	30.82	...	31.49	30.84	29.0
362	28.93	29.69	29.52	30.46	27.94	28.42	29.41	28.19	28.31	30.15	...	31.12	30.68	28.7
363	29.03	30.07	28.61	30.73	27.55	29.56	29.37	29.07	30.68	29.01	...	30.57	31.01	28.6
364	29.15	29.45	28.65	30.29	27.56	29.95	29.33	28.53	30.59	28.17	...	29.36	30.20	29.0
365	NA	28.76	NA	NA	NA	29.33	NA	NA	NA	30.53	...	NA	31.50	NA

366 rows × 70 columns

In [ ]:
```
```

In [15]:
```
tasmin_imd_1951_2020_lat21_long11 = mat['tasmin_imd_1951_2020'][:,21,11]
```

In [16]:
```
len(tasmin_imd_1951_2020_lat21_long11)
```

Out[16]:
```
25568
```

In [17]:
```
tasmin_imd_1951_2020_lat21_long11
```

Out[17]:
```
array([16.06      , 14.73      , 13.6       , ..., 15.88205433,
       17.06483078, 18.24519348])
```

In [18]:
```
df_tasmin_imd_1951_2020_lat21_long11 = pd.DataFrame()
```

In [19]:
```
start = 0

for year in range(1951, 2021):
    if calendar.isleap(year):
        end = start + 366
        col_tmp = list(tasmin_imd_1951_2020_lat21_long11[start:end])
        df_tasmin_imd_1951_2020_lat21_long11[str(year)] = col_tmp
        start = start + 366
    else:
        end = start + 365
        col_tmp = list(tasmin_imd_1951_2020_lat21_long11[start:end]) + ['NA']
        df_tasmin_imd_1951_2020_lat21_long11[str(year)] = col_tmp
        start = start + 365
```

In [20]:
```
df_tasmin_imd_1951_2020_lat21_long11
```

Out[20]:

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	...	2011	2012	201
0	16.06	15.53	14.05	11.29	10.87	15.53	15.94	15.85	14.26	16.58	...	15.45	17.81	18.5
1	14.73	15.53	13.73	12.04	11.09	15.53	15.32	16.71	14	16.99	...	15.03	17.97	18.9
2	13.6	15.54	14.69	12.79	11.3	15.54	15.71	17.38	14.31	16.38	...	15.64	18.03	18.8
3	14.5	15.45	15.66	14.15	11.39	15.45	15.24	16.87	14.76	17.44	...	16.75	17.73	19.2
4	15.36	15.46	15.77	16.69	11.52	15.46	15.83	16.24	16.34	18.66	...	15.1	17.40	18.6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	..
361	15.73	17.09	16.49	17.36	14.99	19.23	17.09	17.27	13.5	14.71	...	14.47	14.54	16.0
362	15.71	16.62	15.63	16.5	15.66	18.29	16.81	16.5	15.14	14.87	...	14.67	14.22	16.0
363	15.73	17.45	15.04	15.79	15.72	17.91	15.78	15.63	16.7	15.87	...	17.65	15.54	15.3
364	15.8	15.16	14.48	14.36	14.52	17.13	15.78	15.29	18.3	15.91	...	18.26	17.92	15.5
365	NA	15.24	NA	NA	NA	16.40	NA	NA	NA	18.79	...	NA	18.77	NA

366 rows × 70 columns

In [22]:
```
df_tasmax_imd_1951_2020_lat21_long11.to_csv('df_tasmax_imd_1951_2020_lat21_lon
g11.csv', index=False)
```

In [23]:
```
df_tasmin_imd_1951_2020_lat21_long11.to_csv('df_tasmin_imd_1951_2020_lat21_lon
g11.csv', index=False)
```

In [ ]:
```

```