

1.) **Exercise:** Calculate the Average Monthly Temperature of the region of interest. Datasets will be downloaded from the Climate Change Knowledge portal [1].

[1] <http://sdwebx.worldbank.org/climateportal/index.cfm>

```
%matplotlib inline
import pandas as pd

# Can read from an URL!
datasets = pd.read_excel('http://sdwebx.worldbank.org/climateportal/DownloadData/tas_1991_2015.xls',
# This is to avoid strange characters in the file such as "\t" in Year
names=['tas', 'year', 'month', 'country', 'ISO3', 'ISO2'])
```

Take a look at the datasets

	tas	year	month	country	ISO3	ISO2
0	23.5343	1991	1	HTI	NaN	NaN
1	23.7943	1991	2	HTI	NaN	NaN
2	24.2247	1991	3	HTI	NaN	NaN
3	25.1256	1991	4	HTI	NaN	NaN
4	25.6834	1991	5	HTI	NaN	NaN
5	25.7992	1991	6	HTI	NaN	NaN
6	26.8788	1991	7	HTI	NaN	NaN
7	25.8742	1991	8	HTI	NaN	NaN
8	26.0162	1991	9	HTI	NaN	NaN
9	26.0076	1991	10	HTI	NaN	NaN
10	24.7016	1991	11	HTI	NaN	NaN
11	23.0347	1991	12	HTI	NaN	NaN

```
In [ ]: ## We are interested in the temperature average per year
```

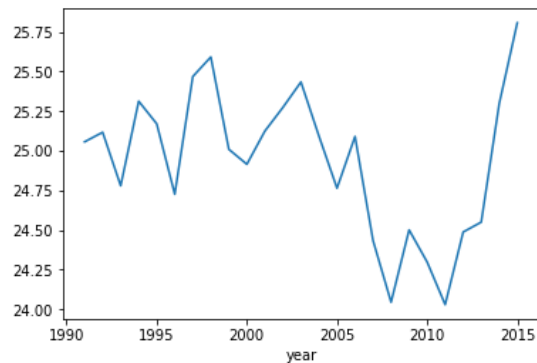
```
In [38]: AverageTemperatures = datasets.groupby('year')['tas']
AverageTemperatures.describe()
```

```
Out[38]:
```

	count	mean	std	min	25%	50%	75%	max
year								
1991	12.0	25.056217	1.190117	23.0347	24.117100	25.40450	25.907550	26.8788
1992	12.0	25.116433	1.214511	23.0503	24.366725	25.15605	26.184375	26.9028
1993	12.0	24.779267	1.177912	23.1202	23.583100	24.86950	25.979600	26.0187
1994	12.0	25.312242	1.327829	23.0777	24.130250	25.71905	26.479900	26.8107
1995	12.0	25.169642	1.396575	22.9559	23.754325	25.31530	26.583500	26.7579
1996	12.0	24.725683	1.399453	22.7771	23.385050	24.98625	25.887725	26.3511
1997	12.0	25.467608	1.474000	22.7302	24.540400	25.66050	26.784050	26.9979
1998	12.0	25.591250	1.323996	23.5483	24.581850	25.58605	26.714025	27.2361
1999	12.0	25.008917	1.524988	22.4480	23.901150	25.38105	26.260025	27.1099
2000	12.0	24.914617	1.620030	22.4316	23.331450	25.15695	26.196025	26.9563
2001	12.0	25.124050	1.455949	22.5032	24.265625	25.03095	26.209600	27.2022
2002	12.0	25.273317	1.214908	23.4380	24.401400	25.57330	26.187575	27.0005
2003	12.0	25.433500	1.241652	23.5292	24.536300	25.57370	26.485325	26.8445
2004	12.0	25.091875	1.265244	23.3618	24.250750	24.65610	26.368325	26.8787

```
AverageTemperatures.mean().plot()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3d0aad32b0>
```



2.) **Exercise:** Calculate the Average Monthly Rainfall of the region of interest. Plot the average monthly temperature and rainfall in the same plot.

Datasets will be downloaded from the Climate Change Knowledge portal [1].

```
%matplotlib inline
import pandas as pd

amt = pd.read_excel('http://sdwebx.worldbank.org/climateportal/DownloadData/tas_1991_2015.xls',
# This is to avoid strange characters in the file such as "\t" in Year
names=['tas', 'year', 'month', 'country', 'IS03', 'IS02'])
```

```
## We are interested in the temperature average per year
temperatures = amt.groupby('year')['tas']
```

```
temperatures.describe()
```

	count	mean	std	min	25%	50%	75%	max
year								
1991	12.0	8.472656	8.654666	-3.99520	2.928243	8.965345	16.018225	20.2824
1992	12.0	9.088098	8.959437	-3.55610	2.574670	10.161895	15.328250	22.4730
1993	12.0	8.552814	8.940789	-4.25900	0.984695	10.037220	16.622775	19.4695
1994	12.0	10.304846	8.353433	-0.77050	2.978630	10.098810	18.167150	21.2989
1995	12.0	8.991743	8.526971	-3.24200	2.361078	9.345450	15.308825	21.4993
1996	12.0	8.528108	9.148292	-3.87850	-1.125675	9.458615	17.351825	19.2327

```
amr = pd.read_excel('http://sdwebx.worldbank.org/climateportal/DownloadData/pr_1991_2015.xls',
# This is to avoid strange characters in the file such as "\t" in Year
names=['pr', 'year', 'month', 'country', 'IS03', 'IS02'])
```

```
## We are interested in the rainfall average per year
rainfall = amr.groupby('year')['pr']
rainfall.describe()
```

	count	mean	std	min	25%	50%	75%	max
year								
1991	12.0	74.369725	30.826459	29.0172	55.291350	63.77745	97.174975	125.7610
1992	12.0	78.937642	41.624538	24.5945	52.197675	69.36015	94.904350	181.5330
1993	12.0	73.347617	42.812077	18.5650	46.504725	61.25655	87.266700	157.4780
1994	12.0	74.196592	34.056412	12.1600	59.188100	65.67540	94.257700	145.6820
1995	12.0	77.194133	27.688322	24.1628	64.909100	77.74910	93.283900	122.7290
1996	12.0	93.997900	29.031864	52.7393	73.732375	95.89745	113.726250	139.2530
1997	12.0	70.960017	40.763953	22.2927	40.909975	63.32270	87.113600	159.9860
1998	12.0	70.184408	31.736953	38.1457	47.045050	63.46375	79.221150	129.4610
1999	12.0	75.628083	17.841523	51.7722	66.328600	73.53995	80.209750	110.2680
2000	12.0	76.383017	42.391440	24.8360	53.752025	64.82355	89.378700	169.9690
2001	12.0	70.093225	27.916037	39.6471	46.225300	64.83510	87.007250	122.9260
2002	12.0	89.665333	38.398625	24.2556	64.223275	89.26395	116.804000	156.5390

```
temperatures.mean().plot()
rainfall.mean().plot()
```

<matplotlib.axes._subplots.AxesSubplot at 0x7f3acbef66a0>

