

Pandas Case Study

- Importing Data

```
In [ ]: import pandas as pd
ind=pd.read_csv("ind_agri.csv")
ind.head(5)
```

Out[]:

	Domain Code	Domain	Area Code	Area	Element Code	Element	Item Code	Item	Year Code	Year	Unit	Value	F
0	RL	Land Use	100	India	5110	Area	6621	Arable land	1961	1961	1000 ha	155806	
1	RL	Land Use	100	India	5110	Area	6650	Land under permanent crops	1961	1961	1000 ha	5180	
2	RL	Land Use	100	India	5110	Area	6655	Land under perm. meadows and pastures	1961	1961	1000 ha	13966	
3	RL	Land Use	100	India	5110	Area	6655	Land under perm. meadows and pastures	1962	1962	1000 ha	14082	
4	RL	Land Use	100	India	5110	Area	6650	Land under permanent crops	1962	1962	1000 ha	5700	

```
In [ ]: pak=pd.read_csv("pak_agri.csv")
pak.head(5)
```

Out[]:

	Domain Code	Domain	Area Code	Area	Element Code	Element	Item Code	Item	Year Code	Year	Unit	Value
0	RL	Land Use	165	Pakistan	5110	Area	6621	Arable land	1961	1961	1000 ha	30580
1	RL	Land Use	165	Pakistan	5110	Area	6650	Land under permanent crops	1961	1961	1000 ha	150
2	RL	Land Use	165	Pakistan	5110	Area	6655	Land under perm. meadows and pastures	1961	1961	1000 ha	5000
3	RL	Land Use	165	Pakistan	5110	Area	6655	Land under perm. meadows and pastures	1962	1962	1000 ha	5000
4	RL	Land Use	165	Pakistan	5110	Area	6650	Land under permanent crops	1962	1962	1000 ha	150

• Information about Dataset

In []:

len(ind.columns)

Out[]:

14

In []:

len(ind)

Out[]:

177

In []:

len(pak.columns)

Out[]:

14

In []:

len(pak)

Out[]:

177

In []:

ind.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 177 entries, 0 to 176
Data columns (total 14 columns):
#   Column                Non-Null Count  Dtype
---  -
0   Domain Code           177 non-null   object
1   Domain                177 non-null   object
2   Area Code            177 non-null   int64
3   Area                 177 non-null   object
4   Element Code         177 non-null   int64
5   Element              177 non-null   object
6   Item Code            177 non-null   int64
7   Item                 177 non-null   object
8   Year Code            177 non-null   int64
9   Year                 177 non-null   int64
10  Unit                 177 non-null   object
11  Value                177 non-null   int64
12  Flag                 177 non-null   object
13  Flag Description      177 non-null   object
dtypes: int64(6), object(8)
memory usage: 19.5+ KB
```

```
In [ ]: pak.info
```

```
Out[ ]: <bound method DataFrame.info of
nt Code Element \
0      RL Land Use      165 Pakistan      5110 Area
1      RL Land Use      165 Pakistan      5110 Area
2      RL Land Use      165 Pakistan      5110 Area
3      RL Land Use      165 Pakistan      5110 Area
4      RL Land Use      165 Pakistan      5110 Area
..      ...      ...      ...      ...
172     RL Land Use      165 Pakistan      5110 Area
173     RL Land Use      165 Pakistan      5110 Area
174     RL Land Use      165 Pakistan      5110 Area
175     RL Land Use      165 Pakistan      5110 Area
176     RL Land Use      165 Pakistan      5110 Area
```

```
Item Code      Item Year Code Year \
0      6621      Arable land      1961 1961
1      6650      Land under permanent crops      1961 1961
2      6655 Land under perm. meadows and pastures      1961 1961
3      6655 Land under perm. meadows and pastures      1962 1962
4      6650      Land under permanent crops      1962 1962
..      ...      ...      ...
172     6650      Land under permanent crops      2018 2018
173     6621      Arable land      2018 2018
174     6621      Arable land      2019 2019
175     6650      Land under permanent crops      2019 2019
176     6655 Land under perm. meadows and pastures      2019 2019
```

```
Unit Value Flag      Flag Description
0  1000 ha  30580 W Data reported on country official publications...
1  1000 ha   150 F      FAO estimate
2  1000 ha  5000 F      FAO estimate
3  1000 ha  5000 F      FAO estimate
4  1000 ha   150 F      FAO estimate
..      ...      ...      ...
172 1000 ha   793 Fm Manual Estimation
173 1000 ha 30507 Fm Manual Estimation
174 1000 ha 30507 Fm Manual Estimation
175 1000 ha   793 Fm Manual Estimation
176 1000 ha  5000 Fm Manual Estimation
```

```
[177 rows x 14 columns]>
```

```
In [ ]: ind.describe()
```

Out[]:

	Area Code	Element Code	Item Code	Year Code	Year	Value
count	177.0	177.0	177.000000	177.000000	177.000000	177.000000
mean	100.0	5110.0	6642.000000	1990.000000	1990.000000	59913.881356
std	0.0	0.0	15.031407	17.077697	17.077697	71168.160729
min	100.0	5110.0	6621.000000	1961.000000	1961.000000	4010.000000
25%	100.0	5110.0	6621.000000	1975.000000	1975.000000	10230.000000
50%	100.0	5110.0	6650.000000	1990.000000	1990.000000	12118.000000
75%	100.0	5110.0	6655.000000	2005.000000	2005.000000	157924.000000
max	100.0	5110.0	6655.000000	2019.000000	2019.000000	163618.000000

In []:

```
pak.describe()
```

Out[]:

	Area Code	Element Code	Item Code	Year Code	Year	Value
count	177.0	177.0	177.000000	177.000000	177.000000	177.000000
mean	165.0	5110.0	6642.000000	1990.000000	1990.000000	12087.028249
std	0.0	0.0	15.031407	17.077697	17.077697	13387.595177
min	165.0	5110.0	6621.000000	1961.000000	1961.000000	150.000000
25%	165.0	5110.0	6621.000000	1975.000000	1975.000000	793.000000
50%	165.0	5110.0	6650.000000	1990.000000	1990.000000	5000.000000
75%	165.0	5110.0	6655.000000	2005.000000	2005.000000	30310.000000
max	165.0	5110.0	6655.000000	2019.000000	2019.000000	33140.000000

In []:

```
ind.columns
```

Out[]:

```
Index(['Domain Code', 'Domain', 'Area Code', 'Area', 'Element Code', 'Element',
      'Item Code', 'Item', 'Year Code', 'Year', 'Unit', 'Value', 'Flag',
      'Flag Description'],
      dtype='object')
```

In []:

```
ind.drop(['Domain Code', 'Domain', 'Area Code', 'Element Code', 'Element', 'Item Code', 'Un
ind.head(5)
```

Out[]:

	Area	Item	Year	Value	Flag	Flag Description
0	India	Arable land	1961	155806	Q	Official data reported on FAO Questionnaires f...
1	India	Land under permanent crops	1961	5180	Q	Official data reported on FAO Questionnaires f...
2	India	Land under perm. meadows and pastures	1961	13966	W	Data reported on country official publications...
3	India	Land under perm. meadows and pastures	1962	14082	W	Data reported on country official publications...
4	India	Land under permanent crops	1962	5700	Q	Official data reported on FAO Questionnaires f...

In []:

```
pak.columns
```

Out[]:

```
Index(['Domain Code', 'Domain', 'Area Code', 'Area', 'Element Code', 'Element',  
      'Item Code', 'Item', 'Year Code', 'Year', 'Unit', 'Value', 'Flag',  
      'Flag Description'],  
      dtype='object')
```

In []:

```
pak.drop(['Domain Code', 'Domain', 'Area Code', 'Element Code', 'Element', 'Item Code', 'Un  
pak.head(5)
```

Out[]:

	Area	Item	Year	Value	Flag	Flag Description
0	Pakistan	Arable land	1961	30580	W	Data reported on country official publications...
1	Pakistan	Land under permanent crops	1961	150	F	FAO estimate
2	Pakistan	Land under perm. meadows and pastures	1961	5000	F	FAO estimate
3	Pakistan	Land under perm. meadows and pastures	1962	5000	F	FAO estimate
4	Pakistan	Land under permanent crops	1962	150	F	FAO estimate

- Merging India & pakistan Data

In []:

```
agri=pd.concat([pak,ind])
```

In []:

```
agri
```

Out []:

	Area	Item	Year	Value	Flag	Flag Description
0	Pakistan	Arable land	1961	30580	W	Data reported on country official publications...
1	Pakistan	Land under permanent crops	1961	150	F	FAO estimate
2	Pakistan	Land under perm. meadows and pastures	1961	5000	F	FAO estimate
3	Pakistan	Land under perm. meadows and pastures	1962	5000	F	FAO estimate
4	Pakistan	Land under permanent crops	1962	150	F	FAO estimate
...
172	India	Land under permanent crops	2018	13000	Fm	Manual Estimation
173	India	Arable land	2018	156317	Fm	Manual Estimation
174	India	Arable land	2019	156067	Fm	Manual Estimation
175	India	Land under permanent crops	2019	13250	Fm	Manual Estimation
176	India	Land under perm. meadows and pastures	2019	10261	Fm	Manual Estimation

354 rows × 6 columns

- After Merging

In []:

```
len(agri.columns)
```

Out []:

6

In []:

```
len(agri)
```

Out []:

354

In []:

```
agri.groupby(['Area', 'Item', 'Year'])
agri
```

Out[]:

	Area	Item	Year	Value	Flag	Flag Description
0	Pakistan	Arable land	1961	30580	W	Data reported on country official publications...
1	Pakistan	Land under permanent crops	1961	150	F	FAO estimate
2	Pakistan	Land under perm. meadows and pastures	1961	5000	F	FAO estimate
3	Pakistan	Land under perm. meadows and pastures	1962	5000	F	FAO estimate
4	Pakistan	Land under permanent crops	1962	150	F	FAO estimate
...
172	India	Land under permanent crops	2018	13000	Fm	Manual Estimation
173	India	Arable land	2018	156317	Fm	Manual Estimation
174	India	Arable land	2019	156067	Fm	Manual Estimation
175	India	Land under permanent crops	2019	13250	Fm	Manual Estimation
176	India	Land under perm. meadows and pastures	2019	10261	Fm	Manual Estimation

354 rows × 6 columns

In []:

```
a=agri.groupby(['Area','Year','Value']).max()  
a.head(5)
```

Out[]:

	Area	Year	Value	Item	Flag	Flag Description
	India	1961	5180	Land under permanent crops	Q	Official data reported on FAO Questionnaires f...
			13966	Land under perm. meadows and pastures	W	Data reported on country official publications...
			155806	Arable land	Q	Official data reported on FAO Questionnaires f...
		1962	5700	Land under permanent crops	Q	Official data reported on FAO Questionnaires f...
			14082	Land under perm. meadows and pastures	W	Data reported on country official publications...

In []:

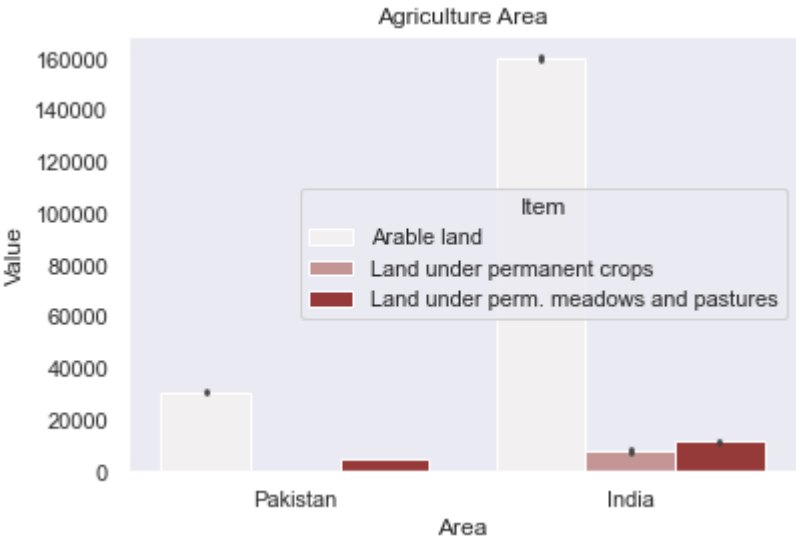
```
a.tail(5)
```


Out[]:

Area	Year	Value	Item	Flag	Flag Description
Pakistan	2018	5000	Land under perm. meadows and pastures	Fm	Manual Estimation
		30507	Arable land	Fm	Manual Estimation
	2019	793	Land under permanent crops	Fm	Manual Estimation
		5000	Land under perm. meadows and pastures	Fm	Manual Estimation
		30507	Arable land	Fm	Manual Estimation

In []:

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.set_theme(style="dark")
pl=sns.barplot(x='Area',y='Value', data=agri, hue='Item',color='brown')
pl.set_title("Agriculture Area")
plt.show()
```



In []:

```
import plotly.express as px
fig = px.pie(agri, values='Value', names='Area')
fig.show()
```

Interpretation: Most of the area in the subcontinent region is under India territory. The above configure data explains the Agriculture area shared by two states from 1961-2019