

```
In [1]: import pandas as pd
data=pd.read_csv("/home/placement/Downloads/rainfall in india 1901-2015.csv")
```

```
In [2]: data.describe()
```

```
Out[2]:
```

| | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------|
| count | 4116.000000 | 4112.000000 | 4113.000000 | 4110.000000 | 4112.000000 | 4113.000000 | 4111.000000 | 4109.000000 | 4112.000000 | 4110.000000 | 4109.0 |
| mean | 1958.218659 | 18.957320 | 21.805325 | 27.359197 | 43.127432 | 85.745417 | 230.234444 | 347.214334 | 290.263497 | 197.361922 | 95.1 |
| std | 33.140898 | 33.585371 | 35.909488 | 46.959424 | 67.831168 | 123.234904 | 234.710758 | 269.539667 | 188.770477 | 135.408345 | 99.1 |
| min | 1901.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.400000 | 0.000000 | 0.000000 | 0.100000 | 0.0 |
| 25% | 1930.000000 | 0.600000 | 0.600000 | 1.000000 | 3.000000 | 8.600000 | 70.350000 | 175.600000 | 155.975000 | 100.525000 | 14.0 |
| 50% | 1958.000000 | 6.000000 | 6.700000 | 7.800000 | 15.700000 | 36.600000 | 138.700000 | 284.800000 | 259.400000 | 173.900000 | 65.1 |
| 75% | 1987.000000 | 22.200000 | 26.800000 | 31.300000 | 49.950000 | 97.200000 | 305.150000 | 418.400000 | 377.800000 | 265.800000 | 148.4 |
| max | 2015.000000 | 583.700000 | 403.500000 | 605.600000 | 595.100000 | 1168.600000 | 1609.900000 | 2362.800000 | 1664.600000 | 1222.000000 | 948.1 |

In [3]: data.head()

Out[3]:

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | Oct-Dec |
|---|---------------------------|------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|---------|---------|---------|
| 0 | ANDAMAN & NICOBAR ISLANDS | 1901 | 49.2 | 87.1 | 29.2 | 2.3 | 528.8 | 517.5 | 365.1 | 481.1 | 332.6 | 388.5 | 558.2 | 33.6 | 3373.2 | 136.3 | 560.3 | 1696.3 | 980.3 |
| 1 | ANDAMAN & NICOBAR ISLANDS | 1902 | 0.0 | 159.8 | 12.2 | 0.0 | 446.1 | 537.1 | 228.9 | 753.7 | 666.2 | 197.2 | 359.0 | 160.5 | 3520.7 | 159.8 | 458.3 | 2185.9 | 716.7 |
| 2 | ANDAMAN & NICOBAR ISLANDS | 1903 | 12.7 | 144.0 | 0.0 | 1.0 | 235.1 | 479.9 | 728.4 | 326.7 | 339.0 | 181.2 | 284.4 | 225.0 | 2957.4 | 156.7 | 236.1 | 1874.0 | 690.6 |
| 3 | ANDAMAN & NICOBAR ISLANDS | 1904 | 9.4 | 14.7 | 0.0 | 202.4 | 304.5 | 495.1 | 502.0 | 160.1 | 820.4 | 222.2 | 308.7 | 40.1 | 3079.6 | 24.1 | 506.9 | 1977.6 | 571.0 |
| 4 | ANDAMAN & NICOBAR ISLANDS | 1905 | 1.3 | 0.0 | 3.3 | 26.9 | 279.5 | 628.7 | 368.7 | 330.5 | 297.0 | 260.7 | 25.4 | 344.7 | 2566.7 | 1.3 | 309.7 | 1624.9 | 630.8 |

```
In [4]: data.groupby(['SUBDIVISION']).count()
```

```
Out[4]:
```

| | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | Oct-Dec |
|----------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|---------|---------|---------|---------|
| SUBDIVISION | | | | | | | | | | | | | | | | | | |
| ANDAMAN & NICOBAR ISLANDS | 110 | 110 | 110 | 108 | 108 | 109 | 108 | 108 | 108 | 107 | 108 | 108 | 107 | 104 | 110 | 107 | 107 | 107 |
| ARUNACHAL PRADESH | 97 | 96 | 96 | 95 | 97 | 97 | 96 | 96 | 97 | 97 | 95 | 95 | 95 | 91 | 96 | 95 | 95 | 94 |
| ASSAM & MEGHALAYA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| BIHAR | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| CHHATTISGARH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| COASTAL ANDHRA PRADESH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| COASTAL KARNATAKA | 115 | 114 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 114 | 114 | 115 | 115 | 115 |
| EAST MADHYA PRADESH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| EAST RAJASTHAN | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| EAST UTTAR PRADESH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| GANGETIC WEST BENGAL | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| GUJARAT REGION | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| HARYANA DELHI & CHANDIGARH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| HIMACHAL PRADESH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| JAMMU & KASHMIR | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 114 | 115 | 115 | 115 | 114 | 114 | 114 | 115 | 115 | 114 | 114 |
| JHARKHAND | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| KERALA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| KONKAN & GOA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| LAKSHADWEEP | 114 | 112 | 113 | 112 | 112 | 112 | 112 | 111 | 112 | 111 | 111 | 108 | 110 | 103 | 111 | 110 | 110 | 108 |
| MADHYA MAHARASHTRA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| MATATHWADA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |

| | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | Oct-Dec |
|------------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|---------|---------|---------|---------|
| SUBDIVISION | | | | | | | | | | | | | | | | | | |
| NAGA MANI MIZO TRIPURA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| NORTH INTERIOR KARNATAKA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| ORISSA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| PUNJAB | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| RAYALSEEMA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| SAURASHTRA & KUTCH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| SOUTH INTERIOR KARNATAKA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| SUB HIMALAYAN WEST BENGAL & SIKKIM | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| TAMIL NADU | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| TELANGANA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| UTTARAKHAND | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| VIDARBHA | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| WEST MADHYA PRADESH | 115 | 115 | 114 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 114 | 114 | 115 | 115 | 115 |
| WEST RAJASTHAN | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| WEST UTTAR PRADESH | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |

```
In [5]: data.isna().sum()
```

```
Out[5]: SUBDIVISION      0  
        YEAR            0  
        JAN             4  
        FEB             3  
        MAR             6  
        APR             4  
        MAY             3  
        JUN             5  
        JUL             7  
        AUG             4  
        SEP             6  
        OCT             7  
        NOV            11  
        DEC            10  
        ANNUAL          26  
        Jan-Feb         6  
        Mar-May         9  
        Jun-Sep         10  
        Oct-Dec         13  
        dtype: int64
```

```
In [6]: data1=data.loc[(data.YEAR<=2010)]
```

In [7]: `data1.tail(10)`

Out[7]:

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | Oct-Dec |
|------|-------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|---------|---------|---------|
| 4101 | LAKSHADWEEP | 2001 | 4.4 | 20.4 | 0.0 | 104.6 | 187.3 | 283.9 | 198.9 | 144.3 | 213.5 | 105.2 | 101.5 | 16.6 | 1380.6 | 24.8 | 291.9 | 840.6 | 223.8 |
| 4102 | LAKSHADWEEP | 2002 | 10.8 | 16.8 | 7.2 | 23.4 | 189.8 | 261.8 | 81.3 | 143.9 | 50.0 | 178.2 | 52.9 | 17.4 | 1033.5 | 27.6 | 220.4 | 537.0 | 248.5 |
| 4103 | LAKSHADWEEP | 2003 | 11.8 | 18.2 | 28.5 | 18.1 | 109.6 | 364.5 | 400.6 | 92.1 | 84.3 | 191.6 | 206.1 | 7.5 | 1532.9 | 30.0 | 156.2 | 941.5 | 405.2 |
| 4104 | LAKSHADWEEP | 2004 | 7.2 | 1.5 | 1.9 | 7.7 | 330.2 | 251.2 | 280.8 | 169.5 | 200.0 | 193.4 | 107.6 | 2.2 | 1553.2 | 8.7 | 339.8 | 901.5 | 303.5 |
| 4105 | LAKSHADWEEP | 2005 | 17.6 | 11.1 | 0.0 | 37.0 | 92.8 | 248.5 | 378.9 | 102.4 | 278.0 | 164.2 | 218.3 | 26.6 | 1575.4 | 28.7 | 129.8 | 1007.8 | 409.9 |
| 4106 | LAKSHADWEEP | 2006 | 20.1 | 0.0 | 33.0 | 0.3 | 327.9 | 286.9 | 172.3 | 150.7 | 318.5 | 119.1 | 158.9 | 10.9 | 1598.6 | 20.1 | 361.2 | 928.4 | 288.9 |
| 4107 | LAKSHADWEEP | 2007 | 2.5 | 4.2 | 0.2 | 22.2 | 166.2 | 573.4 | 427.4 | 294.7 | 457.5 | 256.1 | 47.6 | 109.6 | 2361.6 | 6.7 | 188.6 | 1753.0 | 413.3 |
| 4108 | LAKSHADWEEP | 2008 | 5.5 | 19.8 | 120.7 | 15.8 | 180.4 | 254.6 | 363.9 | 206.6 | 108.9 | 252.9 | 67.6 | 130.1 | 1726.8 | 25.3 | 316.9 | 934.0 | 450.2 |
| 4109 | LAKSHADWEEP | 2009 | 4.7 | 1.5 | 0.1 | 18.1 | 162.1 | 401.2 | 266.4 | 185.0 | 145.1 | 87.4 | 166.2 | 132.3 | 1570.1 | 6.2 | 180.3 | 997.7 | 385.0 |
| 4110 | LAKSHADWEEP | 2010 | 18.8 | 0.0 | 1.2 | 35.6 | 79.0 | 318.9 | 336.7 | 335.1 | 161.5 | 155.4 | 201.5 | 81.5 | 1725.2 | 18.8 | 115.8 | 1152.2 | 438.2 |

In [8]: `data2=data.drop(['ANNUAL','Jan-Feb','Mar-May','Jun-Sep','Oct-Dec'],axis=1)`

In [9]: data2

Out[9]:

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|------|---------------------------|------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | ANDAMAN & NICOBAR ISLANDS | 1901 | 49.2 | 87.1 | 29.2 | 2.3 | 528.8 | 517.5 | 365.1 | 481.1 | 332.6 | 388.5 | 558.2 | 33.6 |
| 1 | ANDAMAN & NICOBAR ISLANDS | 1902 | 0.0 | 159.8 | 12.2 | 0.0 | 446.1 | 537.1 | 228.9 | 753.7 | 666.2 | 197.2 | 359.0 | 160.5 |
| 2 | ANDAMAN & NICOBAR ISLANDS | 1903 | 12.7 | 144.0 | 0.0 | 1.0 | 235.1 | 479.9 | 728.4 | 326.7 | 339.0 | 181.2 | 284.4 | 225.0 |
| 3 | ANDAMAN & NICOBAR ISLANDS | 1904 | 9.4 | 14.7 | 0.0 | 202.4 | 304.5 | 495.1 | 502.0 | 160.1 | 820.4 | 222.2 | 308.7 | 40.1 |
| 4 | ANDAMAN & NICOBAR ISLANDS | 1905 | 1.3 | 0.0 | 3.3 | 26.9 | 279.5 | 628.7 | 368.7 | 330.5 | 297.0 | 260.7 | 25.4 | 344.7 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4111 | LAKSHADWEEP | 2011 | 5.1 | 2.8 | 3.1 | 85.9 | 107.2 | 153.6 | 350.2 | 254.0 | 255.2 | 117.4 | 184.3 | 14.9 |
| 4112 | LAKSHADWEEP | 2012 | 19.2 | 0.1 | 1.6 | 76.8 | 21.2 | 327.0 | 231.5 | 381.2 | 179.8 | 145.9 | 12.4 | 8.8 |
| 4113 | LAKSHADWEEP | 2013 | 26.2 | 34.4 | 37.5 | 5.3 | 88.3 | 426.2 | 296.4 | 154.4 | 180.0 | 72.8 | 78.1 | 26.7 |
| 4114 | LAKSHADWEEP | 2014 | 53.2 | 16.1 | 4.4 | 14.9 | 57.4 | 244.1 | 116.1 | 466.1 | 132.2 | 169.2 | 59.0 | 62.3 |
| 4115 | LAKSHADWEEP | 2015 | 2.2 | 0.5 | 3.7 | 87.1 | 133.1 | 296.6 | 257.5 | 146.4 | 160.4 | 165.4 | 231.0 | 159.0 |

4116 rows × 14 columns

```
In [10]: data['SUBDIVISION'].unique()
```

```
Out[10]: array(['ANDAMAN & NICOBAR ISLANDS', 'ARUNACHAL PRADESH',  
               'ASSAM & MEGHALAYA', 'NAGA MANI MIZO TRIPURA',  
               'SUB HIMALAYAN WEST BENGAL & SIKKIM', 'GANGETIC WEST BENGAL',  
               'ORISSA', 'JHARKHAND', 'BIHAR', 'EAST UTTAR PRADESH',  
               'WEST UTTAR PRADESH', 'UTTARAKHAND', 'HARYANA DELHI & CHANDIGARH',  
               'PUNJAB', 'HIMACHAL PRADESH', 'JAMMU & KASHMIR', 'WEST RAJASTHAN',  
               'EAST RAJASTHAN', 'WEST MADHYA PRADESH', 'EAST MADHYA PRADESH',  
               'GUJARAT REGION', 'SAURASHTRA & KUTCH', 'KONKAN & GOA',  
               'MADHYA MAHARASHTRA', 'MATATHWADA', 'VIDARBHA', 'CHHATTISGARH',  
               'COASTAL ANDHRA PRADESH', 'TELANGANA', 'RAYALSEEMA', 'TAMIL NADU',  
               'COASTAL KARNATAKA', 'NORTH INTERIOR KARNATAKA',  
               'SOUTH INTERIOR KARNATAKA', 'KERALA', 'LAKSHADWEEP'], dtype=object)
```

```
In [11]: data3=data.loc[(data.SUBDIVISION=="ARUNACHAL PRADESH")]
```


In [12]: data3

Out[12]:

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | OCT-DEC |
|-----|-------------------|------|------|-------|-------|-------|-------|--------|--------|-------|-------|-------|------|------|--------|---------|---------|---------|---------|
| 110 | ARUNACHAL PRADESH | 1916 | 48.1 | 69.8 | 71.1 | 316.1 | 424.6 | 1124.9 | NaN | 629.7 | 333.9 | NaN | NaN | NaN | NaN | 117.9 | 811.8 | NaN | NaN |
| 111 | ARUNACHAL PRADESH | 1917 | 21.4 | 164.5 | NaN | 269.6 | 107.9 | 823.8 | 909.1 | 628.4 | 411.5 | 199.3 | 63.5 | 0.0 | NaN | 185.9 | NaN | 2772.8 | 267.1 |
| 112 | ARUNACHAL PRADESH | 1918 | 10.4 | 11.0 | 191.2 | 144.6 | 861.1 | 1609.9 | 1303.0 | 692.6 | 515.8 | 125.2 | 7.8 | 13.7 | 5486.3 | 21.4 | 1196.9 | 4121.3 | 146.1 |
| 113 | ARUNACHAL PRADESH | 1919 | 34.5 | 67.8 | 28.5 | 256.9 | 420.6 | 973.6 | 999.0 | 286.7 | 628.7 | 948.3 | 40.7 | 8.6 | 4693.9 | 102.3 | 706.0 | 2888.0 | 99.1 |
| 114 | ARUNACHAL PRADESH | 1920 | 14.0 | 196.3 | 605.6 | 364.7 | 173.6 | 840.6 | 535.4 | 896.5 | 376.7 | 103.3 | 0.0 | 0.0 | 4106.7 | 210.3 | 1143.9 | 2649.2 | 103.1 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 202 | ARUNACHAL PRADESH | 2011 | 40.0 | 51.3 | 174.5 | 240.8 | 219.6 | 288.4 | 531.4 | 277.6 | 286.7 | 51.9 | 16.2 | 15.2 | 2193.7 | 91.4 | 634.9 | 1384.2 | 83.1 |
| 203 | ARUNACHAL PRADESH | 2012 | 57.8 | 35.8 | 134.2 | 403.4 | 187.4 | 645.8 | 638.9 | 316.0 | 724.9 | 248.1 | 22.0 | 26.2 | 3440.3 | 93.6 | 724.9 | 2325.6 | 296.1 |
| 204 | ARUNACHAL PRADESH | 2013 | 18.5 | 40.5 | 115.1 | 175.1 | 335.8 | 290.0 | 329.6 | 230.2 | 316.1 | 164.1 | 13.3 | 14.6 | 2042.9 | 59.0 | 626.0 | 1165.9 | 191.1 |
| 205 | ARUNACHAL PRADESH | 2014 | 19.0 | 101.9 | 80.3 | 86.7 | 299.0 | 415.8 | 392.4 | 599.6 | 343.0 | 35.1 | 20.1 | 10.2 | 2403.2 | 120.9 | 466.0 | 1750.8 | 61.1 |
| 206 | ARUNACHAL PRADESH | 2015 | 30.8 | 47.5 | 97.5 | 287.1 | 238.9 | 637.9 | 329.3 | 595.5 | 374.2 | 65.2 | 33.8 | 29.8 | 2767.5 | 78.3 | 623.5 | 1936.9 | 121.1 |

97 rows × 19 columns



```
In [13]: data3.isna().sum()
```

```
Out[13]: SUBDIVISION      0  
        YEAR            0  
        JAN             1  
        FEB             1  
        MAR             2  
        APR             0  
        MAY             0  
        JUN             1  
        JUL             1  
        AUG             0  
        SEP             0  
        OCT             2  
        NOV             2  
        DEC             2  
        ANNUAL          6  
        Jan-Feb         1  
        Mar-May         2  
        Jun-Sep         2  
        Oct-Dec         3  
        dtype: int64
```

```
In [14]: data3=data3.fillna(data3.mode())
```

```
In [15]: data3.tail(150)
```

```
Out[15]:
```

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | OCT-DEC |
|-----|-------------------|------|------|-------|-------|-------|-------|--------|--------|-------|-------|-------|------|------|--------|---------|---------|---------|---------|
| 110 | ARUNACHAL PRADESH | 1916 | 48.1 | 69.8 | 71.1 | 316.1 | 424.6 | 1124.9 | NaN | 629.7 | 333.9 | NaN | NaN | NaN | NaN | 117.9 | 811.8 | NaN | NaN |
| 111 | ARUNACHAL PRADESH | 1917 | 21.4 | 164.5 | NaN | 269.6 | 107.9 | 823.8 | 909.1 | 628.4 | 411.5 | 199.3 | 63.5 | 0.0 | NaN | 185.9 | NaN | 2772.8 | 267.1 |
| 112 | ARUNACHAL PRADESH | 1918 | 10.4 | 11.0 | 191.2 | 144.6 | 861.1 | 1609.9 | 1303.0 | 692.6 | 515.8 | 125.2 | 7.8 | 13.7 | 5486.3 | 21.4 | 1196.9 | 4121.3 | 146.1 |
| 113 | ARUNACHAL PRADESH | 1919 | 34.5 | 67.8 | 28.5 | 256.9 | 420.6 | 973.6 | 999.0 | 286.7 | 628.7 | 948.3 | 40.7 | 8.6 | 4693.9 | 102.3 | 706.0 | 2888.0 | 99.1 |
| 114 | ARUNACHAL PRADESH | 1920 | 14.0 | 196.3 | 605.6 | 364.7 | 173.6 | 840.6 | 535.4 | 896.5 | 376.7 | 103.3 | 0.0 | 0.0 | 4106.7 | 210.3 | 1143.9 | 2649.2 | 103.1 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 202 | ARUNACHAL PRADESH | 2011 | 40.0 | 51.3 | 174.5 | 240.8 | 219.6 | 288.4 | 531.4 | 277.6 | 286.7 | 51.9 | 16.2 | 15.2 | 2193.7 | 91.4 | 634.9 | 1384.2 | 85.1 |
| 203 | ARUNACHAL PRADESH | 2012 | 57.8 | 35.8 | 134.2 | 403.4 | 187.4 | 645.8 | 638.9 | 316.0 | 724.9 | 248.1 | 22.0 | 26.2 | 3440.3 | 93.6 | 724.9 | 2325.6 | 290.1 |
| 204 | ARUNACHAL PRADESH | 2013 | 18.5 | 40.5 | 115.1 | 175.1 | 335.8 | 290.0 | 329.6 | 230.2 | 316.1 | 164.1 | 13.3 | 14.6 | 2042.9 | 59.0 | 626.0 | 1165.9 | 190.1 |
| 205 | ARUNACHAL PRADESH | 2014 | 19.0 | 101.9 | 80.3 | 86.7 | 299.0 | 415.8 | 392.4 | 599.6 | 343.0 | 35.1 | 20.1 | 10.2 | 2403.2 | 120.9 | 466.0 | 1750.8 | 65.1 |
| 206 | ARUNACHAL PRADESH | 2015 | 30.8 | 47.5 | 97.5 | 287.1 | 238.9 | 637.9 | 329.3 | 595.5 | 374.2 | 65.2 | 33.8 | 29.8 | 2767.5 | 78.3 | 623.5 | 1936.9 | 128.1 |

97 rows × 19 columns



```
In [16]: data3.isna().sum()
```

```
Out[16]: SUBDIVISION      0  
        YEAR            0  
        JAN             1  
        FEB             1  
        MAR             2  
        APR             0  
        MAY             0  
        JUN             1  
        JUL             1  
        AUG             0  
        SEP             0  
        OCT             2  
        NOV             2  
        DEC             2  
        ANNUAL          6  
        Jan-Feb         1  
        Mar-May         2  
        Jun-Sep         2  
        Oct-Dec         3  
        dtype: int64
```

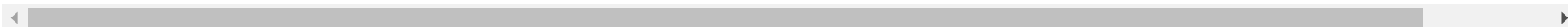
```
In [17]: data3['ANNUAL RAIN']=data3.apply(lambda row: row.JAN + row.FEB + row.MAR + row.MAY + row.JUN + row.JUL +
```

In [18]: data3

Out[18]:

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | OCT-DEC |
|-----|-------------------|------|------|-------|-------|-------|-------|--------|--------|-------|-------|-------|------|------|--------|---------|---------|---------|---------|
| 110 | ARUNACHAL PRADESH | 1916 | 48.1 | 69.8 | 71.1 | 316.1 | 424.6 | 1124.9 | NaN | 629.7 | 333.9 | NaN | NaN | NaN | NaN | 117.9 | 811.8 | NaN | NaN |
| 111 | ARUNACHAL PRADESH | 1917 | 21.4 | 164.5 | NaN | 269.6 | 107.9 | 823.8 | 909.1 | 628.4 | 411.5 | 199.3 | 63.5 | 0.0 | NaN | 185.9 | NaN | 2772.8 | 269.1 |
| 112 | ARUNACHAL PRADESH | 1918 | 10.4 | 11.0 | 191.2 | 144.6 | 861.1 | 1609.9 | 1303.0 | 692.6 | 515.8 | 125.2 | 7.8 | 13.7 | 5486.3 | 21.4 | 1196.9 | 4121.3 | 140.1 |
| 113 | ARUNACHAL PRADESH | 1919 | 34.5 | 67.8 | 28.5 | 256.9 | 420.6 | 973.6 | 999.0 | 286.7 | 628.7 | 948.3 | 40.7 | 8.6 | 4693.9 | 102.3 | 706.0 | 2888.0 | 99.1 |
| 114 | ARUNACHAL PRADESH | 1920 | 14.0 | 196.3 | 605.6 | 364.7 | 173.6 | 840.6 | 535.4 | 896.5 | 376.7 | 103.3 | 0.0 | 0.0 | 4106.7 | 210.3 | 1143.9 | 2649.2 | 103.1 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 202 | ARUNACHAL PRADESH | 2011 | 40.0 | 51.3 | 174.5 | 240.8 | 219.6 | 288.4 | 531.4 | 277.6 | 286.7 | 51.9 | 16.2 | 15.2 | 2193.7 | 91.4 | 634.9 | 1384.2 | 85.1 |
| 203 | ARUNACHAL PRADESH | 2012 | 57.8 | 35.8 | 134.2 | 403.4 | 187.4 | 645.8 | 638.9 | 316.0 | 724.9 | 248.1 | 22.0 | 26.2 | 3440.3 | 93.6 | 724.9 | 2325.6 | 290.1 |
| 204 | ARUNACHAL PRADESH | 2013 | 18.5 | 40.5 | 115.1 | 175.1 | 335.8 | 290.0 | 329.6 | 230.2 | 316.1 | 164.1 | 13.3 | 14.6 | 2042.9 | 59.0 | 626.0 | 1165.9 | 190.1 |
| 205 | ARUNACHAL PRADESH | 2014 | 19.0 | 101.9 | 80.3 | 86.7 | 299.0 | 415.8 | 392.4 | 599.6 | 343.0 | 35.1 | 20.1 | 10.2 | 2403.2 | 120.9 | 466.0 | 1750.8 | 65.1 |
| 206 | ARUNACHAL PRADESH | 2015 | 30.8 | 47.5 | 97.5 | 287.1 | 238.9 | 637.9 | 329.3 | 595.5 | 374.2 | 65.2 | 33.8 | 29.8 | 2767.5 | 78.3 | 623.5 | 1936.9 | 128.1 |

97 rows × 20 columns



In [19]: data3['SWM']=data3.apply (lambda row:row.JUN+row.JUL+row.AUG + row. SEP + row.OCT + row.NOV +row.DEC,axis=1)

In [20]: data3

Out[20]:

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | ... | OCT | NOV | DEC | ANNUAL | Jan-Feb | Mar-May | Jun-Sep | Oct-Dec |
|-----|-------------------|------|------|-------|-------|-------|-------|--------|--------|-------|-----|-------|------|------|--------|---------|---------|---------|---------|
| 110 | ARUNACHAL PRADESH | 1916 | 48.1 | 69.8 | 71.1 | 316.1 | 424.6 | 1124.9 | NaN | 629.7 | ... | NaN | NaN | NaN | NaN | 117.9 | 811.8 | NaN | NaN |
| 111 | ARUNACHAL PRADESH | 1917 | 21.4 | 164.5 | NaN | 269.6 | 107.9 | 823.8 | 909.1 | 628.4 | ... | 199.3 | 63.5 | 0.0 | NaN | 185.9 | NaN | 2772.8 | 262.8 |
| 112 | ARUNACHAL PRADESH | 1918 | 10.4 | 11.0 | 191.2 | 144.6 | 861.1 | 1609.9 | 1303.0 | 692.6 | ... | 125.2 | 7.8 | 13.7 | 5486.3 | 21.4 | 1196.9 | 4121.3 | 146.7 |
| 113 | ARUNACHAL PRADESH | 1919 | 34.5 | 67.8 | 28.5 | 256.9 | 420.6 | 973.6 | 999.0 | 286.7 | ... | 948.3 | 40.7 | 8.6 | 4693.9 | 102.3 | 706.0 | 2888.0 | 997.6 |
| 114 | ARUNACHAL PRADESH | 1920 | 14.0 | 196.3 | 605.6 | 364.7 | 173.6 | 840.6 | 535.4 | 896.5 | ... | 103.3 | 0.0 | 0.0 | 4106.7 | 210.3 | 1143.9 | 2649.2 | 103.3 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 202 | ARUNACHAL PRADESH | 2011 | 40.0 | 51.3 | 174.5 | 240.8 | 219.6 | 288.4 | 531.4 | 277.6 | ... | 51.9 | 16.2 | 15.2 | 2193.7 | 91.4 | 634.9 | 1384.2 | 83.3 |
| 203 | ARUNACHAL PRADESH | 2012 | 57.8 | 35.8 | 134.2 | 403.4 | 187.4 | 645.8 | 638.9 | 316.0 | ... | 248.1 | 22.0 | 26.2 | 3440.3 | 93.6 | 724.9 | 2325.6 | 296.3 |
| 204 | ARUNACHAL PRADESH | 2013 | 18.5 | 40.5 | 115.1 | 175.1 | 335.8 | 290.0 | 329.6 | 230.2 | ... | 164.1 | 13.3 | 14.6 | 2042.9 | 59.0 | 626.0 | 1165.9 | 192.0 |
| 205 | ARUNACHAL PRADESH | 2014 | 19.0 | 101.9 | 80.3 | 86.7 | 299.0 | 415.8 | 392.4 | 599.6 | ... | 35.1 | 20.1 | 10.2 | 2403.2 | 120.9 | 466.0 | 1750.8 | 65.4 |
| 206 | ARUNACHAL PRADESH | 2015 | 30.8 | 47.5 | 97.5 | 287.1 | 238.9 | 637.9 | 329.3 | 595.5 | ... | 65.2 | 33.8 | 29.8 | 2767.5 | 78.3 | 623.5 | 1936.9 | 128.8 |

97 rows × 21 columns



In [21]: data2['NEM']=data2.apply(lambda row:row.OCT+ row.NOV + row.DEC,axis=1)

In [22]: data2

Out[22]:

| | SUBDIVISION | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | NEM |
|------|---------------------------|------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | ANDAMAN & NICOBAR ISLANDS | 1901 | 49.2 | 87.1 | 29.2 | 2.3 | 528.8 | 517.5 | 365.1 | 481.1 | 332.6 | 388.5 | 558.2 | 33.6 | 980.3 |
| 1 | ANDAMAN & NICOBAR ISLANDS | 1902 | 0.0 | 159.8 | 12.2 | 0.0 | 446.1 | 537.1 | 228.9 | 753.7 | 666.2 | 197.2 | 359.0 | 160.5 | 716.7 |
| 2 | ANDAMAN & NICOBAR ISLANDS | 1903 | 12.7 | 144.0 | 0.0 | 1.0 | 235.1 | 479.9 | 728.4 | 326.7 | 339.0 | 181.2 | 284.4 | 225.0 | 690.6 |
| 3 | ANDAMAN & NICOBAR ISLANDS | 1904 | 9.4 | 14.7 | 0.0 | 202.4 | 304.5 | 495.1 | 502.0 | 160.1 | 820.4 | 222.2 | 308.7 | 40.1 | 571.0 |
| 4 | ANDAMAN & NICOBAR ISLANDS | 1905 | 1.3 | 0.0 | 3.3 | 26.9 | 279.5 | 628.7 | 368.7 | 330.5 | 297.0 | 260.7 | 25.4 | 344.7 | 630.8 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4111 | LAKSHADWEEP | 2011 | 5.1 | 2.8 | 3.1 | 85.9 | 107.2 | 153.6 | 350.2 | 254.0 | 255.2 | 117.4 | 184.3 | 14.9 | 316.6 |
| 4112 | LAKSHADWEEP | 2012 | 19.2 | 0.1 | 1.6 | 76.8 | 21.2 | 327.0 | 231.5 | 381.2 | 179.8 | 145.9 | 12.4 | 8.8 | 167.1 |
| 4113 | LAKSHADWEEP | 2013 | 26.2 | 34.4 | 37.5 | 5.3 | 88.3 | 426.2 | 296.4 | 154.4 | 180.0 | 72.8 | 78.1 | 26.7 | 177.6 |
| 4114 | LAKSHADWEEP | 2014 | 53.2 | 16.1 | 4.4 | 14.9 | 57.4 | 244.1 | 116.1 | 466.1 | 132.2 | 169.2 | 59.0 | 62.3 | 290.5 |
| 4115 | LAKSHADWEEP | 2015 | 2.2 | 0.5 | 3.7 | 87.1 | 133.1 | 296.6 | 257.5 | 146.4 | 160.4 | 165.4 | 231.0 | 159.0 | 555.4 |

4116 rows × 15 columns

In [23]: data6=data3.drop(['SUBDIVISION', 'JAN', 'FEB', 'MAR', 'MAY', 'JUN', 'JUL', 'AUG', 'SEP', 'NOV', 'DEC', 'ANNUAL', 'Jan-Fe

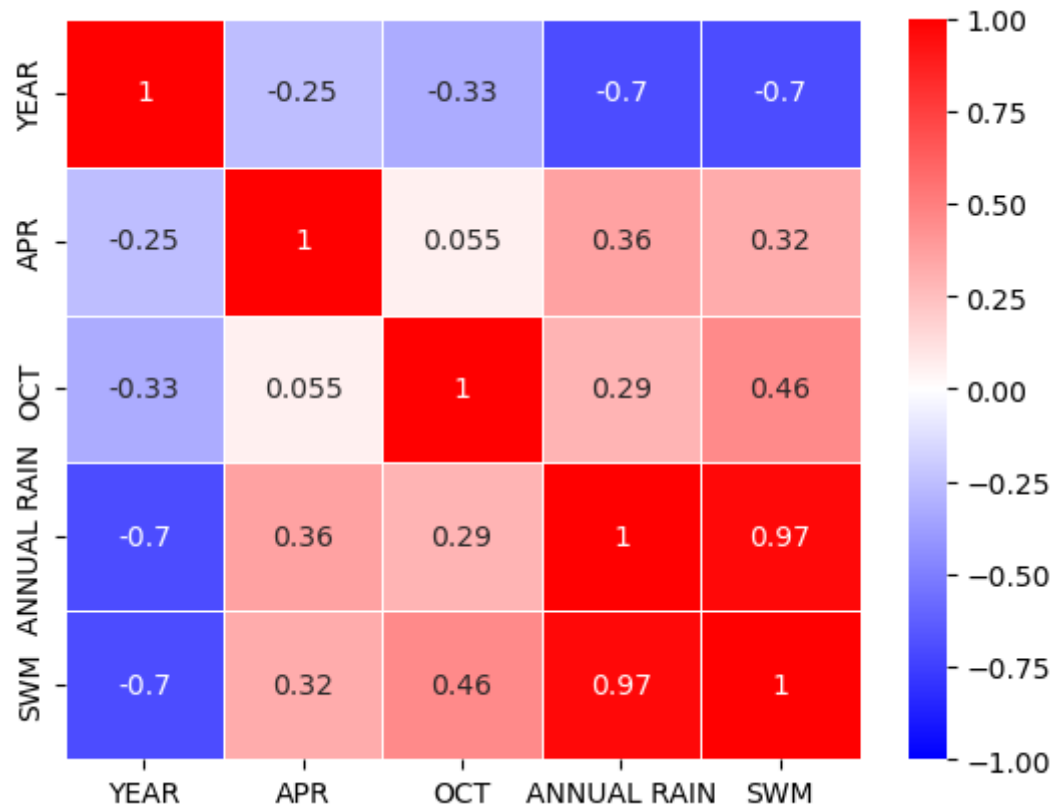
```
In [24]: cor=data6.corr()  
cor
```

Out[24]:

| | YEAR | APR | OCT | ANNUAL RAIN | SWM |
|-------------|-----------|-----------|-----------|-------------|-----------|
| YEAR | 1.000000 | -0.253946 | -0.325208 | -0.696224 | -0.698265 |
| APR | -0.253946 | 1.000000 | 0.054994 | 0.359966 | 0.323527 |
| OCT | -0.325208 | 0.054994 | 1.000000 | 0.291262 | 0.459843 |
| ANNUAL RAIN | -0.696224 | 0.359966 | 0.291262 | 1.000000 | 0.965996 |
| SWM | -0.698265 | 0.323527 | 0.459843 | 0.965996 | 1.000000 |


```
In [25]: import seaborn as sns
sns.heatmap(cor, vmax=1, vmin=-1, annot=True, linewidths=.5, cmap='bwr')
```

Out[25]: <Axes: >



In []: