```
In [49]: import pandas as pd
In [50]: data=pd.read_csv("/home/placement/Downloads/rainfall in india 1901-2015.csv")
In [51]: data.isna().sum()
Out[51]: SUBDIVISION
                          0
         YEAR
                          0
         JAN
                          4
         FEB
         MAR
                          6
         APR
         MAY
                          3
         JUN
         JUL
         AUG
         SEP
         0CT
                          7
         NOV
                         11
         DEC
                         10
         ANNUAL
                         26
         Jan-Feb
                          6
         Mar-May
                          9
         Jun-Sep
                         10
         Oct-Dec
                         13
         dtype: int64
In [52]: data1=data.loc[(data.YEAR<=2010)]</pre>
```

In [53]: data1.tail(5)

Out[53]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	ANNUAL	Jan- Feb	Mar- May	Jun- Sep	De
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.
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.
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.
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.
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.

In [54]: data2=data.drop(['ANNUAL', 'Jan-Feb', 'Mar-May', 'Jun-Sep', 'Oct-Dec'], axis=1)

In [55]: data2

Out[55]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	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 [56]: data2['ANNUAL RAIN']=data2.apply(lambda row:row.JAN+row.FEB,axis=1)

data2

In [57]: data2

Out[57]:

		SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	ANNUAL RAIN
	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	136.3
	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	159.8
	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	156.7
	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	24.1
	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	1.3
41	11	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	7.9
41	12	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	19.3
41	13	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	60.6
41	14	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	69.3
41	15	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	2.7

4116 rows × 15 columns

In [58]: data2['ANNUAL RAIN']=data2.apply(lambda row:row.JAN+row.FEB+row.MAR+row.APR+row.MAY+row.JUN+row.JUL+row.AUG+

In [59]: data2

Out[59]:

:		SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	ANNUAL RAIN
	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
	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
	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
	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
	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
4	1111	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	1533.7
4	1112	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	1405.5
4	1113	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	1426.3
4	114	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	1395.0
4	115	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	1642.9

4116 rows × 15 columns

```
In [60]: data3=data.loc[(data.SUBDIVISION=='ARUNACHAL PRADESH')]
```

In [61]: data4=data3.drop(['SUBDIVISION'],axis=1)

In [67]: cor=data4.corr()
cor

Out[67]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	C
YEAR	1.000000	-0.176300	-0.213918	-0.157302	-0.253946	-0.401934	-0.626889	-0.494607	-0.394066	-0.396480	-0.325208	-0.096053	-0.070
JAN	-0.176300	1.000000	0.083391	0.099054	0.256921	0.217524	0.208187	0.071617	0.193102	0.189419	0.169379	0.162395	0.286
FEB	-0.213918	0.083391	1.000000	0.321564	0.205643	-0.027577	0.111802	0.140842	0.063751	0.154883	-0.024632	0.159914	0.050
MAR	-0.157302	0.099054	0.321564	1.000000	0.307354	0.023099	0.111475	0.047547	0.058362	0.054761	-0.137731	-0.048569	0.065
APR	-0.253946	0.256921	0.205643	0.307354	1.000000	0.097526	0.290472	0.238319	0.132668	0.198362	0.054994	0.295455	0.329
MAY	-0.401934	0.217524	-0.027577	0.023099	0.097526	1.000000	0.398268	0.510852	0.367445	0.246939	0.141720	0.040734	0.093
JUN	-0.626889	0.208187	0.111802	0.111475	0.290472	0.398268	1.000000	0.540408	0.426753	0.354854	0.217141	0.124429	0.054
JUL	-0.494607	0.071617	0.140842	0.047547	0.238319	0.510852	0.540408	1.000000	0.218016	0.380741	0.173107	-0.137416	0.091
AUG	-0.394066	0.193102	0.063751	0.058362	0.132668	0.367445	0.426753	0.218016	1.000000	0.259420	0.293511	0.062165	0.008
SEP	-0.396480	0.189419	0.154883	0.054761	0.198362	0.246939	0.354854	0.380741	0.259420	1.000000	0.241075	-0.040257	0.080
ОСТ	-0.325208	0.169379	-0.024632	-0.137731	0.054994	0.141720	0.217141	0.173107	0.293511	0.241075	1.000000	-0.047687	-0.013
NOV	-0.096053	0.162395	0.159914	-0.048569	0.295455	0.040734	0.124429	-0.137416	0.062165	-0.040257	-0.047687	1.000000	0.312
DEC	-0.070899	0.286771	0.050085	0.065364	0.329066	0.093530	0.054968	0.091248	0.008145	0.080062	-0.013078	0.312240	1.000
ANNUAL	-0.709544	0.325117	0.223998	0.227488	0.439047	0.634682	0.793095	0.762012	0.624845	0.626636	0.406220	0.076944	0.168
Jan-Feb	-0.266442	0.634518	0.823129	0.303319	0.305895	0.102570	0.205393	0.150032	0.159517	0.228104	0.077493	0.216565	0.202
Mar-May	-0.480430	0.300178	0.202870	0.500652	0.636367	0.759252	0.462125	0.498620	0.348350	0.284368	0.080929	0.159040	0.229
Jun-Sep	-0.673985	0.216207	0.164077	0.107055	0.314862	0.542457	0.827003	0.785435	0.636887	0.624762	0.321843	-0.000532	0.089
Oct-Dec	-0.346587	0.249172	0.022492	-0.126796	0.175082	0.156031	0.241761	0.147782	0.299315	0.241389	0.946660	0.236445	0.223

localhost:8888/notebooks/rainfall 17.ipynb

In [69]: import seaborn as sns

```
sns.heatmap(cor,vmax=1,vmin=-1,annot=True,linewidth=5,cmap='bwr')
Out[69]: <Axes: >
                                                                                               1.00
                 YEAR - 10.16.20.16.25.4 1.6 1.4 1.3 0.-0.30309607 1.70.27.4 1.60.35
                   JAN -0.18 0.08309326.20.201070219.19.10.16.29.33 6 0.30.20.25
                                                                                             - 0.75
                   FEB -0.20108 1 0.3 0.201.0 2081 0.1040 604 105.0 2051 6.0 5.2 2 8 0.20.106 02 2
                  MAR -0.1060 90932 110.3010 208 1010 480 1080 505.104 04.99 605 230.3 110.1-10.13
                  APR -0.25.26.2 D.31 0.09 29.29.2 0.1 30. 0.0 5 5.30.3 B.4 0.3 1. 6 0.3 D.18
                                                                                             - 0.50
                  MAY - 0.0.20.00.80030981 0.4 50.30.25.1040400946 0.1 1/ 50.16
                   UN - 160.20.10.10.290.4 1 150.48.35.20.10205570.21.4 180.24
                                                                                             - 0.25
                   JUL - 10.070210404082415 5 10.20.38.1-10.10409170.15 70.15
                  AUG - 100 0640 508 1 B 3 0 4 B 2 2 1 0 2 6 20 9 00 0 0 3 6 0 1 6 3 5 6 0 3
                                                                                             - 0.00
                   SEP - 0.0.19.105050.20.20.30.30.38.26 10.2-0.04.08 60.20.28 60.24
                  OCT -0.30, 107.0 205 1040 505 1 49.2 10.1 10.2 19.2 4 1 1 10.0 4 80 10340 1.0 10.70 801.3 2 12
                                                                                              - -0.25
                  NOV-9.090616.105.049.10.0401.1-20.1040602.00404110.301.0707212-01.000005234
                  DEC-9.070129.00506053080940550090081908.010331100.170.20,203080922
              ANNUAL - 170.38.220.28.44.6 7 7 6 60.401070.17 10.36.7 90.44
                                                                                             - -0.50
               Jan-Feb -0.2 16 8 0.30.310.10.2 0.1 0.1 0.200 707.220.20,36 10.3 0.2 0.16
              Mar-May - 14 0.30.2 15 16 17 14 0.50.3 0.2 0.8 0.2 16.2 3 7 0.3 3 1 15 0.15
                                                                                             - -0.75
              lun-Sep - 160.20.10.10.31.15 18 1/ 16 160.02000.58990.25 15 100.32
              Oct-Dec -0.35, 25, 020, 18, 18, 16, 24, 150, 30, 24, 90, 24, 20, 44, 16, 15, 32
                                                                                               -1.00
                                                                                Jun-Sep
                                                           OCT
                                                                      ANNUAL
```

In [ ]: