10. rainfall in india 1901-2015 17june23¶

data analysis from csv file

In [44]:
```
import pandas as pd
```

In [14]:
```
data=pd.read_csv("/home/placement/Desktop/saimohan data/csv files/rainfall in india 1901-2015.csv")
```

In [15]:
```
data.describe()
```

Out[15]:

	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.(
mean	1958.218659	18.957320	21.805325	27.359197	43.127432	85.745417	230.234444	347.214334	290.263497	197.361922	95.5
std	33.140898	33.585371	35.909488	46.959424	67.831168	123.234904	234.710758	269.539667	188.770477	135.408345	99.5
min	1901.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.400000	0.000000	0.000000	0.100000	0.(
25%	1930.000000	0.600000	0.600000	1.000000	3.000000	8.600000	70.350000	175.600000	155.975000	100.525000	14.(
50%	1958.000000	6.000000	6.700000	7.800000	15.700000	36.600000	138.700000	284.800000	259.400000	173.900000	65.2
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	948.3

In [16]:
```
data
```

Out[16]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep	
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	9
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	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	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	5
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	6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
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	1533.7	7.9	196.2	1013.0	3
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	1405.5	19.3	99.6	1119.5	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	1426.3	60.6	131.1	1057.0	1
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	1395.0	69.3	76.7	958.5	2
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	1642.9	2.7	223.9	860.9	5

4116 rows × 19 columns

In [17]:
```
data.head()
```

Out[17]:

	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 [18]:
```
data.tail(100)
```

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
4016	LAKSHADWEEP	1915	0.0	0.0	22.9	50.5	143.3	183.4	461.6	76.0	222.1	151.6	155.8	78.3	1545.5	0.0	216.7	943.1	385.
4017	LAKSHADWEEP	1916	0.3	13.2	32.0	28.7	130.5	327.6	445.9	31.8	275.4	85.2	17.5	10.4	1398.5	13.5	191.2	1080.7	113.
4018	LAKSHADWEEP	1917	NaN	68.6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
4019	LAKSHADWEEP	1919	74.4	1.3	39.4	25.6	249.8	352.1	367.4	175.6	196.9	181.0	150.2	112.8	1926.5	75.7	314.8	1092.0	444.
4020	LAKSHADWEEP	1920	82.6	NaN	35.6	49.4	203.1	530.0	134.2	116.9	247.6	258.8	359.6	33.1	NaN	NaN	288.1	1028.7	651.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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	1533.7	7.9	196.2	1013.0	316.
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	1405.5	19.3	99.6	1119.5	167.
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	1426.3	60.6	131.1	1057.0	177.
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	1395.0	69.3	76.7	958.5	290.
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	1642.9	2.7	223.9	860.9	555.

100 rows × 19 columns

In [19]:
```
#group by subdivision
data.groupby(['SUBDIVISION']).count()
```

Out[19]:

SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep	Oct-Dec
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

SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep	Oct-Dec
MATATHWADA	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
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 [20]:
```
#CHECKING STATEMENT FOR NULL VALUES
data.isna().sum()
```

Out[20]:
```
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 [21]:
```
#i want data upto 2010,so we have to locate the data
data1=data.loc[(data.YEAR<=2010)]
```

In [22]:
```
data1
```

Out[22]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep	
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	9
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	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	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	5
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	6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
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	2
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	4
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	4
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	3
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	4

3936 rows × 19 columns

In [23]:
```
data1.tail(10)
```

Out[23]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep	Oc D
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
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
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
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
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
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 [24]:
```
data1=data.drop(['ANNUAL'],axis=1)
```

In [25]:
```
data1
```

Out[25]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	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	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	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	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	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	1.3	309.7	1624.9	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	7.9	196.2	1013.0	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	19.3	99.6	1119.5	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	60.6	131.1	1057.0	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	69.3	76.7	958.5	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	2.7	223.9	860.9	555.4

4116 rows × 18 columns

In [26]:
```
data1=data.drop(["Jan-Feb","Mar-May","Jun-Sep","Jun-Sep","Oct-Dec","ANNUAL"],axis=1)
data1
```

Out[26]:

	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 [27]:
```
data['SUBDIVISION'].unique()
```

Out[27]:
```
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 [28]:
```
#extracting only for the ARUNACHAL PRADESH
data2=data1.loc[(data1.SUBDIVISION =="ARUNACHAL PRADESH")]
```

In [29]:
```
data2
```

Out[29]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	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
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
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
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
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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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
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
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
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
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

97 rows × 14 columns

In [30]:
```
data2.isna().sum()
```

Out[30]:
```
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
dtype: int64
```

how can you add two columns in a data frame

In [31]:
```
data1['ANNUAL RAIN']=data1.apply(lambda row: row.JAN + row.FEB + row.MAR + row.APR + row.MAY + row.JUN + row
#data name should be same
#data2["ANNUAL YEAR"]=data2.apply(lambda row:row.JAN+row.FEB,axis=1)
```

In [32]:
```
data1
```

Out[32]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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	1533.7
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	1405.5
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	1426.3
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	1395.0
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	1642.9

4116 rows × 15 columns

In [ ]:
```
```

In [33]:
```
data1=data1.drop(['SUBDIVISION'],axis=1)
data1
```

Out[33]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL RAIN
0	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	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	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	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	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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4111	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
4112	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
4113	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
4114	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
4115	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 × 14 columns

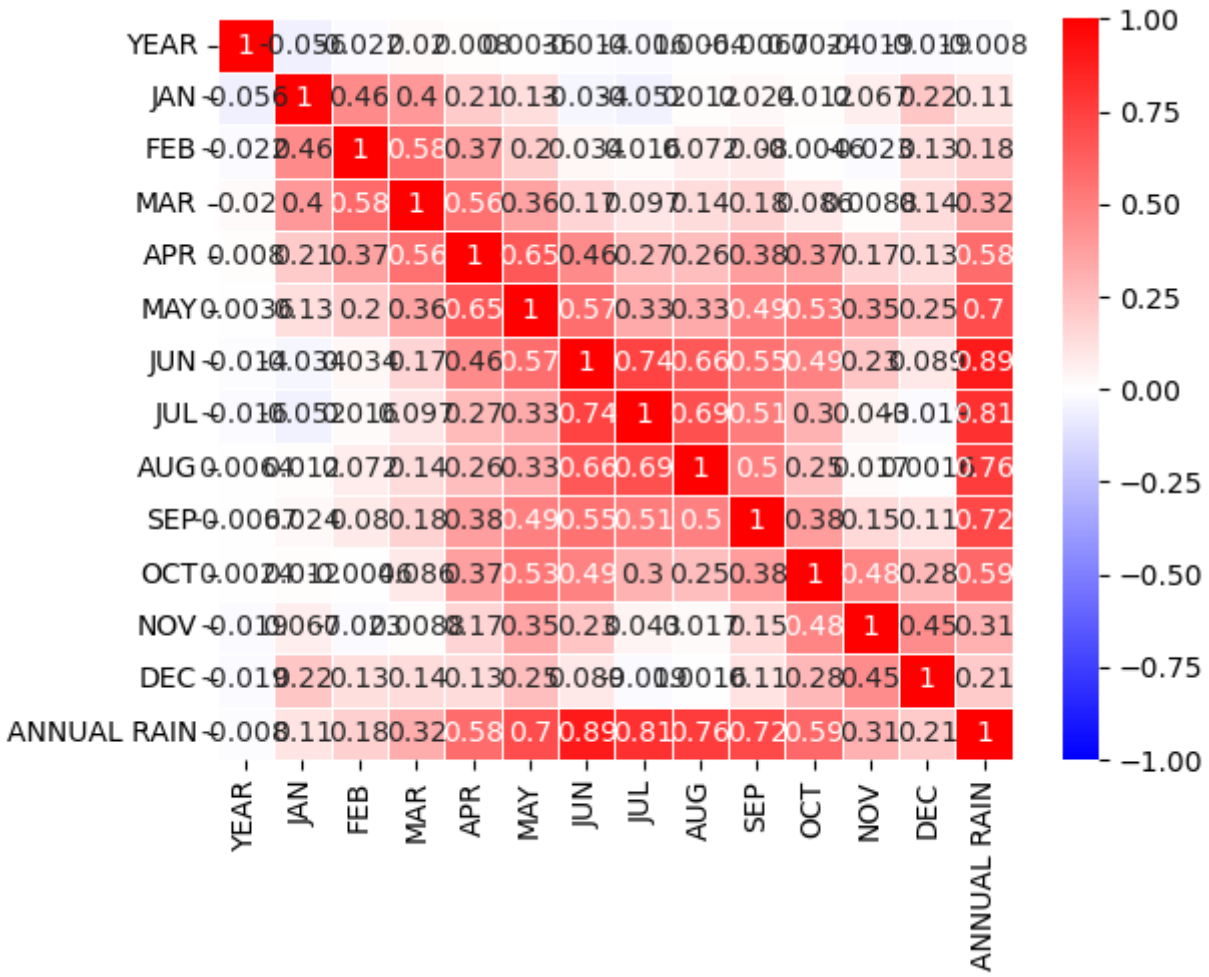
In [34]:
```
cor_mat=data1.corr()
cor_mat
```

Out[34]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
YEAR	1.000000	-0.056235	-0.022144	0.020338	0.008007	0.003594	-0.013594	-0.016240	0.006442	-0.006670	0.002406	-0.018776	-0.019139
JAN	-0.056235	1.000000	0.456183	0.398502	0.209302	0.129622	-0.033725	-0.051642	0.011952	0.024289	0.012374	0.067281	0.219701
FEB	-0.022144	0.456183	1.000000	0.579819	0.367114	0.203062	0.033703	0.016235	0.072159	0.080148	-0.004581	-0.023413	0.132570
MAR	0.020338	0.398502	0.579819	1.000000	0.556856	0.362815	0.165857	0.097334	0.135071	0.178904	0.086187	0.008814	0.136328
APR	0.008007	0.209302	0.367114	0.556856	1.000000	0.650595	0.457091	0.268097	0.256168	0.382525	0.368886	0.165642	0.132892
MAY	0.003594	0.129622	0.203062	0.362815	0.650595	1.000000	0.567618	0.332283	0.329499	0.492378	0.529342	0.351931	0.250112
JUN	-0.013594	-0.033725	0.033703	0.165857	0.457091	0.567618	1.000000	0.741285	0.655142	0.551890	0.490393	0.229718	0.088782
JUL	-0.016240	-0.051642	0.016235	0.097334	0.268097	0.332283	0.741285	1.000000	0.686662	0.513067	0.299221	0.042671	-0.019427
AUG	0.006442	0.011952	0.072159	0.135071	0.256168	0.329499	0.655142	0.686662	1.000000	0.497037	0.250600	0.017488	0.001648
SEP	-0.006670	0.024289	0.080148	0.178904	0.382525	0.492378	0.551890	0.513067	0.497037	1.000000	0.384138	0.153465	0.109457
OCT	0.002406	0.012374	-0.004581	0.086187	0.368886	0.529342	0.490393	0.299221	0.250600	0.384138	1.000000	0.477503	0.281172
NOV	-0.018776	0.067281	-0.023413	0.008814	0.165642	0.351931	0.229718	0.042671	0.017488	0.153465	0.477503	1.000000	0.451407
DEC	-0.019139	0.219701	0.132570	0.136328	0.132892	0.250112	0.088782	-0.019427	0.001648	0.109457	0.281172	0.451407	1.000000
ANNUAL RAIN	-0.008041	0.105697	0.181561	0.322201	0.577574	0.698014	0.891302	0.812279	0.759303	0.715133	0.587066	0.308771	0.207178

In [35]:
```
import seaborn as sns
sns.heatmap(cor_mat,vmax=1,vmin=-1,annot=True,linewidths=.5,cmap='bwr')
```

Out[35]: <Axes: >



In [36]:
```
data
```

Out[36]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep	
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	9
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	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	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	5
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	6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
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	1533.7	7.9	196.2	1013.0	3
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	1405.5	19.3	99.6	1119.5	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	1426.3	60.6	131.1	1057.0	1
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	1395.0	69.3	76.7	958.5	2
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	1642.9	2.7	223.9	860.9	5

4116 rows × 19 columns

In [37]:
```
#SOUTH WEST MONSOON
data1['SWM']=data1.apply(lambda row:row.JUN + row.JUL + row.AUG + row.SEP,axis=1)
```

In [38]:
```
data1
```

Out[38]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL RAIN	SWM
0	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	1696.3
1	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	2185.9
2	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	1874.0
3	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	1977.6
4	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	1624.9
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4111	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	1013.0
4112	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	1119.5
4113	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	1057.0
4114	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	958.5
4115	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	860.9

4116 rows × 15 columns

In [39]:
```
#NORTH WEST MONSOON
data1['NEM']=data1.apply(lambda row:row.OCT + row.NOV + row.DEC,axis=1)
```

In [40]:
```
data1
```

Out[40]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL RAIN	SWM	NEM
0	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	1696.3	980.3
1	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	2185.9	716.7
2	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	1874.0	690.6
3	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	1977.6	571.0
4	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	1624.9	630.8
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4111	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	1013.0	316.6
4112	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	1119.5	167.1
4113	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	1057.0	177.6
4114	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	958.5	290.5
4115	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	860.9	555.4

4116 rows × 16 columns

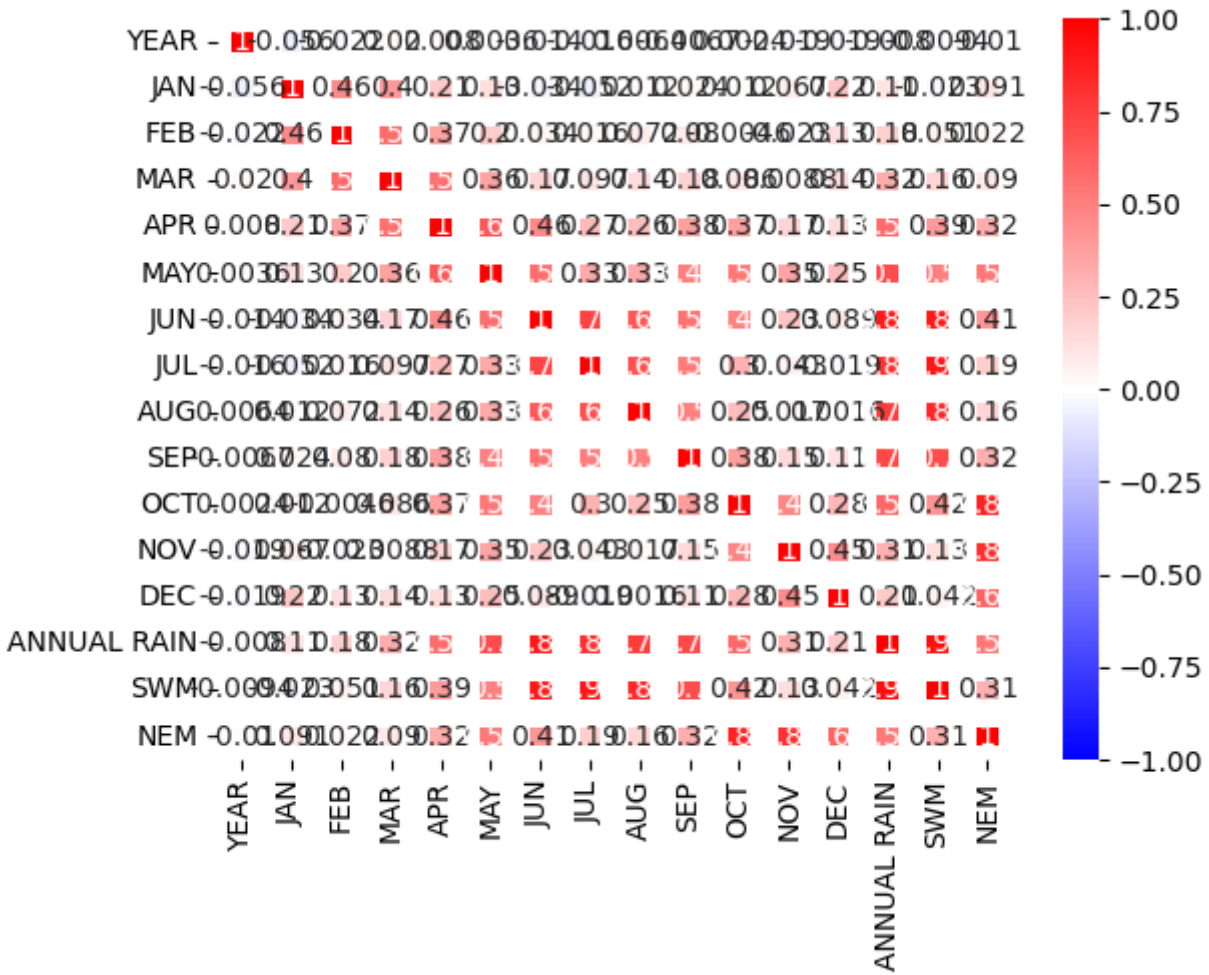
In [45]:
```
cor_mat=data1.corr()
cor_mat
```

Out[45]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
YEAR	1.000000	-0.056235	-0.022144	0.020338	0.008007	0.003594	-0.013594	-0.016240	0.006442	-0.006670	0.002406	-0.018776	-0.019139
JAN	-0.056235	1.000000	0.456183	0.398502	0.209302	0.129622	-0.033725	-0.051642	0.011952	0.024289	0.012374	0.067281	0.219701
FEB	-0.022144	0.456183	1.000000	0.579819	0.367114	0.203062	0.033703	0.016235	0.072159	0.080148	-0.004581	-0.023413	0.132570
MAR	0.020338	0.398502	0.579819	1.000000	0.556856	0.362815	0.165857	0.097334	0.135071	0.178904	0.086187	0.008814	0.136328
APR	0.008007	0.209302	0.367114	0.556856	1.000000	0.650595	0.457091	0.268097	0.256168	0.382525	0.368886	0.165642	0.132892
MAY	0.003594	0.129622	0.203062	0.362815	0.650595	1.000000	0.567618	0.332283	0.329499	0.492378	0.529342	0.351931	0.250112
JUN	-0.013594	-0.033725	0.033703	0.165857	0.457091	0.567618	1.000000	0.741285	0.655142	0.551890	0.490393	0.229718	0.088782
JUL	-0.016240	-0.051642	0.016235	0.097334	0.268097	0.332283	0.741285	1.000000	0.686662	0.513067	0.299221	0.042671	-0.019427
AUG	0.006442	0.011952	0.072159	0.135071	0.256168	0.329499	0.655142	0.686662	1.000000	0.497037	0.250600	0.017488	0.001648
SEP	-0.006670	0.024289	0.080148	0.178904	0.382525	0.492378	0.551890	0.513067	0.497037	1.000000	0.384138	0.153465	0.109457
OCT	0.002406	0.012374	-0.004581	0.086187	0.368886	0.529342	0.490393	0.299221	0.250600	0.384138	1.000000	0.477503	0.281172
NOV	-0.018776	0.067281	-0.023413	0.008814	0.165642	0.351931	0.229718	0.042671	0.017488	0.153465	0.477503	1.000000	0.451407
DEC	-0.019139	0.219701	0.132570	0.136328	0.132892	0.250112	0.088782	-0.019427	0.001648	0.109457	0.281172	0.451407	1.000000
ANNUAL RAIN	-0.008041	0.105697	0.181561	0.322201	0.577574	0.698014	0.891302	0.812279	0.759303	0.715133	0.587066	0.308771	0.207178
SWM	-0.009414	-0.022751	0.051064	0.162056	0.394858	0.496164	0.893969	0.907722	0.840352	0.701978	0.416351	0.126340	0.042441
NEM	-0.010152	0.090932	0.021871	0.090105	0.321408	0.523682	0.409048	0.190397	0.156290	0.319830	0.862759	0.808802	0.606657

In [46]:
```
import seaborn as sns
sns.heatmap(cor_mat,vmax=1,vmin=-1,annot=True,linewidths=10,cmap='bwr')
```

Out[46]: <Axes: >



In [41]:
```
data3=data1.drop(["JAN","FEB","MAR","APR","MAY","JUN","AUG","SEP","OCT","NOV","DEC","JUL","YEAR"],axis=1)
data3
```

Out[41]:

	ANNUAL RAIN	SWM	NEM
0	3373.2	1696.3	980.3
1	3520.7	2185.9	716.7
2	2957.4	1874.0	690.6
3	3079.6	1977.6	571.0
4	2566.7	1624.9	630.8
...	...	...	...
4111	1533.7	1013.0	316.6
4112	1405.5	1119.5	167.1
4113	1426.3	1057.0	177.6
4114	1395.0	958.5	290.5
4115	1642.9	860.9	555.4

4116 rows × 3 columns

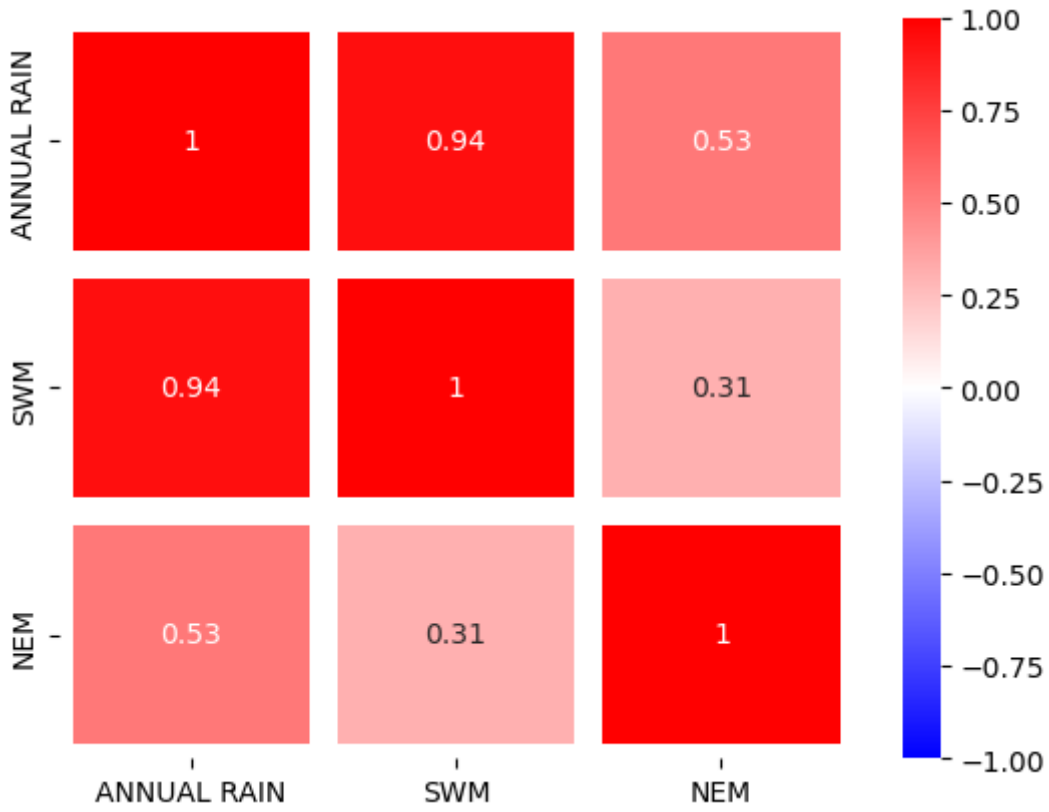
In [42]:
```
cor_mat=data3.corr()
cor_mat
```

Out[42]:

	ANNUAL RAIN	SWM	NEM
ANNUAL RAIN	1.000000	0.943660	0.529596
SWM	0.943660	1.000000	0.310432
NEM	0.529596	0.310432	1.000000

In [43]:
```
import seaborn as sns
sns.heatmap(cor_mat,vmax=1,vmin=-1,annot=True,linewidths=10,cmap='bwr')
```

Out[43]: <Axes: >



In [ ]: