RAINFALL IN INDIA 1901-2015

PROBLEM STATEMENT:-

To perform an analytics report on 100 years of Rainfall data
Which Subdivision getting more rainfall

In [1]:
```
import numpy as np
import pandas as pd
import warnings
warnings.simplefilter(action='ignore')
```

In [2]:
```
df = pd.read_csv(r"C:\Users\HP\OneDrive\Desktop\revathi\rainfall in india 1901-2015.csv")
df
```

Out[2]:

	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
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
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
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
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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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
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
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
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
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

4116 rows × 19 columns

In [3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4116 entries, 0 to 4115
Data columns (total 19 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   SUBDIVISION  4116 non-null   object
 1   YEAR         4116 non-null   int64
 2   JAN          4112 non-null   float64
 3   FEB          4113 non-null   float64
 4   MAR          4110 non-null   float64
 5   APR          4112 non-null   float64
 6   MAY          4113 non-null   float64
 7   JUN          4111 non-null   float64
 8   JUL          4109 non-null   float64
 9   AUG          4112 non-null   float64
 10  SEP          4110 non-null   float64
 11  OCT          4109 non-null   float64
 12  NOV          4105 non-null   float64
 13  DEC          4106 non-null   float64
 14  ANNUAL       4090 non-null   float64
 15  Jan-Feb      4110 non-null   float64
 16  Mar-May      4107 non-null   float64
 17  Jun-Sep      4106 non-null   float64
 18  Oct-Dec      4103 non-null   float64
dtypes: float64(17), int64(1), object(1)
memory usage: 611.1+ KB
```

In [4]:
```
1 df.isnull().sum()
```

Out[4]:
```
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 [5]:
```
1 df.fillna(method='ffill',inplace=True)
```

In [6]:
```
1 df.isnull().sum()
```

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

In [7]:
```
1 df['SUBDIVISION'].value_counts()
```

Out[7]:
```
SUBDIVISION
WEST MADHYA PRADESH                 115
EAST RAJASTHAN                      115
COASTAL KARNATAKA                   115
TAMIL NADU                          115
RAYALSEEMA                          115
TELANGANA                           115
COASTAL ANDHRA PRADESH              115
CHHATTISGARH                        115
VIDARBHA                            115
MATATHWADA                          115
MADHYA MAHARASHTRA                  115
KONKAN & GOA                        115
SAURASHTRA & KUTCH                  115
GUJARAT REGION                      115
EAST MADHYA PRADESH                 115
KERALA                              115
WEST RAJASTHAN                      115
SOUTH INTERIOR KARNATAKA            115
JAMMU & KASHMIR                     115
HIMACHAL PRADESH                    115
PUNJAB                              115
HARYANA DELHI & CHANDIGARH          115
UTTARAKHAND                         115
WEST UTTAR PRADESH                  115
EAST UTTAR PRADESH                  115
BIHAR                               115
JHARKHAND                           115
ORISSA                              115
GANGETIC WEST BENGAL                115
SUB HIMALAYAN WEST BENGAL & SIKKIM  115
NAGA MANI MIZO TRIPURA              115
ASSAM & MEGHALAYA                   115
NORTH INTERIOR KARNATAKA            115
LAKSHADWEEP                         114
ANDAMAN & NICOBAR ISLANDS           110
ARUNACHAL PRADESH                    97
Name: count, dtype: int64
```

In [8]:

```
s = {'SUBDIVISION':{'WEST MADHYA PRADESH':1,
                    'EAST RAJASTHAN':2,
                    'COASTAL KARNATAKA':3,
                    'TAMIL NADU':4,
                    'RAYALSEEMA':5,
                    'TELANGANA':6,
                    'COASTAL ANDHRA PRADESH':7,
                    'CHHATTISGARH':8,
                    'VIDARBHA':9,
                    'MATATHWADA':10,
                    'MADHYA MAHARASHTRA':11,
                    'KONKAN & GOA':12,
                    'SAURASHTRA & KUTCH':13,
                    'GUJARAT REGION':14,
                    'EAST MADHYA PRADESH':15,
                    'KERALA':16,
                    'WEST RAJASTHAN':17,
                    'SOUTH INTERIOR KARNATAKA':18,
                    'JAMMU & KASHMIR':19,
                    'HIMACHAL PRADESH':20,
                    'PUNJAB':21,
                    'HARYANA DELHI & CHANDIGARH':22,
                    'UTTARAKHAND':23,
                    'WEST UTTAR PRADESH':24,
                    'EAST UTTAR PRADESH':25,
                    'BIHAR':26,
                    'JHARKHAND':27,
                    'ORISSA':28,
                    'GANGETIC WEST BENGAL':29,
                    'SUB HIMALAYAN WEST BENGAL & SIKKIM':30,
                    'NAGA MANI MIZO TRIPURA':31,
                    'ASSAM & MEGHALAYA':32,
                    'NORTH INTERIOR KARNATAKA':33,
                    'LAKSHADWEEP':34,
                    'ANDAMAN & NICOBAR ISLANDS':35,
                    'ARUNACHAL PRADESH':36}}
df = df.replace(s)
df
```

Out[8]:

	SUBDIVISION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep
0	35	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
1	35	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
2	35	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
3	35	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
4	35	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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4111	34	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
4112	34	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
4113	34	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
4114	34	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
4115	34	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

4116 rows × 19 columns

In [9]:

```
df.columns
```

Out[9]:

```
Index(['SUBDIVISION', 'YEAR', 'JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN', 'JUL',
       'AUG', 'SEP', 'OCT', 'NOV', 'DEC', 'ANNUAL', 'Jan-Feb', 'Mar-May',
       'Jun-Sep', 'Oct-Dec'],
      dtype='object')
```

In [10]:

```
x=df[['YEAR', 'JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN', 'JUL',
      'AUG', 'SEP', 'OCT', 'NOV', 'DEC', 'Jan-Feb', 'Mar-May',
      'Jun-Sep', 'Oct-Dec','ANNUAL']]
y=df[['SUBDIVISION']]
```

In [11]:

```
from sklearn.model_selection import train_test_split
```

In [12]:

```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.3)
x_train.shape,x_test.shape
```

Out[12]:

```
((2881, 18), (1235, 18))
```

In [13]:
```
from sklearn.linear_model import LinearRegression
```

In [14]:
```
lr = LinearRegression()
lr.fit(x_train,y_train)
print(lr.score(x_test,y_test))
print(lr.score(x_train,y_train))
```

```
0.3350430369928301
0.3477307578496588
```

In [15]:
```
from sklearn.linear_model import Lasso,Ridge,LassoCV,RidgeCV
```

In [16]:
```
lasso = Lasso(alpha=10)
lasso.fit(x_train,y_train)
print(lasso.score(x_test,y_test))
print(lasso.score(x_train,y_train))
```

```
0.3363056150705481
0.3430519877004349
```

In [17]:
```
ridge = Ridge(alpha=10)
ridge.fit(x_train,y_train)
print(ridge.score(x_test,y_test))
print(ridge.score(x_train,y_train))
```

```
0.3350439248441428
0.34773074194053677
```

In [18]:
```
lasso_cv = LassoCV(alphas=[10,20,30,40,50])
lasso_cv.fit(x_train,y_train)
print(lasso_cv.score(x_test,y_test))
print(lasso_cv.score(x_train,y_train))
```

```
0.3363056150705481
0.3430519877004349
```

In [19]:
```
ridge_cv = RidgeCV(alphas=[10,20,30,40,50])
ridge_cv.fit(x_train,y_train)
print(ridge_cv.score(x_test,y_test))
print(ridge_cv.score(x_train,y_train))
```

```
0.33504733213082327
0.34773038438019777
```

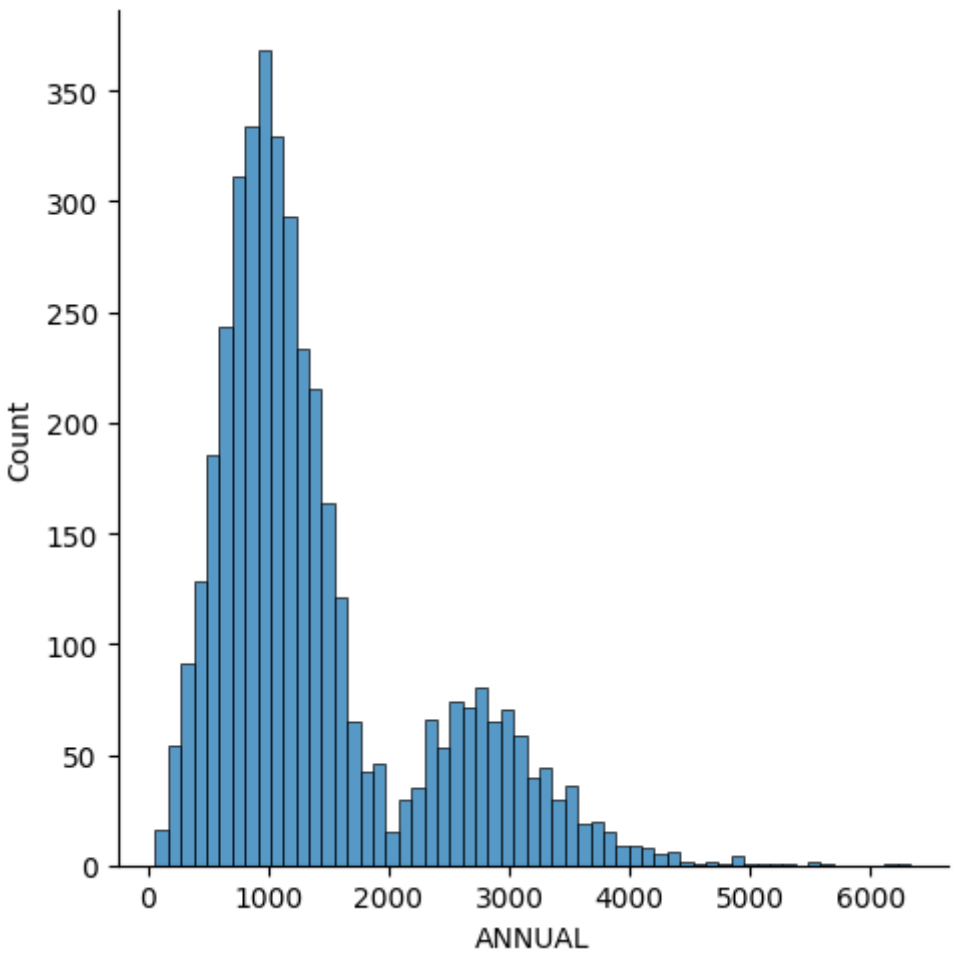
In [20]:
```
from sklearn.linear_model import ElasticNet
```

In [21]:
```
en = ElasticNet()
en.fit(x_train,y_train)
print(en.score(x_train,y_train))
print(en.score(x_test,y_test))
```

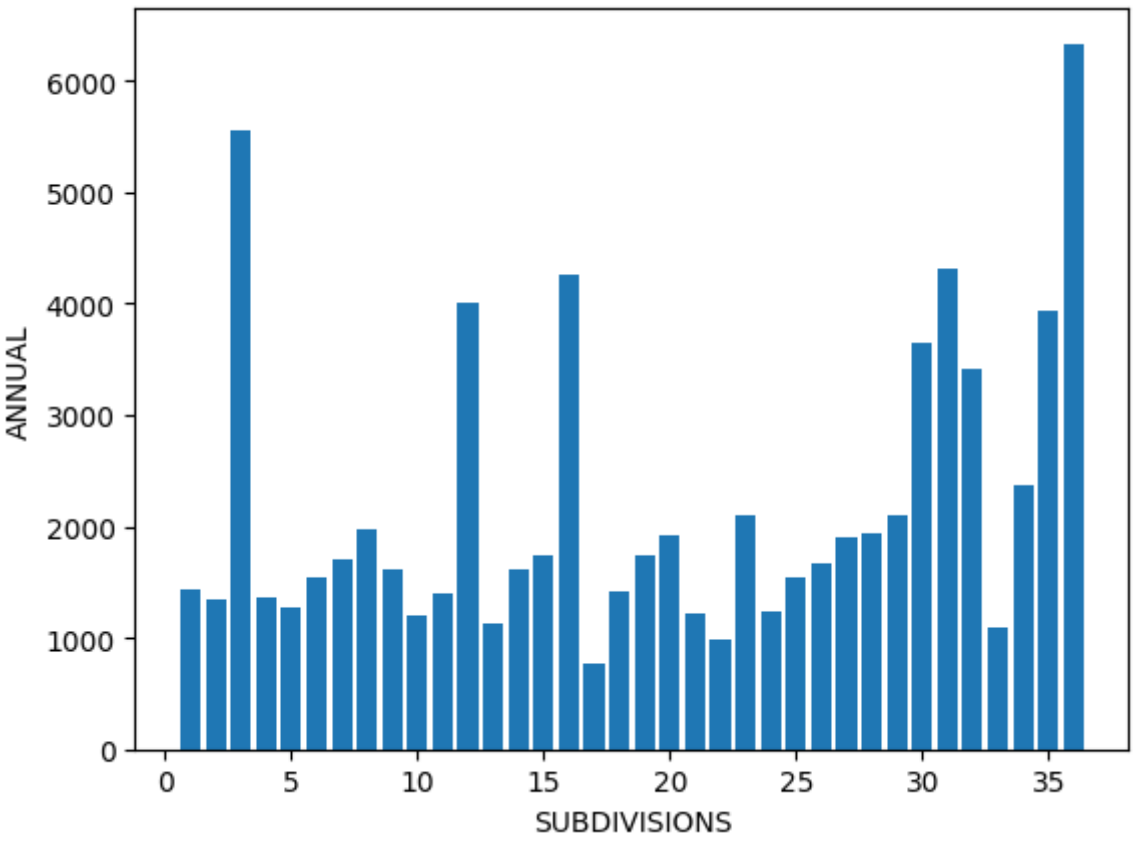
```
0.34738681609723476
0.33550251703102685
```

In [22]:
```
import seaborn as sns
sns.displot(df['ANNUAL'])
```

Out[22]: <seaborn.axisgrid.FacetGrid at 0x16f4ca29e70>



In [23]:
```
import matplotlib.pyplot as plt
import seaborn as sns
plt.bar(df['SUBDIVISION'],df['ANNUAL'])
plt.xlabel('SUBDIVISIONS')
plt.ylabel('ANNUAL')
plt.show()
```



CONCLUSION:-

According to this dataset Andaman & nicobar was noted highest rain fall in annually

District wise RainFall Normal

Problem Statement:-

Which state has more rainfall in annually

In [38]:
```
import pandas as pd
import numpy as np
```

In [39]:
```
data =pd.read_csv(r"C:\Users\HP\OneDrive\Desktop\revathi\district wise rainfall normal.csv")
data
```

Out[39]:

NAME	DISTRICT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb	Mar-May	Jun-Sep	O
AN And COBAR LANDS	NICOBAR	107.3	57.9	65.2	117.0	358.5	295.5	285.0	271.9	354.8	326.0	315.2	250.9	2805.2	165.2	540.7	1207.2	89
AN And COBAR LANDS	SOUTH ANDAMAN	43.7	26.0	18.6	90.5	374.4	457.2	421.3	423.1	455.6	301.2	275.8	128.3	3015.7	69.7	483.5	1757.2	70
AN And COBAR LANDS	N & M ANDAMAN	32.7	15.9	8.6	53.4	343.6	503.3	465.4	460.9	454.8	276.1	198.6	100.0	2913.3	48.6	405.6	1884.4	57
ACHAL ADESH	LOHIT	42.2	80.8	176.4	358.5	306.4	447.0	660.1	427.8	313.6	167.1	34.1	29.8	3043.8	123.0	841.3	1848.5	23
ACHAL ADESH	EAST SIANG	33.3	79.5	105.9	216.5	323.0	738.3	990.9	711.2	568.0	206.9	29.5	31.7	4034.7	112.8	645.4	3008.4	26
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
ERALA	IDUKKI	13.4	22.1	43.6	150.4	232.6	651.6	788.9	527.3	308.4	343.2	172.9	48.1	3302.5	35.5	426.6	2276.2	56
ERALA	KASARGOD	2.3	1.0	8.4	46.9	217.6	999.6	1108.5	636.3	263.1	234.9	84.6	18.4	3621.6	3.3	272.9	3007.5	33
ERALA	PATHANAMTHITTA	19.8	45.2	73.9	184.9	294.7	556.9	539.9	352.7	266.2	359.4	213.5	51.3	2958.4	65.0	553.5	1715.7	62
ERALA	WAYANAD	4.8	8.3	17.5	83.3	174.6	698.1	1110.4	592.9	230.7	213.1	93.6	25.8	3253.1	13.1	275.4	2632.1	33
WEEP	LAKSHADWEEP	20.8	14.7	11.8	48.9	171.7	330.2	287.7	217.5	163.1	157.1	117.7	58.8	1600.0	35.5	232.4	998.5	33

olumns

In [40]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 641 entries, 0 to 640
Data columns (total 19 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   STATE_UT_NAME  641 non-null    object
 1   DISTRICT       641 non-null    object
 2   JAN            641 non-null    float64
 3   FEB            641 non-null    float64
 4   MAR            641 non-null    float64
 5   APR            641 non-null    float64
 6   MAY            641 non-null    float64
 7   JUN            641 non-null    float64
 8   JUL            641 non-null    float64
 9   AUG            641 non-null    float64
 10  SEP            641 non-null    float64
 11  OCT            641 non-null    float64
 12  NOV            641 non-null    float64
 13  DEC            641 non-null    float64
 14  ANNUAL         641 non-null    float64
 15  Jan-Feb        641 non-null    float64
 16  Mar-May        641 non-null    float64
 17  Jun-Sep        641 non-null    float64
 18  Oct-Dec        641 non-null    float64
dtypes: float64(17), object(2)
memory usage: 95.3+ KB
```

In [41]:
```
1 data.isnull().sum()
```

Out[41]:
```
STATE_UT_NAME    0
DISTRICT         0
JAN              0
FEB              0
MAR              0
APR              0
MAY              0
JUN              0
JUL              0
AUG              0
SEP              0
OCT              0
NOV              0
DEC              0
ANNUAL           0
Jan-Feb          0
Mar-May          0
Jun-Sep          0
Oct-Dec          0
dtype: int64
```

In [42]:
```
1 data.columns
```

Out[42]:
```
Index(['STATE_UT_NAME', 'DISTRICT', 'JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN',
       'JUL', 'AUG', 'SEP', 'OCT', 'NOV', 'DEC', 'ANNUAL', 'Jan-Feb',
       'Mar-May', 'Jun-Sep', 'Oct-Dec'],
      dtype='object')
```

In [43]:
```
1 data['STATE_UT_NAME'].value_counts()
```

Out[43]:
```
STATE_UT_NAME
UTTAR PRADESH                  71
MADHYA PRADESH                 50
BIHAR                          38
MAHARASHTRA                    35
RAJASTHAN                      33
TAMIL NADU                     32
KARNATAKA                      30
ORISSA                         30
ASSAM                          27
GUJARAT                        26
JHARKHAND                      24
ANDHRA PRADESH                 23
JAMMU AND KASHMIR              22
HARYANA                        21
PUNJAB                         20
WEST BENGAL                    19
CHATISGARH                     18
ARUNACHAL PRADESH              16
KERALA                         14
UTTARANCHAL                    13
HIMACHAL                       12
NAGALAND                       11
MIZORAM                         9
MANIPUR                         9
DELHI                           9
MEGHALAYA                       7
SIKKIM                          4
TRIPURA                         4
PONDICHERRY                     4
ANDAMAN And NICOBAR ISLANDS     3
GOA                             2
DAMAN AND DUI                   2
DADAR NAGAR HAVELI              1
CHANDIGARH                      1
LAKSHADWEEP                     1
Name: count, dtype: int64
```

In [44]:
```
t = {'STATE_UT_NAME':{'UTTAR PRADESH':1,
                      'MADHYA PRADESH':2,
                      'BIHAR':3,
                      'MAHARASHTRA':4,
                      'RAJASTHAN':5,
                      'TAMIL NADU':6,
                      'KARNATAKA':7,
                      'ORISSA':8,
                      'ASSAM':9,
                      'GUJARAT':10,
                      'JHARKHAND':11,
                      'ANDHRA PRADESH':12,
                      'JAMMU AND KASHMIR':13,
                      'HARYANA':14,
                      'PUNJAB':15,
                      'WEST BENGAL':16,
                      'CHATISGARH':17,
                      'ARUNACHAL PRADESH':18,
                      'KERALA':19,
                      'UTTARANCHAL':20,
                      'HIMACHAL':21,
                      'NAGALAND':22,
                      'MIZORAM':23,
                      'MANIPUR':24,
                      'DELHI':25,
                      'MEGHALAYA':26,
                      'SIKKIM':27,
                      'TRIPURA':28,
                      'PONDICHERRY':29,
                      'ANDAMAN And NICOBAR ISLANDS':30,
                      'GOA':31,
                      'DAMAN AND DUI':32,
                      'DADAR NAGAR HAVELI':33,
                      'CHANDIGARH':34,
                      'LAKSHADWEEP':35}}
data = data.replace(t)
data
```

Out[44]:

	STATE_UT_NAME	DISTRICT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	Jan-Feb
0	30	NICOBAR	107.3	57.9	65.2	117.0	358.5	295.5	285.0	271.9	354.8	326.0	315.2	250.9	2805.2	165.2
1	30	SOUTH ANDAMAN	43.7	26.0	18.6	90.5	374.4	457.2	421.3	423.1	455.6	301.2	275.8	128.3	3015.7	69.7
2	30	N & M ANDAMAN	32.7	15.9	8.6	53.4	343.6	503.3	465.4	460.9	454.8	276.1	198.6	100.0	2913.3	48.6
3	18	LOHIT	42.2	80.8	176.4	358.5	306.4	447.0	660.1	427.8	313.6	167.1	34.1	29.8	3043.8	123.0
4	18	EAST SIANG	33.3	79.5	105.9	216.5	323.0	738.3	990.9	711.2	568.0	206.9	29.5	31.7	4034.7	112.8
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
636	19	IDUKKI	13.4	22.1	43.6	150.4	232.6	651.6	788.9	527.3	308.4	343.2	172.9	48.1	3302.5	35.5
637	19	KASARGOD	2.3	1.0	8.4	46.9	217.6	999.6	1108.5	636.3	263.1	234.9	84.6	18.4	3621.6	3.3
638	19	PATHANAMTHITTA	19.8	45.2	73.9	184.9	294.7	556.9	539.9	352.7	266.2	359.4	213.5	51.3	2958.4	65.0
639	19	WAYANAD	4.8	8.3	17.5	83.3	174.6	698.1	1110.4	592.9	230.7	213.1	93.6	25.8	3253.1	13.1
640	35	LAKSHADWEEP	20.8	14.7	11.8	48.9	171.7	330.2	287.7	217.5	163.1	157.1	117.7	58.8	1600.0	35.5

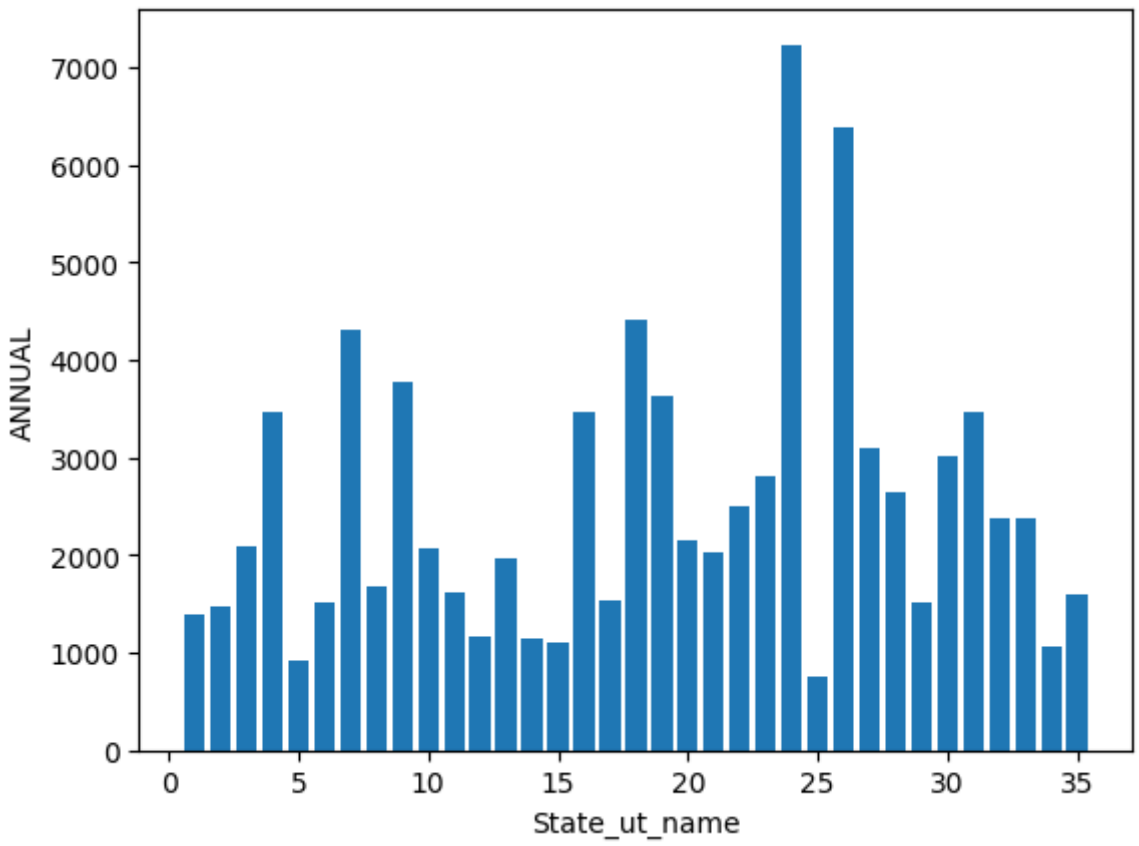
641 rows × 19 columns

In [45]:
```
data['DISTRICT'].value_counts()
```

Out[45]:
```
DISTRICT
BIJAPUR        2
BILASPUR       2
AURANGABAD     2
HAMIRPUR       2
NICOBAR        1
              ..
GONDA          1
GORAKHPUR      1
HARDOI         1
JAUNPUR        1
LAKSHADWEEP    1
Name: count, Length: 637, dtype: int64
```

In [46]:
```
import matplotlib.pyplot as plt
import seaborn as sns
```

In [47]:
```
plt.bar(data['STATE_UT_NAME'],data['ANNUAL'])
plt.xlabel("State_ut_name")
plt.ylabel("ANNUAL")
plt.show()
```



In [59]:
```
x=data[['STATE_UT_NAME', 'JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN',
       'JUL', 'AUG', 'SEP', 'OCT', 'NOV', 'DEC', 'Jan-Feb',
       'Mar-May', 'Jun-Sep', 'Oct-Dec']]
y=data[['ANNUAL']]
```

In [60]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
```

LInearRegression

In [61]:
```
from sklearn.linear_model import LinearRegression
lr=LinearRegression()
lr.fit(x_train,y_train)
print(lr.score(x_test,y_test))
print(lr.score(x_train,y_train))
```

```
1.0
1.0
```

Ridge, Lasso,RidgeCV and LassoCV

In [62]:
```
from sklearn.linear_model import Lasso,Ridge,LassoCV,RidgeCV
```

In [63]:
```
ridge=Ridge(alpha=20)
ridge.fit(x_train,y_train)
print(ridge.score(x_test,y_test))
print(ridge.score(x_train,y_train))
```

```
0.9999999999983411
0.9999999999983038
```

In [64]:
```
lasso=Lasso(alpha=20)
lasso.fit(x_train,y_train)
print(lasso.score(x_test,y_test))
print(lasso.score(x_train,y_train))
```

```
0.9999966231147088
0.9999979052675522
```

In [65]:
```
ridge_cv=RidgeCV(alphas=[20,30,40,50])
ridge_cv.fit(x_train,y_train)
print(ridge_cv.score(x_test,y_test))
print(ridge_cv.score(x_train,y_train))
```

```
0.9999999999983404
0.9999999999983021
```

In [66]:
```
lasso_cv=LassoCV(alphas=[20,40,60,80,100])
lasso_cv.fit(x_train,y_train)
print(lasso_cv.score(x_test,y_test))
print(lasso_cv.score(x_train,y_train))
```

```
0.9999966231147088
0.9999979052675522
```

ElasticNet

In [67]:
```
from sklearn.linear_model import ElasticNet
en = ElasticNet()
en.fit(x_train,y_train)
print(en.score(x_test,y_test))
print(en.score(x_train,y_train))
```

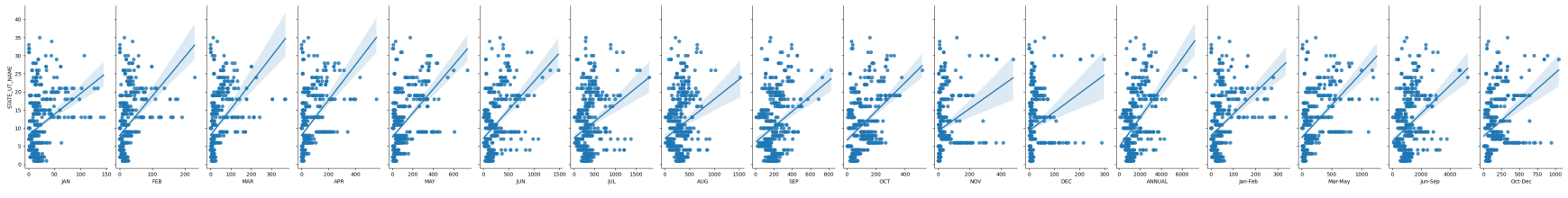
```
0.9999997350849389
0.9999997754503391
```

In [68]:
```
print(en.coef_)
print(en.intercept_)
```

```
[ 0.          3.98877046  4.06401905  2.85788025  2.84060681  2.8482631
  0.95094543  0.95238712  0.95190578  0.95118891 -0.19115325 -0.20630732
 -0.16499712 -3.03943597 -1.84734926  0.04822758  1.19302125]
[0.1604596]
```

In [71]:
```
sns.pairplot(data,x_vars=['JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN',
       'JUL', 'AUG', 'SEP', 'OCT', 'NOV', 'DEC', 'ANNUAL', 'Jan-Feb',
       'Mar-May', 'Jun-Sep', 'Oct-Dec'],y_vars=['STATE_UT_NAME'],height=5,aspect=0.5,kind='reg')
```

Out[71]: <seaborn.axisgrid.PairGrid at 0x16f5a554430>



Conclusion:-

Annually Manipur got more rainfall compared to all other states

In [ ]:
```

```