

Importing Files

```
In [1]: import pandas as pd
```

```
In [2]: d=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_March_2022.csv")
d
```

Out[2]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-03-01	2022	3	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-03-02	2022	3	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-03-03	2022	3	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-03-04	2022	3	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-03-05	2022	3	NaN	NRSC VIC MODEL
...
22718	West Bengal	Purulia	2022-03-27	2022	3	11.567757	NRSC VIC MODEL
22719	West Bengal	Purulia	2022-03-28	2022	3	11.382254	NRSC VIC MODEL
22720	West Bengal	Purulia	2022-03-29	2022	3	11.209592	NRSC VIC MODEL
22721	West Bengal	Purulia	2022-03-30	2022	3	11.054024	NRSC VIC MODEL
22722	West Bengal	Purulia	2022-03-31	2022	3	10.891377	NRSC VIC MODEL

22723 rows × 7 columns

```
In [3]: march_22=d
```

```
In [ ]:
```

```
In [ ]:
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```
In [ ]:
```

Statistical Summary

In [4]: `march_22.describe()`

	Year	Month	Avg_smlvl_at15cm
count	22723.0	22723.0	22599.000000
mean	2022.0	3.0	14.007021
std	0.0	0.0	4.603443
min	2022.0	3.0	0.062412
25%	2022.0	3.0	10.836027
50%	2022.0	3.0	14.001695
75%	2022.0	3.0	17.004312
max	2022.0	3.0	30.303639

In [5]: `march_22.info`

```
Out[5]: <bound method DataFrame.info of
0    Andaman & Nicobar  Nicobars  2022-03-01  2022      3      NaN
1    Andaman & Nicobar  Nicobars  2022-03-02  2022      3      NaN
2    Andaman & Nicobar  Nicobars  2022-03-03  2022      3      NaN
3    Andaman & Nicobar  Nicobars  2022-03-04  2022      3      NaN
4    Andaman & Nicobar  Nicobars  2022-03-05  2022      3      NaN
...
...      ...      ...      ...
22718    West Bengal    Purulia  2022-03-27  2022      3  11.567757
22719    West Bengal    Purulia  2022-03-28  2022      3  11.382254
22720    West Bengal    Purulia  2022-03-29  2022      3  11.209592
22721    West Bengal    Purulia  2022-03-30  2022      3  11.054024
22722    West Bengal    Purulia  2022-03-31  2022      3  10.891377
Agency_name
0    NRSC VIC MODEL
1    NRSC VIC MODEL
2    NRSC VIC MODEL
3    NRSC VIC MODEL
4    NRSC VIC MODEL
...
...
22718  NRSC VIC MODEL
22719  NRSC VIC MODEL
22720  NRSC VIC MODEL
22721  NRSC VIC MODEL
22722  NRSC VIC MODEL
[22723 rows x 7 columns]>
```

In []:

In []:

In []:

Handling missing values

In [6]: `march_22.isnull().sum()`

```
Out[6]: State          0  
District       0  
Date           0  
Year           0  
Month          0  
Avg_smlvl_at15cm    124  
Agency_name     0  
dtype: int64
```

```
In [7]: march_22.isnull()
```

```
Out[7]:   State  District  Date  Year  Month  Avg_smlvl_at15cm  Agency_name  
0      False    False  False  False  False        True        False  
1      False    False  False  False  False        True        False  
2      False    False  False  False  False        True        False  
3      False    False  False  False  False        True        False  
4      False    False  False  False  False        True        False  
...     ...     ...     ...     ...     ...     ...     ...  
22718  False    False  False  False  False        False       False  
22719  False    False  False  False  False        False       False  
22720  False    False  False  False  False        False       False  
22721  False    False  False  False  False        False       False  
22722  False    False  False  False  False        False       False
```

22723 rows × 7 columns

```
In [8]: march_22=march_22.dropna()  
march_22
```

Out[8]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
93	Andhra Pradesh	Anantapur	2022-03-08	2022	3	15.222117	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-03-23	2022	3	16.261184	NRSC VIC MODEL
95	Andhra Pradesh	Anantapur	2022-03-01	2022	3	15.596499	NRSC VIC MODEL
96	Andhra Pradesh	Anantapur	2022-03-02	2022	3	15.532565	NRSC VIC MODEL
97	Andhra Pradesh	Anantapur	2022-03-03	2022	3	15.475746	NRSC VIC MODEL
...
22718	West Bengal	Purulia	2022-03-27	2022	3	11.567757	NRSC VIC MODEL
22719	West Bengal	Purulia	2022-03-28	2022	3	11.382254	NRSC VIC MODEL
22720	West Bengal	Purulia	2022-03-29	2022	3	11.209592	NRSC VIC MODEL
22721	West Bengal	Purulia	2022-03-30	2022	3	11.054024	NRSC VIC MODEL
22722	West Bengal	Purulia	2022-03-31	2022	3	10.891377	NRSC VIC MODEL

22599 rows × 7 columns

In [9]: `march_22.isnull().sum()`

out[9]:

In []:

In []:

In []:

Grouping

```
In [10]: grp=march_22.groupby("District")
grp.first()
```

Out[10]:

	State	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
District						
24 Paraganas North	West Bengal	2022-03-01	2022	3	18.093207	NRSC VIC MODEL
24 Paraganas South	West Bengal	2022-03-01	2022	3	12.023932	NRSC VIC MODEL
Adilabad	Telangana	2022-03-01	2022	3	22.136312	NRSC VIC MODEL
Agar Malwa	Madhya Pradesh	2022-03-01	2022	3	22.164867	NRSC VIC MODEL
Agra	Uttar Pradesh	2022-03-01	2022	3	9.183056	NRSC VIC MODEL
...
Yadgir	Karnataka	2022-03-01	2022	3	14.826457	NRSC VIC MODEL
Yamunanagar	Haryana	2022-03-01	2022	3	17.566128	NRSC VIC MODEL
Yanam	Puducherry	2022-03-07	2022	3	2.098358	NRSC VIC MODEL
Yavatmal	Maharashtra	2022-03-01	2022	3	18.158048	NRSC VIC MODEL
Zunheboto	Nagaland	2022-03-09	2022	3	14.557435	NRSC VIC MODEL

725 rows × 6 columns

```
In [11]: yavatmal=grp.get_group("Yavatmal")
yavatmal
```

Out[11]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
12524	Maharashtra	Yavatmal	2022-03-01	2022	3	18.158048	NRSC VIC MODEL
12525	Maharashtra	Yavatmal	2022-03-02	2022	3	18.058843	NRSC VIC MODEL
12526	Maharashtra	Yavatmal	2022-03-03	2022	3	17.967880	NRSC VIC MODEL
12527	Maharashtra	Yavatmal	2022-03-04	2022	3	17.885023	NRSC VIC MODEL
12528	Maharashtra	Yavatmal	2022-03-05	2022	3	17.806645	NRSC VIC MODEL
12529	Maharashtra	Yavatmal	2022-03-06	2022	3	17.722169	NRSC VIC MODEL
12530	Maharashtra	Yavatmal	2022-03-07	2022	3	17.639534	NRSC VIC MODEL
12531	Maharashtra	Yavatmal	2022-03-08	2022	3	17.560080	NRSC VIC MODEL
12532	Maharashtra	Yavatmal	2022-03-09	2022	3	17.479900	NRSC VIC MODEL
12533	Maharashtra	Yavatmal	2022-03-10	2022	3	17.410365	NRSC VIC MODEL
12534	Maharashtra	Yavatmal	2022-03-11	2022	3	17.335263	NRSC VIC MODEL
12535	Maharashtra	Yavatmal	2022-03-12	2022	3	17.285516	NRSC VIC MODEL
12536	Maharashtra	Yavatmal	2022-03-13	2022	3	17.212501	NRSC VIC MODEL
12537	Maharashtra	Yavatmal	2022-03-14	2022	3	17.143749	NRSC VIC MODEL
12538	Maharashtra	Yavatmal	2022-03-15	2022	3	17.069199	NRSC VIC MODEL
12539	Maharashtra	Yavatmal	2022-03-16	2022	3	16.994936	NRSC VIC MODEL
12540	Maharashtra	Yavatmal	2022-03-17	2022	3	16.920336	NRSC VIC MODEL
12541	Maharashtra	Yavatmal	2022-03-18	2022	3	16.852149	NRSC VIC MODEL
12542	Maharashtra	Yavatmal	2022-03-19	2022	3	16.778780	NRSC VIC MODEL
12543	Maharashtra	Yavatmal	2022-03-20	2022	3	16.727766	NRSC VIC MODEL
12544	Maharashtra	Yavatmal	2022-03-21	2022	3	16.665745	NRSC VIC MODEL
12545	Maharashtra	Yavatmal	2022-03-22	2022	3	16.606538	NRSC VIC MODEL
12546	Maharashtra	Yavatmal	2022-03-23	2022	3	16.539087	NRSC VIC MODEL
12547	Maharashtra	Yavatmal	2022-03-24	2022	3	16.472412	NRSC VIC MODEL
12548	Maharashtra	Yavatmal	2022-03-25	2022	3	16.461139	NRSC VIC MODEL

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
12549	Maharashtra	Yavatmal	2022-03-26	2022	3	16.947306	NRSC VIC MODEL
12550	Maharashtra	Yavatmal	2022-03-27	2022	3	16.849483	NRSC VIC MODEL
12551	Maharashtra	Yavatmal	2022-03-28	2022	3	16.759820	NRSC VIC MODEL
12552	Maharashtra	Yavatmal	2022-03-29	2022	3	16.668719	NRSC VIC MODEL
12553	Maharashtra	Yavatmal	2022-03-30	2022	3	16.584833	NRSC VIC MODEL
12554	Maharashtra	Yavatmal	2022-03-31	2022	3	16.508237	NRSC VIC MODEL

```
In [12]: grp2=march_22.groupby(["State","District"])
grp2.first()
```

Out[12]:

State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
Andhra Pradesh	Anantapur	2022-03-08	2022	3	15.222117	NRSC VIC MODEL
	Chittoor	2022-03-01	2022	3	16.468657	NRSC VIC MODEL
	East Godavari	2022-03-01	2022	3	15.436604	NRSC VIC MODEL
	Guntur	2022-03-01	2022	3	17.780424	NRSC VIC MODEL
	Krishna	2022-03-12	2022	3	13.486988	NRSC VIC MODEL
...						
West Bengal	Murshidabad	2022-03-01	2022	3	24.736332	NRSC VIC MODEL
	Nadia	2022-03-01	2022	3	19.776005	NRSC VIC MODEL
	Paschim Bardhaman	2022-03-01	2022	3	14.203483	NRSC VIC MODEL
	Purba Bardhaman	2022-03-01	2022	3	30.099424	NRSC VIC MODEL
	Purulia	2022-03-11	2022	3	16.360350	NRSC VIC MODEL

729 rows × 5 columns

In []:

In []:

In []:

Pivot table

```
In [13]: pivot=pd.pivot_table(march_22.reset_index(),
                           index='Date', columns='District', values='Avg_smlvl_at15cm'
                           )
pivot
```

Out[13]:

District	24 Paraganas North	24 Paraganas South	Adilabad	Agar Malwa	Agra	Ahmadabad	Ahmednagar	Aizawl	Ajmer	Akola	...	West Singhbhum
Date												
2022-03-01	18.093207	12.023932	22.136312	22.164867	9.183056	10.644901	13.646121	14.574315	11.996285	16.176685	...	25.765379
2022-03-02	17.383939	11.613475	22.022526	22.106983	9.036208	10.602013	13.624088	14.401421	11.922852	16.144756	...	26.270067
2022-03-03	16.767945	11.210786	21.914526	22.048864	8.896687	10.561662	13.587167	14.233276	11.875528	16.113786	...	25.812651
2022-03-04	16.225726	10.834384	21.809106	21.995140	8.770255	10.522221	13.572899	14.071980	11.807872	16.082192	...	25.446829
2022-03-05	15.720867	10.485812	21.714067	21.932063	8.660280	10.488102	13.544659	13.914081	11.735271	16.052671	...	25.123607
2022-03-06	15.255798	10.158000	21.617665	21.872937	8.552400	10.446628	13.516193	13.760165	11.666935	16.020419	...	24.834188
2022-03-07	14.827179	9.858837	21.516710	21.812585	8.451760	10.409878	13.497297	13.593857	11.595736	15.988347	...	24.563049
2022-03-08	14.422810	9.574426	21.418471	22.078417	8.358159	10.373636	13.475618	13.440907	11.529669	16.056576	...	24.301641
2022-03-09	14.018975	9.291591	21.319831	22.018955	8.272584	10.336887	13.576715	13.289471	12.668022	16.077291	...	24.060520
2022-03-10	13.643163	9.031622	21.228821	22.985579	8.208798	10.302918	13.540045	13.150789	12.983097	16.211769	...	23.825884
2022-03-11	13.296525	8.800352	21.134420	22.890057	8.148756	10.267773	13.534479	13.015407	12.850158	16.169055	...	23.603953
2022-03-12	12.967776	8.578712	21.092443	22.794850	8.081650	10.230385	14.360879	12.887266	12.723166	16.128530	...	23.395123
2022-03-13	12.653385	8.377790	20.992540	22.705428	8.023197	10.195155	14.300397	12.766065	12.593648	16.086340	...	23.188638
2022-03-14	13.115354	9.772945	20.899429	22.607010	7.969711	10.158515	14.176252	12.725305	12.466158	16.046792	...	22.985928

District	24 Paraganas North	24 Paraganas South	Adilabad	Agar Malwa	Agra	Ahmadabad	Ahmednagar	Aizawl	Ajmer	Akola	...	West Singhbhum
Date												
2022-03-15	12.803485	9.438898	20.811692	22.513644	7.921521	10.122914	14.085683	12.617675	12.344112	16.006431	...	22.797472
2022-03-16	12.483441	9.139416	20.719242	22.419287	7.878865	10.091088	13.986263	12.506718	12.221532	15.962542	...	22.607508
2022-03-17	12.189370	8.905976	20.619132	22.326462	7.848053	10.055402	13.880856	12.404434	12.102593	15.919317	...	22.432204
2022-03-18	11.922426	8.662732	20.523906	22.232660	7.813815	10.025677	13.787677	12.306150	11.990619	15.877949	...	22.266454
2022-03-19	11.667297	8.438784	20.441256	22.142315	7.789284	9.995392	13.749743	12.215315	11.884513	15.836562	...	22.104596
2022-03-20	11.436240	8.240512	20.389538	22.053944	7.764649	9.966589	13.680418	12.129079	11.781071	15.799929	...	21.939449
2022-03-21	11.223199	8.054232	20.333070	21.967339	7.739885	9.938138	13.655447	12.042098	11.678891	15.769242	...	21.802464
2022-03-22	11.021481	7.889633	20.246940	21.878450	7.718265	9.909442	13.619204	11.969449	11.581738	15.736572	...	21.669782
2022-03-23	10.836680	7.744630	20.174632	21.795730	7.700218	9.884118	13.575494	11.890479	11.488631	15.703148	...	21.539575
2022-03-24	10.723636	7.613097	20.090174	21.722573	7.679200	9.867286	13.519840	11.818922	11.396849	15.673150	...	21.402502
2022-03-25	10.592147	7.498240	20.018881	21.683049	7.659997	9.837704	13.569064	11.744799	11.311681	15.643579	...	21.273082
2022-03-26	11.332149	8.134867	19.990343	21.603987	7.646430	9.807932	13.511264	11.685602	11.224039	15.840628	...	21.624624
2022-03-27	11.542074	8.778767	19.909803	21.519161	7.634071	9.779889	13.453762	14.465283	11.141100	15.796282	...	21.480479
2022-03-28	11.294834	8.500301	19.821576	21.424974	7.619615	9.752413	13.395422	14.666682	11.055523	15.740945	...	21.338787

District	24 Paraganas North	24 Paraganas South	Adilabad	Agar Malwa	Agra	Ahmadabad	Ahmednagar	Aizawl	Ajmer	Akola	...	West Singhbhum
Date												
2022-03-29	11.068395	8.273431	19.729350	21.334854	7.605232	9.723598	13.341664	15.001763	10.970238	15.689398	...	21.200846
2022-03-30	10.879060	8.080106	19.641558	21.248799	7.596369	9.694765	13.291398	14.790585	10.885262	15.635749	...	21.065339
2022-03-31	10.686698	7.913255	19.556636	21.160208	7.586811	9.714273	13.247979	14.620216	10.802343	15.590070	...	20.947036

31 rows × 725 columns

In []:

In []:

In []:

Plot

```
In [14]: import plotly.express as px

fig = px.line(yavatmal, x='Date', y="Avg_smlvl_at15cm")
fig.show()
```



In []:

In []:

In []:

```
In [15]: uni=grp["District"].unique()  
uni
```

```
Out[15]: District
24 Paraganas North      [24 Paraganas North]
24 Paraganas South      [24 Paraganas South]
Adilabad                  [Adilabad]
Agar Malwa                [Agar Malwa]
Agra                      [Agra]
...
Yadgir                     [Yadgir]
Yamunanagar               [Yamunanagar]
Yanam                      [Yanam]
Yavatmal                   [Yavatmal]
Zunheboto                  [Zunheboto]
Name: District, Length: 725, dtype: object
```

In []:

In []:

In []:

Outlier analysis

```
In [16]: highval=march_22[march_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=march_22[march_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [17]: val0=march_22[march_22["State"]==0]
print(val0.count())

val0s=march_22[march_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [ ]:
```

```
In [ ]:
```

Statewise and districtwise df

```
In [18]: march_22_d={}
for name, group in march_22.groupby('District'):
    march_22_d[str(name)] = group
```

```
In [19]: #march_22_d
```

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

State names and district names

```
In [20]: dist_names=list(march_22_d.keys())
dist_names
```

```
Out[20]: ['24 Paraganas North',
 '24 Paraganas South',
 'Adilabad',
 'Agar Malwa',
 'Agra',
 'Ahmadabad',
 'Ahmednagar',
 'Aizawl',
 'Ajmer',
 'Akola',
 'Alappuzha',
 'Aligarh',
 'Alipurduar',
 'Alirajpur',
 'Almora',
 'Alwar',
 'Ambala',
 'Ambedkar Nagar',
 'Amethi',
 'Amravati',
 'Amreli',
 'Amritsar',
 'Amroha',
 'Anand',
 'Anantapur',
 'Anantnag',
 'Anjaw',
 'Anugul',
 'Anuppur',
 'Araria',
 'Ariyalur',
 'Arvalli',
 'Arwal',
 'Ashoknagar',
 'Auraiya',
 'Aurangabad',
 'Ayodhya',
 'Azamgarh',
 'Bagalkote',
 'Bageshwar',
 'Baghpat',
 'Bahraich',
 'Baksa',
 'Balaghat',
 'Balangir',
```

'Baleshwar',
'Ballari',
'Ballia',
'Balod',
'Baloda Bazar',
'Balrampur',
'Banas Kantha',
'Banda',
'Bandipora',
'Banka',
'Bankura',
'Banswara',
'Barabanki',
'Baramulla',
'Baran',
'Bareilly',
'Bargarh',
'Barmer',
'Barnala',
'Barpeta',
'Barwani',
'Bastar',
'Basti',
'Bathinda',
'Beed',
'Begusarai',
'Belagavi',
'Bemetara',
'Bengaluru Rural',
'Bengaluru Urban',
'Betul',
'Bhadohi',
'Bhadradri Kothagudem',
'Bhadrak',
'Bhagalpur',
'Bhandara',
'Bharatpur',
'Bharuch',
'Bhavnagar',
'Bhilwara',
'Bhind',
'Bhiwani',
'Bhojpur',
'Bhopal',
'Bidar',

'Bijapur',
'Bijnor',
'Bikaner',
'Bilapur',
'Bilaspur',
'Birbhum',
'Bishnupur',
'Biswanath',
'Bokaro',
'Bongaigaon',
'Botad',
'Boudh',
'Budaun',
'Budgam',
'Bulandshahr',
'Buldhana',
'Bundi',
'Burhanpur',
'Buxar',
'Cachar',
'Central',
'Chamarajanagara',
'Chamba',
'Chamoli',
'Champawat',
'Champhai',
'Chandauli',
'Chandel',
'Chandigarh',
'Chandrapur',
'Changlang',
'Charaideo',
'Charki Dadri',
'Chatra',
'Chengalpattu',
'Chennai',
'Chhatarpur',
'Chhindwara',
'Chhotaudepur',
'Chikkaballapura',
'Chikkamagaluru',
'Chirang',
'Chitradurga',
'Chitrakoot',
'Chittoor',

'Chittorgarh',
'Churachandpur',
'Churu',
'Coimbatore',
'Coochbehar',
'Cuddalore',
'Cuttack',
'Dadra And Nagar Haveli',
'Dakshina Kannada',
'Daman',
'Damoh',
'Dang',
'Dantewada',
'Darbhanga',
'Darjeeling',
'Darrang',
'Datia',
'Dausa',
'Davangere',
'Dehradun',
'Deogarh',
'Deoghar',
'Deoria',
'Devbhumi Dwarka',
'Dewas',
'Dhalai',
'Dhamtari',
'Dhanbad',
'Dhar',
'Dharmapuri',
'Dharwad',
'Dhemaji',
'Dhenkanal',
'Dholpur',
'Dhubri',
'Dhule',
'Dibang Valley',
'Dibrugarh',
'Dima Hasao',
'Dimapur',
'Dinajpur Dakshin',
'Dinajpur Uttar',
'Dindigul',
'Dindori',
'Diu',

'Doda',
'Dohad',
'Dumka',
'Dungarpur',
'Durg',
'East',
'East District',
'East Garo Hills',
'East Godavari',
'East Jaintia Hills',
'East Kameng',
'East Khasi Hills',
'East Nimar',
'East Siang',
'East Singhbum',
'Ernakulam',
'Erode',
'Etah',
'Etawah',
'Faridabad',
'Faridkot',
'Farrukhabad',
'Fatehabad',
'Fatehgarh Sahib',
'Fatehpur',
'Fazilka',
'Firozabad',
'Firozepur',
'Gadag',
'Gadchiroli',
'Gajapati',
'Ganderbal',
'Gandhinagar',
'Ganganagar',
'Ganjam',
'Garhwa',
'Gariyaband',
'Gaurella Pendra Marwahi',
'Gautam Buddha Nagar',
'Gaya',
'Ghaziabad',
'Ghazipur',
'Gir Somnath',
'Giridih',
'Goalpara',

'Godda',
'Golaghat',
'Gomati',
'Gonda',
'Gondia',
'Gopalganj',
'Gorakhpur',
'Gumla',
'Guna',
'Guntur',
'Gurdaspur',
'Gurugram',
'Gwalior',
'Hailakandi',
'Hamirpur',
'Hanumangarh',
'Hapur',
'Harda',
'Hardoi',
'Haridwar',
'Hassan',
'Hathras',
'Haveri',
'Hazaribagh',
'Hingoli',
'Hisar',
'Hojai',
'Hooghly',
'Hoshangabad',
'Hoshiarpur',
'Howrah',
'Hyderabad',
'Idukki',
'Imphal East',
'Imphal West',
'Indore',
'Jabalpur',
'Jagatsinghpur',
'Jagital',
'Jaipur',
'Jaisalmer',
'Jajapur',
'Jalandhar',
'Jalaun',
'Jalgaon',

'Jalna',
'Jalore',
'Jalpaiguri',
'Jammu',
'Jamnagar',
'Jamtara',
'Jamui',
'Jangoan',
'Janjgir-Champa',
'Jashpur',
'Jaunpur',
'Jayashankar Bhupalapally',
'Jehanabad',
'Jhabua',
'Jhajjar',
'Jhalawar',
'Jhansi',
'Jhargram',
'Jharsuguda',
'Jhunjhunu',
'Jind',
'Jiribam',
'Jodhpur',
'Jogulamba Gadwal',
'Jorhat',
'Junagadh',
'Kabirdham',
'Kachchh',
'Kaimur (Bhabua)',
'Kaithal',
'Kakching',
'Kalaburagi',
'Kalahandi',
'Kalimpong',
'Kallakurichi',
'Kamareddy',
'Kamjong',
'Kamle',
'Kamrup',
'Kamrup Metro',
'Kanchipuram',
'Kandhamal',
'Kangpokpi',
'Kangra',
'Kanker',

'Kannauj',
'Kanniyakumari',
'Kannur',
'Kanpur Dehat',
'Kanpur Nagar',
'Kapurthala',
'Karaikal',
'Karauli',
'Karbi Anglong',
'Kargil',
'Karimganj',
'Karimnagar',
'Karnal',
'Karur',
'Kasaragod',
'Kasganj',
'Kathua',
'Katihar',
'Katni',
'Kaushambi',
'Kendrapara',
'Kendujhar',
'Khagaria',
'Khammam',
'Khargone',
'Kheda',
'Kheri',
'Khordha',
'Khowai',
'Khunti',
'Kinnaur',
'Kiphire',
'Kishanganj',
'Kishtwar',
'Kodagu',
'Koderma',
'Kohima',
'Kokrajhar',
'Kolar',
'Kolasib',
'Kolhapur',
'Kolkata',
'Kollam',
'Kondagaon',
'Koppal',

'Koraput',
'Korba',
'Korea',
'Kota',
'Kottayam',
'Kozhikode',
'Kra Daadi',
'Krishna',
'Krishnagiri',
'Kulgam',
'Kullu',
'Kumuram Bheem Asifabad',
'Kupwara',
'Kurnool',
'Kurukshtetra',
'Kurung Kumey',
'Kushi Nagar',
'Lahul & Spiti',
'Lakhimpur',
'Lakhisarai',
'Lalitpur',
'Latehar',
'Latur',
'Lawngtlai',
'Leh Ladakh',
'Leparada',
'Lohardaga',
'Lohit',
'Longding',
'Longleng',
'Lower Dibang Valley',
'Lower Siang',
'Lower Subansiri',
'Lucknow',
'Ludhiana',
'Lunglei',
'Madhepura',
'Madhubani',
'Madurai',
'Mahabubabad',
'Mahabubnagar',
'Maharajganj',
'Mahasamund',
'Mahe',
'Mahendragarh',

'Mahesana',
'Mahisagar',
'Mahoba',
'Mainpuri',
'Majuli',
'Malappuram',
'Maldah',
'Malkangiri',
'Mamit',
'Mancherial',
'Mandi',
'Mandla',
'Mandsaur',
'Mandyā',
'Mansa',
'Marigaon',
'Mathura',
'Mau',
'Mayurbhanj',
'Medak',
'Medchal Malkajgiri',
'Medinipur East',
'Medinipur West',
'Meerut',
'Mirpur',
'Mirzapur',
'Moga',
'Mokokchung',
'Mon',
'Moradabad',
'Morbi',
'Morena',
'Mulugu',
'Mumbai City',
'Mumbai Suburban',
'Mungeli',
'Munger',
'Murshidabad',
'Muzaffarabad',
'Muzaffarnagar',
'Muzaffarpur',
'Mysuru',
'Nabarangpur',
'Nadia',
'Nagaon',

'Nagapattinam',
'Nagarkurnool',
'Nagaur',
'Nagpur',
'Nainital',
'Nalanda',
'Nalbari',
'Nalgonda',
'Namakkal',
'Namsai',
'Nanded',
'Nandurbar',
'Narayanpet',
'Narayanpur',
'Narmada',
'Narsinghpur',
'Nashik',
'Navsari',
'Nawada',
'Nayagarh',
'Neemuch',
'New Delhi',
'Nirmal',
'Niwari',
'Nizamabad',
'Noney',
'North',
'North District',
'North East',
'North Garo Hills',
'North Goa',
'North Tripura',
'North West',
'Nuapada',
'Nuh',
'Osmanabad',
'Pakke Kessang',
'Pakur',
'Palakkad',
'Palamu',
'Palghar',
'Pali',
'Palwal',
'Panch Mahals',
'Panchkula',

'Panipat',
'Panna',
'Papum Pare',
'Parbhani',
'Paschim Bardhaman',
'Pashchim Champaran',
'Patan',
'Pathanamthitta',
'Pathankot',
'Patiala',
'Patna',
'Pauri Garhwal',
'Peddapalli',
'Perambalur',
'Peren',
'Phek',
'Pherzawl',
'Pilibhit',
'Pithoragarh',
'Pondicherry',
'Poonch',
'Porbandar',
'Prakasam',
'Pratapgarh',
'Prayagraj',
'Pudukkottai',
'Pulwama',
'Pune',
'Purba Bardhaman',
'Purbi Champaran',
'Puri',
'Purnia',
'Purulia',
'Rae Bareli',
'Raichur',
'Raigad',
'Raigarh',
'Raipur',
'Raisen',
'Rajanna Sircilla',
'Rajgarh',
'Rajkot',
'Rajnandgaon',
'Rajouri',
'Rajsamand',

'Ramanagara',
'Ramanathapuram',
'Ramban',
'Ramgarh',
'Rampur',
'Ranchi',
'Ranga Reddy',
'Ranipet',
'Ratlam',
'Ratnagiri',
'Rayagada',
'Reasi',
'Rewa',
'Rewari',
'Ri Bhoi',
'Rohtak',
'Rohtas',
'Rudra Prayag',
'Rupnagar',
'S.A.S Nagar',
'SPSR Nellore',
'Sabar Kantha',
'Sagar',
'Saharanpur',
'Saharsa',
'Sahebganj',
'Saiha',
'Salem',
'Samastipur',
'Samba',
'Sambalpur',
'Sambhal',
'Sangareddy',
'Sangli',
'Sangrur',
'Sant Kabeer Nagar',
'Saraikela Kharsawan',
'Saran',
'Satara',
'Satna',
'Sawai Madhopur',
'Sehore',
'Senapati',
'Seoni',
'Sepahijala',

'Serchhip',
'Shahdara',
'Shahdol',
'Shahid Bhagat Singh Nagar',
'Shahjahanpur',
'Shajapur',
'Shamli',
'Sheikhpura',
'Sheohar',
'Sheopur',
'Shi Yomi',
'Shimla',
'Shivamogga',
'Shivpuri',
'Shopian',
'Shravasti',
'Siang',
'Siddharth Nagar',
'Siddipet',
'Sidhi',
'Sikar',
'Simdega',
'Sindhudurg',
'Singrauli',
'Sirmaur',
'Sirohi',
'Sirsa',
'Sitamarhi',
'Sitapur',
'Sivaganga',
'Sivasagar',
'Siwan',
'Solan',
'Solapur',
'Sonbhadra',
'Sonepur',
'Sonipat',
'Sonitpur',
'South',
'South District',
'South East',
'South Garo Hills',
'South Goa',
'South Salmara Mancachar',
'South Tripura',

'South West',
'South West Garo Hills',
'South West Khasi Hills',
'Sri Muktsar Sahib',
'Srikakulam',
'Srinagar',
'Sukma',
'Sultanpur',
'Sundargarh',
'Supaul',
'Surajpur',
'Surat',
'Surendranagar',
'Surguja',
'Suryapet',
'Tamenglong',
'Tapi',
'Tarn Taran',
'Tawang',
'Tehri Garhwal',
'Tengnoupal',
'Tenkasi',
'Thane',
'Thanjavur',
'The Nilgiris',
'Theni',
'Thiruvallur',
'Thiruvananthapuram',
'Thiruvarur',
'Thoubal',
'Thrissur',
'Tikamgarh',
'Tinsukia',
'Tirap',
'Tiruchirappalli',
'Tirunelveli',
'Tirupathur',
'Tiruppur',
'Tiruvannamalai',
'Tonk',
'Tuensang',
'Tumakuru',
'Tuticorin',
'Udaipur',
'Udaguri',

'Udam Singh Nagar',
'Udhampur',
'Udupi',
'Ujjain',
'Ukhrul',
'Umaria',
'Una',
'Unakoti',
'Unnao',
'Upper Siang',
'Upper Subansiri',
'Uttar Kashi',
'Uttara Kannada',
'Vadodara',
'Vaishali',
'Valsad',
'Varanasi',
'Vellore',
'Vidisha',
'Vijayapura',
'Vikarabad',
'Villupuram',
'Virudhunagar',
'Visakhapatnam',
'Vizianagaram',
'Wanaparthy',
'Warangal Rural',
'Warangal Urban',
'Wardha',
'Washim',
'Wayanad',
'West',
'West District',
'West Garo Hills',
'West Godavari',
'West Jaintia Hills',
'West Kameng',
'West Karbi Anglong',
'West Khasi Hills',
'West Siang',
'West Singhbhum',
'West Tripura',
'Wokha',
'Y.S.R.',
'Yadadri Bhuvanagiri',

```
'Yadgir',
'Yamunanagar',
'Yanam',
'Yavatmal',
'Zunheboto']
```

```
In [21]: march_22_d['24 Paraganas North'].columns
```

```
Out[21]: Index(['State', 'District', 'Date', 'Year', 'Month', 'Avg_smlvl_at15cm',
       'Agency_name'],
       dtype='object')
```

```
In [22]: fig = px.line(march_22_d["24 Paraganas North"], x=march_22_d["24 Paraganas North"]["Date"], y=march_22_d["24 Paraganas North"])
fig.show()
```



In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [23]: jan_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_January_2022.csv")
jan_22
```

Out[23]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-01-03	2022	1	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-01-04	2022	1	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-01-05	2022	1	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-01-06	2022	1	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-01-07	2022	1	NaN	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-01-27	2022	1	20.527306	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-01-28	2022	1	20.103116	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-01-29	2022	1	19.667876	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-01-30	2022	1	19.232391	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-01-31	2022	1	18.804066	NRSC VIC MODEL

21990 rows × 7 columns

```
In [24]: jan_22.isnull().sum()
```

Out[24]:

State	0
District	0
Date	0
Year	0
Month	0
Avg_smlvl_at15cm	120
Agency_name	0
dtype: int64	

```
In [25]: jan_22=jan_22.dropna()
jan_22
```

Out[25]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
90	Andhra Pradesh	Anantapur	2022-01-07	2022	1	19.049744	NRSC VIC MODEL
91	Andhra Pradesh	Anantapur	2022-01-22	2022	1	17.582039	NRSC VIC MODEL
92	Andhra Pradesh	Anantapur	2022-01-01	2022	1	19.926819	NRSC VIC MODEL
93	Andhra Pradesh	Anantapur	2022-01-03	2022	1	19.610792	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-01-04	2022	1	19.468128	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-01-27	2022	1	20.527306	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-01-28	2022	1	20.103116	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-01-29	2022	1	19.667876	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-01-30	2022	1	19.232391	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-01-31	2022	1	18.804066	NRSC VIC MODEL

21870 rows × 7 columns

In [26]: `jan_22.isnull().sum()`

Out[26]:

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm    0
Agency_name     0
dtype: int64
```

In [27]: `highval=jan_22[jan_22["Avg_smlvl_at15cm"]>90]
print(highval.count())`

```
lessthan0=jan_22[jan_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [28]: val0=jan_22[jan_22["State"]==0]
print(val0.count())

val0s=jan_22[jan_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [29]: jan_22_d={}
for name, group in jan_22.groupby('District'):
    jan_22_d[str(name)] = group
```

```
In [30]: #jan_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [31]: feb_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_February_2022.csv")  
feb_22
```

Out[31]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-02-01	2022	2	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-02-02	2022	2	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-02-03	2022	2	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-02-04	2022	2	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-02-05	2022	2	NaN	NRSC VIC MODEL
...
20519	West Bengal	Purulia	2022-02-23	2022	2	15.644909	NRSC VIC MODEL
20520	West Bengal	Purulia	2022-02-25	2022	2	27.044811	NRSC VIC MODEL
20521	West Bengal	Purulia	2022-02-26	2022	2	25.296855	NRSC VIC MODEL
20522	West Bengal	Purulia	2022-02-27	2022	2	24.203563	NRSC VIC MODEL
20523	West Bengal	Purulia	2022-02-28	2022	2	23.667545	NRSC VIC MODEL

20524 rows × 7 columns

```
In [32]: feb_22.isnull().sum()
```

```
Out[32]: State      0  
District    0  
Date        0  
Year         0  
Month        0  
Avg_smlvl_at15cm 112  
Agency_name   0  
dtype: int64
```

```
In [33]: feb_22=feb_22.dropna()
```

```
In [34]: feb_22.isnull().sum()
```

```
Out[34]: State      0  
District    0  
Date        0  
Year         0  
Month        0  
Avg_smlvl_at15cm 0  
Agency_name   0  
dtype: int64
```

```
In [35]: highval=feb_22[feb_22["Avg_smlvl_at15cm"]>90]  
print(highval.count())
```

```
lessthan0=feb_22[feb_22["Avg_smlvl_at15cm"]<0]  
print(lessthan0.count())
```

```
State      0  
District    0  
Date        0  
Year         0  
Month        0  
Avg_smlvl_at15cm 0  
Agency_name   0  
dtype: int64  
State      0  
District    0  
Date        0  
Year         0  
Month        0  
Avg_smlvl_at15cm 0  
Agency_name   0  
dtype: int64
```

```
In [36]: val0=feb_22[feb_22["State"]==0]
print(val0.count())

val0s=feb_22[feb_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [37]: feb_22_d={}
for name, group in feb_22.groupby('District'):
    feb_22_d[str(name)] = group
```

```
In [38]: #feb_22_d
```

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [39]: apr_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_April_2022.csv")
apr_22
```

Out[39]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-04-01	2022	4	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-04-02	2022	4	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-04-03	2022	4	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-04-04	2022	4	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-04-05	2022	4	NaN	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-04-26	2022	4	11.096124	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-04-27	2022	4	10.894274	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-04-28	2022	4	10.704354	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-04-29	2022	4	10.537032	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-04-30	2022	4	10.594443	NRSC VIC MODEL

21990 rows × 7 columns

In [40]: `apr_22.isnull().sum()`

```
Out[40]: State      0
District    0
Date        0
Year         0
Month       0
Avg_smlvl_at15cm 120
Agency_name  0
dtype: int64
```

In [41]: `apr_22=apr_22.dropna()`
`apr_22`

Out[41]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
90	Andhra Pradesh	Anantapur	2022-04-07	2022	4	15.072492	NRSC VIC MODEL
91	Andhra Pradesh	Anantapur	2022-04-22	2022	4	17.787676	NRSC VIC MODEL
92	Andhra Pradesh	Anantapur	2022-04-01	2022	4	15.366367	NRSC VIC MODEL
93	Andhra Pradesh	Anantapur	2022-04-02	2022	4	15.343912	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-04-03	2022	4	15.280125	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-04-26	2022	4	11.096124	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-04-27	2022	4	10.894274	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-04-28	2022	4	10.704354	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-04-29	2022	4	10.537032	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-04-30	2022	4	10.594443	NRSC VIC MODEL

21870 rows × 7 columns

In [42]:

```
highval=apr_22[apr_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=apr_22[apr_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [43]: val0=apr_22[apr_22["State"]==0]
print(val0.count())

val0s=apr_22[apr_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [44]: apr_22_d={}
for name, group in apr_22.groupby('District'):
    apr_22_d[str(name)] = group

#apr_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [45]: may_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_May_2022.csv")
may_22
```

Out[45]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-05-02	2022	5	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-05-03	2022	5	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-05-04	2022	5	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-05-05	2022	5	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-05-06	2022	5	NaN	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-05-27	2022	5	22.774462	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-05-28	2022	5	21.921633	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-05-29	2022	5	20.970956	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-05-30	2022	5	20.881821	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-05-31	2022	5	19.856005	NRSC VIC MODEL

21990 rows × 7 columns

```
In [46]: may_22=may_22.dropna()
may_22
```

Out[46]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
90	Andhra Pradesh	Anantapur	2022-05-07	2022	5	19.113798	NRSC VIC MODEL
91	Andhra Pradesh	Anantapur	2022-05-23	2022	5	27.028225	NRSC VIC MODEL
92	Andhra Pradesh	Anantapur	2022-05-01	2022	5	17.603120	NRSC VIC MODEL
93	Andhra Pradesh	Anantapur	2022-05-02	2022	5	17.753316	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-05-03	2022	5	17.539594	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-05-27	2022	5	22.774462	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-05-28	2022	5	21.921633	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-05-29	2022	5	20.970956	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-05-30	2022	5	20.881821	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-05-31	2022	5	19.856005	NRSC VIC MODEL

21870 rows × 7 columns

```
In [47]: highval=may_22[may_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=may_22[may_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [48]: val0=may_22[may_22["State"]==0]
print(val0.count())

val0s=may_22[may_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [49]: may_22_d={}
for name, group in may_22.groupby('District'):
    may_22_d[str(name)] = group

#may_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [50]: jun_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_June_2022.csv")
jun_22
```

Out[50]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-06-01	2022	6	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-06-02	2022	6	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-06-03	2022	6	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-06-04	2022	6	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-06-05	2022	6	NaN	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-06-26	2022	6	24.687814	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-06-27	2022	6	23.347299	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-06-28	2022	6	22.222229	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-06-29	2022	6	21.058943	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-06-30	2022	6	20.694427	NRSC VIC MODEL

21990 rows × 7 columns

```
In [51]: jun_22=jun_22.dropna()
jun_22
```

Out[51]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
90	Andhra Pradesh	Anantapur	2022-06-07	2022	6	27.113133	NRSC VIC MODEL
91	Andhra Pradesh	Anantapur	2022-06-01	2022	6	22.769457	NRSC VIC MODEL
92	Andhra Pradesh	Anantapur	2022-06-02	2022	6	26.694181	NRSC VIC MODEL
93	Andhra Pradesh	Anantapur	2022-06-03	2022	6	25.660519	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-06-04	2022	6	25.079836	NRSC VIC MODEL
...
21985	West Bengal	Purulia	2022-06-26	2022	6	24.687814	NRSC VIC MODEL
21986	West Bengal	Purulia	2022-06-27	2022	6	23.347299	NRSC VIC MODEL
21987	West Bengal	Purulia	2022-06-28	2022	6	22.222229	NRSC VIC MODEL
21988	West Bengal	Purulia	2022-06-29	2022	6	21.058943	NRSC VIC MODEL
21989	West Bengal	Purulia	2022-06-30	2022	6	20.694427	NRSC VIC MODEL

21870 rows × 7 columns

In [52]:

```
highval=jun_22[jun_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=jun_22[jun_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [53]: val0=jun_22[jun_22["State"]==0]
print(val0.count())

val0s=jun_22[jun_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [54]: jun_22_d={}
for name, group in jun_22.groupby('District'):
    jun_22_d[str(name)] = group

#jun_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [55]: jul_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_July_2022.csv")
jul_22
```

Out[55]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-07-01	2022	7	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-07-02	2022	7	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-07-03	2022	7	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-07-04	2022	7	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-07-05	2022	7	NaN	NRSC VIC MODEL
...
22718	West Bengal	Purulia	2022-07-27	2022	7	22.151651	NRSC VIC MODEL
22719	West Bengal	Purulia	2022-07-28	2022	7	21.157685	NRSC VIC MODEL
22720	West Bengal	Purulia	2022-07-29	2022	7	21.033065	NRSC VIC MODEL
22721	West Bengal	Purulia	2022-07-30	2022	7	25.120413	NRSC VIC MODEL
22722	West Bengal	Purulia	2022-07-31	2022	7	23.405393	NRSC VIC MODEL

22723 rows × 7 columns

```
In [56]: jul_22=jul_22.dropna()
jul_22
```

Out[56]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
93	Andhra Pradesh	Anantapur	2022-07-01	2022	7	24.317660	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-07-02	2022	7	23.640350	NRSC VIC MODEL
95	Andhra Pradesh	Anantapur	2022-07-03	2022	7	22.963943	NRSC VIC MODEL
96	Andhra Pradesh	Anantapur	2022-07-04	2022	7	22.553356	NRSC VIC MODEL
97	Andhra Pradesh	Anantapur	2022-07-05	2022	7	22.104365	NRSC VIC MODEL
...
22718	West Bengal	Purulia	2022-07-27	2022	7	22.151651	NRSC VIC MODEL
22719	West Bengal	Purulia	2022-07-28	2022	7	21.157685	NRSC VIC MODEL
22720	West Bengal	Purulia	2022-07-29	2022	7	21.033065	NRSC VIC MODEL
22721	West Bengal	Purulia	2022-07-30	2022	7	25.120413	NRSC VIC MODEL
22722	West Bengal	Purulia	2022-07-31	2022	7	23.405393	NRSC VIC MODEL

21949 rows × 7 columns

In [57]:

```
highval=jul_22[jul_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=jul_22[jul_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [58]: val0=jul_22[jul_22["State"]==0]
print(val0.count())

val0s=jul_22[jul_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [59]: jul_22_d={}
for name, group in jul_22.groupby('District'):
    jul_22_d[str(name)] = group

#jul_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [60]: aug_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_August_2022.csv")
aug_22
```

Out[60]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-08-23	2022	8	1.344123e+270	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-08-24	2022	8	1.663653e+288	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-08-25	2022	8	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-08-26	2022	8	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-08-27	2022	8	NaN	NRSC VIC MODEL
...
22718	West Bengal	Purulia	2022-08-18	2022	8	2.620425e+01	NRSC VIC MODEL
22719	West Bengal	Purulia	2022-08-19	2022	8	3.280631e+01	NRSC VIC MODEL
22720	West Bengal	Purulia	2022-08-20	2022	8	3.326271e+01	NRSC VIC MODEL
22721	West Bengal	Purulia	2022-08-21	2022	8	3.280041e+01	NRSC VIC MODEL
22722	West Bengal	Purulia	2022-08-22	2022	8	3.203190e+01	NRSC VIC MODEL

22723 rows × 7 columns

```
In [61]: aug_22=aug_22.dropna()
aug_22
```

Out[61]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-08-23	2022	8	1.344123e+270	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-08-24	2022	8	1.663653e+288	NRSC VIC MODEL
31	Andaman & Nicobar	North And Middle Andaman	2022-08-24	2022	8	-3.170923e+292	NRSC VIC MODEL
62	Andaman & Nicobar	South Andamans	2022-08-23	2022	8	-1.808109e+296	NRSC VIC MODEL
63	Andaman & Nicobar	South Andamans	2022-08-24	2022	8	-8.934823e+295	NRSC VIC MODEL
...
22718	West Bengal	Purulia	2022-08-18	2022	8	2.620425e+01	NRSC VIC MODEL
22719	West Bengal	Purulia	2022-08-19	2022	8	3.280631e+01	NRSC VIC MODEL
22720	West Bengal	Purulia	2022-08-20	2022	8	3.326271e+01	NRSC VIC MODEL
22721	West Bengal	Purulia	2022-08-21	2022	8	3.280041e+01	NRSC VIC MODEL
22722	West Bengal	Purulia	2022-08-22	2022	8	3.203190e+01	NRSC VIC MODEL

22215 rows × 7 columns

In [62]:

```
highval=aug_22[aug_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=aug_22[aug_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State           396
District        396
Date            396
Year             396
Month            396
Avg_smlvl_at15cm 396
Agency_name      396
dtype: int64
State           668
District        668
Date            668
Year             668
Month            668
Avg_smlvl_at15cm 668
Agency_name      668
dtype: int64
```

```
In [63]: aug_22[aug_22["Avg_smlvl_at15cm"]>90]=90
aug_22[aug_22["Avg_smlvl_at15cm"]<0]=0
```

C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\3088411187.py:1: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\3088411187.py:2: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
In [64]: highval=aug_22[aug_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=aug_22[aug_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [65]: val0=aug_22[aug_22["State"]==0]
print(val0.count())

val0s=aug_22[aug_22["District"]==0]
print(val0s.count())
```

```
State          668
District       668
Date           668
Year            668
Month           668
Avg_smlvl_at15cm  668
Agency_name     668
dtype: int64
State          668
District       668
Date           668
Year            668
Month           668
Avg_smlvl_at15cm  668
Agency_name     668
dtype: int64
```

```
In [66]: aug_22.drop(aug_22[aug_22["State"]==0].index,inplace=True)

aug_22.drop(aug_22[aug_22["District"]==0].index,inplace=True)
```

```
C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\3100935607.py:1: SettingWithCopyWarning:
```

A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\3100935607.py:3: SettingWithCopyWarning:
```

A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
In [67]: val0=aug_22[aug_22["State"]==0]
print(val0.count())

val0s=aug_22[aug_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm    0
Agency_name     0
dtype: int64

State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm    0
Agency_name     0
dtype: int64
```

```
In [68]: val90=aug_22[aug_22["State"]==90]
print(val90.count())
```

```
State          396  
District       396  
Date           396  
Year            396  
Month           396  
Avg_smlvl_at15cm 396  
Agency_name     396  
dtype: int64
```

```
In [69]: aug_22.drop(aug_22[aug_22["State"]==90].index,inplace=True)
```

C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\2801163737.py:1: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
In [70]: val90=aug_22[aug_22["State"]==90]  
print(val90.count())
```

```
State          0  
District       0  
Date           0  
Year            0  
Month           0  
Avg_smlvl_at15cm 0  
Agency_name     0  
dtype: int64
```

```
In [71]: aug_22_d={}
for name, group in aug_22.groupby('District'):
    aug_22_d[str(name)] = group

#aug_22_d
```

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [72]: sep_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_September_2022.csv")
sep_22
```

```
Out[72]:
```

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-09-01	2022	9	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-09-02	2022	9	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-09-03	2022	9	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-09-04	2022	9	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-09-07	2022	9	NaN	NRSC VIC MODEL
...
19786	West Bengal	Purulia	2022-09-22	2022	9	29.179052	NRSC VIC MODEL
19787	West Bengal	Purulia	2022-09-24	2022	9	26.302775	NRSC VIC MODEL
19788	West Bengal	Purulia	2022-09-25	2022	9	24.914633	NRSC VIC MODEL
19789	West Bengal	Purulia	2022-09-26	2022	9	24.910407	NRSC VIC MODEL
19790	West Bengal	Purulia	2022-09-27	2022	9	24.028795	NRSC VIC MODEL

19791 rows × 7 columns

```
In [73]: sep_22=sep_22.dropna()
sep_22
```

Out[73]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
81	Andhra Pradesh	Anantapur	2022-09-01	2022	9	27.784486	NRSC VIC MODEL
82	Andhra Pradesh	Anantapur	2022-09-02	2022	9	27.408942	NRSC VIC MODEL
83	Andhra Pradesh	Anantapur	2022-09-03	2022	9	26.060281	NRSC VIC MODEL
84	Andhra Pradesh	Anantapur	2022-09-04	2022	9	25.379347	NRSC VIC MODEL
85	Andhra Pradesh	Anantapur	2022-09-06	2022	9	30.445267	NRSC VIC MODEL
...
19786	West Bengal	Purulia	2022-09-22	2022	9	29.179052	NRSC VIC MODEL
19787	West Bengal	Purulia	2022-09-24	2022	9	26.302775	NRSC VIC MODEL
19788	West Bengal	Purulia	2022-09-25	2022	9	24.914633	NRSC VIC MODEL
19789	West Bengal	Purulia	2022-09-26	2022	9	24.910407	NRSC VIC MODEL
19790	West Bengal	Purulia	2022-09-27	2022	9	24.028795	NRSC VIC MODEL

19683 rows × 7 columns

```
In [74]: highval=sep_22[sep_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=sep_22[sep_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [75]: val0=sep_22[sep_22["State"]==0]
print(val0.count())

val0s=sep_22[sep_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [76]: sep_22_d={}
for name, group in sep_22.groupby('District'):
    sep_22_d[str(name)] = group

#sep_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [77]: oct_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_October_2022.csv")
oct_22
```

Out[77]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-10-01	2022	10	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-10-02	2022	10	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-10-03	2022	10	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-10-04	2022	10	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-10-05	2022	10	NaN	NRSC VIC MODEL
...
20519	West Bengal	Purulia	2022-10-24	2022	10	20.205559	NRSC VIC MODEL
20520	West Bengal	Purulia	2022-10-25	2022	10	19.824742	NRSC VIC MODEL
20521	West Bengal	Purulia	2022-10-26	2022	10	19.201884	NRSC VIC MODEL
20522	West Bengal	Purulia	2022-10-27	2022	10	18.601021	NRSC VIC MODEL
20523	West Bengal	Purulia	2022-10-28	2022	10	18.049025	NRSC VIC MODEL

20524 rows × 7 columns

```
In [78]: oct_22=oct_22.dropna()
oct_22
```

Out[78]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
84	Andhra Pradesh	Anantapur	2022-10-01	2022	10	28.354131	NRSC VIC MODEL
85	Andhra Pradesh	Anantapur	2022-10-02	2022	10	28.211167	NRSC VIC MODEL
86	Andhra Pradesh	Anantapur	2022-10-03	2022	10	26.813033	NRSC VIC MODEL
87	Andhra Pradesh	Anantapur	2022-10-04	2022	10	25.619609	NRSC VIC MODEL
88	Andhra Pradesh	Anantapur	2022-10-05	2022	10	24.726939	NRSC VIC MODEL
...
20519	West Bengal	Purulia	2022-10-24	2022	10	20.205559	NRSC VIC MODEL
20520	West Bengal	Purulia	2022-10-25	2022	10	19.824742	NRSC VIC MODEL
20521	West Bengal	Purulia	2022-10-26	2022	10	19.201884	NRSC VIC MODEL
20522	West Bengal	Purulia	2022-10-27	2022	10	18.601021	NRSC VIC MODEL
20523	West Bengal	Purulia	2022-10-28	2022	10	18.049025	NRSC VIC MODEL

20412 rows × 7 columns

In [79]:

```
highval=oct_22[oct_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=oct_22[oct_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [80]: val0=oct_22[oct_22["State"]==0]
print(val0.count())

val0s=oct_22[oct_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [81]: oct_22_d={}
for name, group in oct_22.groupby('District'):
    oct_22_d[str(name)] = group

#oct_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [82]: nov_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_November_2022.csv")  
nov_22
```

Out[82]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-11-01	2022	11	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-11-02	2022	11	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-11-03	2022	11	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-11-04	2022	11	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-11-05	2022	11	NaN	NRSC VIC MODEL
...
9524	West Bengal	Purulia	2022-11-09	2022	11	13.506465	NRSC VIC MODEL
9525	West Bengal	Purulia	2022-11-11	2022	11	12.994565	NRSC VIC MODEL
9526	West Bengal	Purulia	2022-11-12	2022	11	12.770794	NRSC VIC MODEL
9527	West Bengal	Purulia	2022-11-10	2022	11	13.242009	NRSC VIC MODEL
9528	West Bengal	Purulia	2022-11-13	2022	11	12.522034	NRSC VIC MODEL

9529 rows × 7 columns

```
In [83]: nov_22=nov_22.dropna()  
nov_22
```

Out[83]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
39	Andhra Pradesh	Anantapur	2022-11-01	2022	11	20.971587	NRSC VIC MODEL
40	Andhra Pradesh	Anantapur	2022-11-02	2022	11	22.773908	NRSC VIC MODEL
41	Andhra Pradesh	Anantapur	2022-11-03	2022	11	23.261964	NRSC VIC MODEL
42	Andhra Pradesh	Anantapur	2022-11-04	2022	11	23.938062	NRSC VIC MODEL
43	Andhra Pradesh	Anantapur	2022-11-05	2022	11	23.214463	NRSC VIC MODEL
...
9524	West Bengal	Purulia	2022-11-09	2022	11	13.506465	NRSC VIC MODEL
9525	West Bengal	Purulia	2022-11-11	2022	11	12.994565	NRSC VIC MODEL
9526	West Bengal	Purulia	2022-11-12	2022	11	12.770794	NRSC VIC MODEL
9527	West Bengal	Purulia	2022-11-10	2022	11	13.242009	NRSC VIC MODEL
9528	West Bengal	Purulia	2022-11-13	2022	11	12.522034	NRSC VIC MODEL

9477 rows × 7 columns

```
In [84]: highval=nov_22[nov_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=nov_22[nov_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [85]: val0=nov_22[nov_22["State"]==0]
print(val0.count())

val0s=nov_22[nov_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [86]: nov_22_d={}
for name, group in nov_22.groupby('District'):
    nov_22_d[str(name)] = group

#nov_22_d
```

In []:

In []:

In []:

Importing, Handling missing values, Outlier Analysis and creating separate dataframes

```
In [87]: dec_22=pd.read_csv(r"C:\Users\harsh\Downloads\Soil Moisture\2022\Daily_data_of_Soil_Moisture_December_2022.csv")  
dec_22
```

Out[87]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
0	Andaman & Nicobar	Nicobars	2022-12-01	2022	12	NaN	NRSC VIC MODEL
1	Andaman & Nicobar	Nicobars	2022-12-02	2022	12	NaN	NRSC VIC MODEL
2	Andaman & Nicobar	Nicobars	2022-12-03	2022	12	NaN	NRSC VIC MODEL
3	Andaman & Nicobar	Nicobars	2022-12-04	2022	12	NaN	NRSC VIC MODEL
4	Andaman & Nicobar	Nicobars	2022-12-05	2022	12	NaN	NRSC VIC MODEL
...
20519	West Bengal	Purulia	2022-12-24	2022	12	8.634418	NRSC VIC MODEL
20520	West Bengal	Purulia	2022-12-25	2022	12	8.593103	NRSC VIC MODEL
20521	West Bengal	Purulia	2022-12-26	2022	12	8.554651	NRSC VIC MODEL
20522	West Bengal	Purulia	2022-12-27	2022	12	8.568392	NRSC VIC MODEL
20523	West Bengal	Purulia	2022-12-28	2022	12	8.540755	NRSC VIC MODEL

20524 rows × 7 columns

```
In [88]: dec_22=dec_22.dropna()  
dec_22
```

Out[88]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
84	Andhra Pradesh	Anantapur	2022-12-01	2022	12	18.790915	NRSC VIC MODEL
85	Andhra Pradesh	Anantapur	2022-12-02	2022	12	18.635356	NRSC VIC MODEL
86	Andhra Pradesh	Anantapur	2022-12-03	2022	12	18.482661	NRSC VIC MODEL
87	Andhra Pradesh	Anantapur	2022-12-04	2022	12	18.334302	NRSC VIC MODEL
88	Andhra Pradesh	Anantapur	2022-12-05	2022	12	18.199972	NRSC VIC MODEL
...
20519	West Bengal	Purulia	2022-12-24	2022	12	8.634418	NRSC VIC MODEL
20520	West Bengal	Purulia	2022-12-25	2022	12	8.593103	NRSC VIC MODEL
20521	West Bengal	Purulia	2022-12-26	2022	12	8.554651	NRSC VIC MODEL
20522	West Bengal	Purulia	2022-12-27	2022	12	8.568392	NRSC VIC MODEL
20523	West Bengal	Purulia	2022-12-28	2022	12	8.540755	NRSC VIC MODEL

20382 rows × 7 columns

In [89]:

```
highval=dec_22[dec_22["Avg_smlvl_at15cm"]>90]
print(highval.count())

lessthan0=dec_22[dec_22["Avg_smlvl_at15cm"]<0]
print(lessthan0.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [90]: val0=dec_22[dec_22["State"]==0]
print(val0.count())

val0s=dec_22[dec_22["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [91]: dec_22_d={}
for name, group in dec_22.groupby('District'):
    dec_22_d[str(name)] = group

#dec_22_d
```

In []:

In []:

In []:

Creating the list of state names and district names

In [92]: march_22

	State	District	Date	Year	Month	Avg_smvl_at15cm	Agency_name
93	Andhra Pradesh	Anantapur	2022-03-08	2022	3	15.222117	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-03-23	2022	3	16.261184	NRSC VIC MODEL
95	Andhra Pradesh	Anantapur	2022-03-01	2022	3	15.596499	NRSC VIC MODEL
96	Andhra Pradesh	Anantapur	2022-03-02	2022	3	15.532565	NRSC VIC MODEL
97	Andhra Pradesh	Anantapur	2022-03-03	2022	3	15.475746	NRSC VIC MODEL
...
22718	West Bengal	Purulia	2022-03-27	2022	3	11.567757	NRSC VIC MODEL
22719	West Bengal	Purulia	2022-03-28	2022	3	11.382254	NRSC VIC MODEL
22720	West Bengal	Purulia	2022-03-29	2022	3	11.209592	NRSC VIC MODEL
22721	West Bengal	Purulia	2022-03-30	2022	3	11.054024	NRSC VIC MODEL
22722	West Bengal	Purulia	2022-03-31	2022	3	10.891377	NRSC VIC MODEL

22599 rows × 7 columns

In [93]: dictn=march_22.iloc[:,0:2]
dictn

Out[93]:

	State	District
93	Andhra Pradesh	Anantapur
94	Andhra Pradesh	Anantapur
95	Andhra Pradesh	Anantapur
96	Andhra Pradesh	Anantapur
97	Andhra Pradesh	Anantapur
...
22718	West Bengal	Purulia
22719	West Bengal	Purulia
22720	West Bengal	Purulia
22721	West Bengal	Purulia
22722	West Bengal	Purulia

22599 rows × 2 columns

In [94]:

```
key_val={}
for name, group in dictn.groupby('State'):
    key_val[str(name)] = group

#key_val
```

In [95]:

```
key_val['Andhra Pradesh']["District"].unique()
```

Out[95]:

```
array(['Anantapur', 'Chittoor', 'East Godavari', 'Guntur', 'Krishna',
       'Kurnool', 'Prakasam', 'SPSR Nellore', 'Srikakulam',
       'Visakhapatnam', 'Vizianagaram', 'West Godavari', 'Y.S.R.'],
      dtype=object)
```

In [96]:

```
key_val.keys()
```

Out[96]:

```
dict_keys(['Andhra Pradesh', 'Arunachal Pradesh', 'Assam', 'Bihar', 'Chandigarh', 'Chhattisgarh', 'Dadra & Nagar Haveli', 'Daman & Diu', 'Delhi', 'Goa', 'Gujarat', 'Haryana', 'Himachal Pradesh', 'Jammu & Kashmir', 'Jharkhand', 'Karnataka', 'Kerala', 'Ladakh', 'Madhya Pradesh', 'Maharashtra', 'Manipur', 'Meghalaya', 'Mizoram', 'Nagaland', 'Odisha', 'Puducherry', 'Punjab', 'Rajasthan', 'Sikkim', 'Tamil Nadu', 'Telangana', 'Tripura', 'Uttar Pradesh', 'Uttarakhand', 'West Bengal'])
```

```
In [97]: st_dist={}
for i in key_val.keys():
    st_dist[str(i)]=key_val[i]["District"].unique()

st_dist
```

```
Out[97]: {'Andhra Pradesh': array(['Anantapur', 'Chittoor', 'East Godavari', 'Guntur', 'Krishna',
       'Kurnool', 'Prakasam', 'SPSR Nellore', 'Srikakulam',
       'Visakhapatnam', 'Vizianagaram', 'West Godavari', 'Y.S.R.'],
      dtype=object),
 'Arunachal Pradesh': array(['Anjaw', 'Changlang', 'Dibang Valley', 'East Kameng', 'East Siang',
       'Kamle', 'Kra Daadi', 'Kurung Kumey', 'Leparada', 'Lohit',
       'Longding', 'Lower Dibang Valley', 'Lower Siang',
       'Lower Subansiri', 'Namsai', 'Pakke Kessang', 'Papum Pare',
       'Shi Yomi', 'Siang', 'Tawang', 'Tirap', 'Upper Siang',
       'Upper Subansiri', 'West Kameng', 'West Siang'], dtype=object),
 'Assam': array(['Baksa', 'Barpeta', 'Biswanath', 'Bongaigaon', 'Cachar',
       'Charaideo', 'Chirang', 'Darrang', 'Dhemaji', 'Dhubri',
       'Dibrugarh', 'Dima Hasao', 'Goalpara', 'Golaghat', 'Hailakandi',
       'Hojai', 'Jorhat', 'Kamrup', 'Kamrup Metro', 'Karbi Anglong',
       'Karimganj', 'Kokrajhar', 'Lakhimpur', 'Majuli', 'Marigaon',
       'Nagaon', 'Nalbari', 'Sivasagar', 'Sonitpur',
       'South Salmara Mancachar', 'Tinsukia', 'Udalguri',
       'West Karbi Anglong'], dtype=object),
 'Bihar': array(['Araria', 'Arwal', 'Aurangabad', 'Banka', 'Begusarai', 'Bhagalpur',
       'Bhojpur', 'Buxar', 'Darbhanga', 'Gaya', 'Gopalganj', 'Jamui',
       'Jehanabad', 'Kaimur (Bhabua)', 'Katihar', 'Khagaria',
       'Kishanganj', 'Lakhisarai', 'Madhepura', 'Madhubani', 'Munger',
       'Muzaffarpur', 'Nalanda', 'Nawada', 'Pashchim Champaran', 'Patna',
       'Purbi Champaran', 'Purnia', 'Rohtas', 'Saharsa', 'Samastipur',
       'Saran', 'Sheikhpura', 'Sheohar', 'Sitamarhi', 'Siwan', 'Supaul',
       'Vaishali'], dtype=object),
 'Chandigarh': array(['Chandigarh'], dtype=object),
 'Chhattisgarh': array(['Balod', 'Baloda Bazar', 'Balrampur', 'Bastar', 'Bemetara',
       'Bijapur', 'Bilapur', 'Dantewada', 'Dhamtari', 'Durg',
       'Gariyaband', 'Gaurella Pendra Marwahi', 'Janjgir-Champa',
       'Jashpur', 'Kabirdham', 'Kanker', 'Kondagaon', 'Korba', 'Korea',
       'Mahasamund', 'Mungeli', 'Narayanpur', 'Raigarh', 'Raipur',
       'Rajnandgaon', 'Sukma', 'Surajpur', 'Surguja'], dtype=object),
 'Dadra & Nagar Haveli': array(['Dadra And Nagar Haveli']), dtype=object),
 'Daman & Diu': array(['Daman', 'Diu']), dtype=object),
 'Delhi': array(['Central', 'East', 'New Delhi', 'North', 'North East',
       'North West', 'Shahdara', 'South', 'South East', 'South West',
       'West'], dtype=object),
 'Goa': array(['North Goa', 'South Goa']), dtype=object),
 'Gujarat': array(['Ahmadabad', 'Amreli', 'Anand', 'Arvalli', 'Banas Kantha',
       'Bharuch', 'Bhavnagar', 'Botad', 'Chhotaudepur', 'Dang',
       'Devbhumi Dwarka', 'Dohad', 'Gandhinagar', 'Gir Somnath',
       'Jamnagar', 'Junagadh', 'Kachchh', 'Kheda', 'Mahesana',
       'Mahisagar', 'Morbi', 'Narmada', 'Navsari', 'Panch Mahals',
       'Patan', 'Porbandar', 'Rajkot', 'Sabar Kantha', 'Surat',
```

```
'Surendranagar', 'Tapi', 'Vadodara', 'Valsad'], dtype=object),
'Haryana': array(['Ambala', 'Bhiwani', 'Charki Dadri', 'Faridabad', 'Fatehabad',
   'Gurugram', 'Hisar', 'Jhajjar', 'Jind', 'Kaithal', 'Karnal',
   'Kurukshetra', 'Mahendragarh', 'Nuh', 'Palwal', 'Panchkula',
   'Panipat', 'Rewari', 'Rohtak', 'Sirsia', 'Sonipat', 'Yamunanagar'],
  dtype=object),
'Himachal Pradesh': array(['Bilaspur', 'Chamba', 'Hamirpur', 'Kangra', 'Kinnaur', 'Kullu',
   'Lahul & Spiti', 'Mandi', 'Shimla', 'Sirmaur', 'Solan', 'Una'],
  dtype=object),
'Jammu & Kashmir': array(['Anantnag', 'Bandipora', 'Baramulla', 'Budgam', 'Doda',
   'Ganderbal', 'Jammu', 'Kathua', 'Kishtwar', 'Kulgam', 'Kupwara',
   'Mirpur', 'Muzaffarabad', 'Poonch', 'Pulwama', 'Rajouri', 'Ramban',
   'Reasi', 'Samba', 'Shopian', 'Srinagar', 'Udhampur'], dtype=object),
'Jharkhand': array(['Bokaro', 'Chatra', 'Deoghar', 'Dhanbad', 'Dumka', 'East Singhbhum',
   'Garhwa', 'Giridih', 'Godda', 'Gumla', 'Hazaribagh', 'Jamtara',
   'Khunti', 'Koderma', 'Latehar', 'Lohardaga', 'Pakur', 'Palamu',
   'Ramgarh', 'Ranchi', 'Sahebganj', 'Saraikela Kharsawan', 'Simdega',
   'West Singhbhum'], dtype=object),
'Karnataka': array(['Bagalkote', 'Ballari', 'Belagavi', 'Bengaluru Rural',
   'Bengaluru Urban', 'Bidar', 'Chamarajanagara', 'Chikkaballapura',
   'Chikkamagaluru', 'Chitradurga', 'Dakshina Kannada', 'Davangere',
   'Dharwad', 'Gadag', 'Hassan', 'Haveri', 'Kalaburagi', 'Kodagu',
   'Kolar', 'Koppal', 'Mandya', 'Mysuru', 'Raichur', 'Ramanagara',
   'Shivamogga', 'Tumakuru', 'Udupi', 'Uttara Kannada', 'Vijayapura',
   'Yadgir'], dtype=object),
'Kerala': array(['Alappuzha', 'Ernakulam', 'Idukki', 'Kannur', 'Kasaragod',
   'Kollam', 'Kottayam', 'Kozhikode', 'Malappuram', 'Palakkad',
   'Pathanamthitta', 'Thiruvananthapuram', 'Thrissur', 'Wayanad'],
  dtype=object),
'Ladakh': array(['Kargil', 'Leh Ladakh'], dtype=object),
'Madhya Pradesh': array(['Agar Malwa', 'Alirajpur', 'Anuppur', 'Ashoknagar', 'Balaghat',
   'Barwani', 'Betul', 'Bhind', 'Bhopal', 'Burhanpur', 'Chhatarpur',
   'Chhindwara', 'Damoh', 'Datia', 'Dewas', 'Dhar', 'Dindori',
   'East Nimar', 'Guna', 'Gwalior', 'Harda', 'Hoshangabad', 'Indore',
   'Jabalpur', 'Jhabua', 'Katni', 'Khargone', 'Mandla', 'Mandsaur',
   'Morena', 'Narsinghpur', 'Neemuch', 'Niwari', 'Panna', 'Raisen',
   'Rajgarh', 'Ratlam', 'Rewa', 'Sagar', 'Satna', 'Sehore', 'Seoni',
   'Shahdol', 'Shajapur', 'Sheopur', 'Shivpuri', 'Sidhi', 'Singrauli',
   'Tikamgarh', 'Ujjain', 'Umaria', 'Vidisha'], dtype=object),
'Maharashtra': array(['Ahmednagar', 'Akola', 'Amravati', 'Aurangabad', 'Beed',
   'Bhandara', 'Buldhana', 'Chandrapur', 'Dhule', 'Gadchiroli',
   'Gondia', 'Hingoli', 'Jalgaon', 'Jalna', 'Kolhapur', 'Latur',
   'Mumbai City', 'Mumbai Suburban', 'Nagpur', 'Nanded', 'Nandurbar',
   'Nashik', 'Osmanabad', 'Palghar', 'Parbhani', 'Pune', 'Raigad',
   'Ratnagiri', 'Sangli', 'Satara', 'Sindhudurg', 'Solapur', 'Thane',
```

```
'Wardha', 'Washim', 'Yavatmal'], dtype=object),
'Manipur': array(['Bishnupur', 'Chandel', 'Churachandpur', 'Imphal East',
    'Imphal West', 'Jiribam', 'Kakching', 'Kamjong', 'Kangpokpi',
    'Noney', 'Pherzawl', 'Senapati', 'Tamenglong', 'Tengnoupal',
    'Thoubal', 'Ukhrul'], dtype=object),
'Meghalaya': array(['East Garo Hills', 'East Jaintia Hills', 'East Khasi Hills',
    'North Garo Hills', 'Ri Bhoi', 'South Garo Hills',
    'South West Garo Hills', 'South West Khasi Hills',
    'West Garo Hills', 'West Jaintia Hills', 'West Khasi Hills'],
    dtype=object),
'Mizoram': array(['Aizawl', 'Champhai', 'Kolasib', 'Lawngtlai', 'Lunglei', 'Mamit',
    'Saiha', 'Serchhip'], dtype=object),
'Nagaland': array(['Dimapur', 'Kiphire', 'Kohima', 'Longleng', 'Mokokchung', 'Mon',
    'Peren', 'Phek', 'Tuensang', 'Wokha', 'Zunheboto'], dtype=object),
'Odisha': array(['Anugul', 'Balangir', 'Baleswar', 'Bargarh', 'Bhadrak', 'Boudh',
    'Cuttack', 'Deogarh', 'Dhenkanal', 'Gajapati', 'Ganjam',
    'Jagatsinghpur', 'Jajapur', 'Jharsuguda', 'Kalahandi',
    'Kandhamal', 'Kendrapara', 'Kendujhar', 'Khordha', 'Koraput',
    'Malkangiri', 'Mayurbhanj', 'Nabarangpur', 'Nayagarh', 'Nuapada',
    'Puri', 'Rayagada', 'Sambalpur', 'Sonepur', 'Sundargarh'],
    dtype=object),
'Puducherry': array(['Karaikal', 'Mahe', 'Pondicherry', 'Yanam'], dtype=object),
'Punjab': array(['Amritsar', 'Barnala', 'Bathinda', 'Faridkot', 'Fatehgarh Sahib',
    'Fazilka', 'Firozepur', 'Gurdaspur', 'Hoshiarpur', 'Jalandhar',
    'Kapurthala', 'Ludhiana', 'Mansa', 'Moga', 'Pathankot', 'Patiala',
    'Rupnagar', 'S.A.S Nagar', 'Sangrur', 'Shahid Bhagat Singh Nagar',
    'Sri Muktsar Sahib', 'Tarn Taran'], dtype=object),
'Rajasthan': array(['Ajmer', 'Alwar', 'Banswara', 'Baran', 'Barmer', 'Bharatpur',
    'Bhilwara', 'Bikaner', 'Bundi', 'Chittorgarh', 'Churu', 'Dausa',
    'Dholpur', 'Dungarpur', 'Ganganagar', 'Hanumangarh', 'Jaipur',
    'Jaisalmer', 'Jalore', 'Jhalawar', 'Jhunjhunu', 'Jodhpur',
    'Karauli', 'Kota', 'Nagaur', 'Pali', 'Pratapgarh', 'Rajsamand',
    'Sawai Madhopur', 'Sikar', 'Sirohi', 'Tonk', 'Udaipur'],
    dtype=object),
'Sikkim': array(['East District', 'North District', 'South District',
    'West District'], dtype=object),
'Tamil Nadu': array(['Ariyalur', 'Chengalpattu', 'Chennai', 'Coimbatore', 'Cuddalore',
    'Dharmapuri', 'Dindigul', 'Erode', 'Kallakurichi', 'Kanchipuram',
    'Kanniyakumari', 'Karur', 'Krishnagiri', 'Madurai', 'Nagapattinam',
    'Namakkal', 'Perambalur', 'Pudukkottai', 'Ramanathapuram',
    'Ranipet', 'Salem', 'Sivaganga', 'Tenkasi', 'Thanjavur',
    'The Nilgiris', 'Theni', 'Thiruvallur', 'Thiruvarur',
    'Tiruchirappalli', 'Tirunelveli', 'Tirupathur', 'Tiruppur',
    'Tiruvannamalai', 'Tuticorin', 'Vellore', 'Villupuram',
    'Virudhunagar'], dtype=object),
```

```
'Telangana': array(['Adilabad', 'Bhadradri Kothagudem', 'Hyderabad', 'Jagital',
    'Jangoan', 'Jayashankar Bhupalapally', 'Jogulamba Gadwal',
    'Kamareddy', 'Karimnagar', 'Khammam', 'Kumuram Bheem Asifabad',
    'Mahabubabad', 'Mahabubnagar', 'Mancherial', 'Medak',
    'Medchal Malkajgiri', 'Mulugu', 'Nagarkurnool', 'Nalgonda',
    'Narayanpet', 'Nirmal', 'Nizamabad', 'Peddapalli',
    'Rajanna Sircilla', 'Ranga Reddy', 'Sangareddy', 'Siddipet',
    'Suryapet', 'Vikarabad', 'Wanaparthy', 'Warangal Rural',
    'Warangal Urban', 'Yadadri Bhuvanagiri'], dtype=object),
'Tripura': array(['Dhalai', 'Gomati', 'Khowai', 'North Tripura', 'Sepahijala',
    'South Tripura', 'Unakoti', 'West Tripura'], dtype=object),
'Uttar Pradesh': array(['Agra', 'Aligarh', 'Ambedkar Nagar', 'Amethi', 'Amroha', 'Auraiya',
    'Ayodhya', 'Azamgarh', 'Baghpat', 'Babraich', 'Ballia',
    'Balrampur', 'Banda', 'Barabanki', 'Bareilly', 'Basti', 'Bhadohi',
    'Bijnor', 'Budaun', 'Bulandshahr', 'Chandauli', 'Chitrakoot',
    'Deoria', 'Etah', 'Etawah', 'Farrukhabad', 'Fatehpur', 'Firozabad',
    'Gautam Buddha Nagar', 'Ghaziabad', 'Ghazipur', 'Gonda',
    'Gorakhpur', 'Hamirpur', 'Hapur', 'Hardoi', 'Hathras', 'Jalaun',
    'Jaunpur', 'Jhansi', 'Kannauj', 'Kanpur Dehat', 'Kanpur Nagar',
    'Kasganj', 'Kaushambi', 'Kheri', 'Kushi Nagar', 'Lalitpur',
    'Lucknow', 'Maharajganj', 'Mahoba', 'Mainpuri', 'Mathura', 'Mau',
    'Meerut', 'Mirzapur', 'Moradabad', 'Muzaffarnagar', 'Pilibhit',
    'Pratapgarh', 'Prayagraj', 'Rae Bareli', 'Rampur', 'Saharanpur',
    'Sambhal', 'Sant Kabeer Nagar', 'Shahjahanpur', 'Shamli',
    'Shravasti', 'Siddharth Nagar', 'Sitapur', 'Sonbhadra',
    'Sultanpur', 'Unnao', 'Varanasi'], dtype=object),
'Uttarakhand': array(['Almora', 'Bageshwar', 'Chamoli', 'Champawat', 'Dehradun',
    'Haridwar', 'Nainital', 'Pauri Garhwal', 'Pithoragarh',
    'Rudra Prayag', 'Tehri Garhwal', 'Udam Singh Nagar', 'Uttar Kashi'],
    dtype=object),
'West Bengal': array(['24 Paraganas North', '24 Paraganas South', 'Alipurduar',
    'Bankura', 'Birbhum', 'Coochbehar', 'Darjeeling',
    'Dinajpur Dakshin', 'Dinajpur Uttar', 'Hooghly', 'Howrah',
    'Jalpaiguri', 'Jhargram', 'Kalimpong', 'Kolkata', 'Maldah',
    'Medinipur East', 'Medinipur West', 'Murshidabad', 'Nadia',
    'Paschim Bardhaman', 'Purba Bardhaman', 'Purulia'], dtype=object)}
```

In [98]: `list(st_dist['Bihar'])`

```
Out[98]: ['Araria',
 'Arwal',
 'Aurangabad',
 'Banka',
 'Begusarai',
 'Bhagalpur',
 'Bhojpur',
 'Buxar',
 'Darbhanga',
 'Gaya',
 'Gopalganj',
 'Jamui',
 'Jehanabad',
 'Kaimur (Bhabua)',
 'Katihar',
 'Khagaria',
 'Kishanganj',
 'Lakhisarai',
 'Madhepura',
 'Madhubani',
 'Munger',
 'Muzaffarpur',
 'Nalanda',
 'Nawada',
 'Pashchim Champaran',
 'Patna',
 'Purbi Champaran',
 'Purnia',
 'Rohtas',
 'Saharsa',
 'Samastipur',
 'Saran',
 'Sheikhpura',
 'Sheohar',
 'Sitamarhi',
 'Siwan',
 'Supaul',
 'Vaishali']
```

```
In [99]: st_name=list(st_dist.keys())
st_name
```

```
Out[99]: ['Andhra Pradesh',
 'Arunachal Pradesh',
 'Assam',
 'Bihar',
 'Chandigarh',
 'Chhattisgarh',
 'Dadra & Nagar Haveli',
 'Daman & Diu',
 'Delhi',
 'Goa',
 'Gujarat',
 'Haryana',
 'Himachal Pradesh',
 'Jammu & Kashmir',
 'Jharkhand',
 'Karnataka',
 'Kerala',
 'Ladakh',
 'Madhya Pradesh',
 'Maharashtra',
 'Manipur',
 'Meghalaya',
 'Mizoram',
 'Nagaland',
 'Odisha',
 'Puducherry',
 'Punjab',
 'Rajasthan',
 'Sikkim',
 'Tamil Nadu',
 'Telangana',
 'Tripura',
 'Uttar Pradesh',
 'Uttarakhand',
 'West Bengal']
```

```
In [100... st_dist["Bihar"]]
```

```
Out[100]: array(['Araria', 'Arwal', 'Aurangabad', 'Banka', 'Begusarai', 'Bhagalpur',  
   'Bhojpur', 'Buxar', 'Darbhanga', 'Gaya', 'Gopalganj', 'Jamui',  
   'Jehanabad', 'Kaimur (Bhabua)', 'Katihar', 'Khagaria',  
   'Kishanganj', 'Lakhisarai', 'Madhepura', 'Madhubani', 'Munger',  
   'Muzaffarpur', 'Nalanda', 'Nawada', 'Pashchim Champaran', 'Patna',  
   'Purbi Champaran', 'Purnia', 'Rohtas', 'Saharsa', 'Samastipur',  
   'Saran', 'Sheikhpura', 'Sheohar', 'Sitamarhi', 'Siwan', 'Supaul',  
   'Vaishali'], dtype=object)
```

```
In [101... st_name=list(st_dist.keys())  
dist_name=st_dist[st_name[0]]  
st_name
```

```
Out[101]: ['Andhra Pradesh',
 'Arunachal Pradesh',
 'Assam',
 'Bihar',
 'Chandigarh',
 'Chhattisgarh',
 'Dadra & Nagar Haveli',
 'Daman & Diu',
 'Delhi',
 'Goa',
 'Gujarat',
 'Haryana',
 'Himachal Pradesh',
 'Jammu & Kashmir',
 'Jharkhand',
 'Karnataka',
 'Kerala',
 'Ladakh',
 'Madhya Pradesh',
 'Maharashtra',
 'Manipur',
 'Meghalaya',
 'Mizoram',
 'Nagaland',
 'Odisha',
 'Puducherry',
 'Punjab',
 'Rajasthan',
 'Sikkim',
 'Tamil Nadu',
 'Telangana',
 'Tripura',
 'Uttar Pradesh',
 'Uttarakhand',
 'West Bengal']
```

In []:

In []:

In []:

Time series graphs for monthly soil moisture analysis (Dashboard)

In [102...]

```
#Monthly

import dash_bootstrap_components as dbc
from dash import Dash, dcc, html, Input, Output
import plotly.express as px
app = Dash(__name__, external_stylesheets=[dbc.themes.MORPH])

app.layout = html.Div([
    html.H4('Soil Moisture Analysis'),
    dcc.Graph(id="time-series-chart"),
    html.P("Select State:"), 
    dcc.Dropdown(
        id="State",
        options=st_name,
        clearable=False,
        searchable=True,
        style={'color': 'red'},
    ),
    html.P("Select District:"), 
    dcc.Dropdown(
        id="District",
        clearable=False,
        searchable=True,
        style={'color': 'red'},
    ),
    html.P("Select Month:"), 
    dcc.Dropdown(
        id="Month",
        options=["January '22", "February '22", "March '22", "April '22", "May '22", "June '22", "July '22", "August '22",
                 "September '22", "October '22", "November '22", "December '22"],
        value="January '22",
        clearable=False,
        searchable=True,
        style={'color': 'red'},
    ),
])
])
```

```
@app.callback(
    Output("District", "options"),
    Input("State", "value"))
def dist_options(State):
    if State is None:
        return [{"label": i, "value": i} for i in dist_names]
    else:
        return [{"label": i, "value": i} for i in st_dist[State]]
```



```
@app.callback(
    Output("time-series-chart", "figure"),
    Input("District", "value"),
    Input("Month", "value"))
def display_time_series(District, Month):
    if Month=="March '22":
        df = march_22_d[str(District)] # replace with your own data source
        fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
        return fig
    elif Month=="January '22":
        df = jan_22_d[str(District)] # replace with your own data source
        fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
        return fig
    elif Month=="February '22":
        df = feb_22_d[str(District)] # replace with your own data source
        fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
        return fig
    elif Month=="April '22":
        df = apr_22_d[str(District)] # replace with your own data source
        fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
        return fig
    elif Month=="May '22":
        df = may_22_d[str(District)] # replace with your own data source
        fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
        return fig
    elif Month=="June '22":
        df = jun_22_d[str(District)] # replace with your own data source
        fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
        return fig
    elif Month=="July '22":
        df = jul_22_d[str(District)] # replace with your own data source
        fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
        return fig
    elif Month=="August '22":
```

```

df = aug_22_d[str(District)] # replace with your own data source
fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
return fig
elif Month=="September '22":
    df = sep_22_d[str(District)] # replace with your own data source
    fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
    return fig
elif Month=="October '22":
    df = oct_22_d[str(District)] # replace with your own data source
    fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
    return fig
elif Month=="November '22":
    df = nov_22_d[str(District)] # replace with your own data source
    fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
    return fig
elif Month=="December '22":
    df = dec_22_d[str(District)] # replace with your own data source
    fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
    return fig
else:
    print("ERROR")

```

```
app.run_server(debug=False)
```

Dash is running on http://127.0.0.1:8050/

```

* Serving Flask app "__main__" (lazy loading)
* Environment: production
WARNING: This is a development server. Do not use it in a production deployment.
Use a production WSGI server instead.
* Debug mode: off

* Running on http://127.0.0.1:8050/ (Press CTRL+C to quit)
127.0.0.1 - - [31/Jan/2023 21:58:50] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:58:51] "GET /_dash-layout HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:58:51] "GET /_dash-dependencies HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:58:51] "GET /_dash-component-suites/dash/dcc/async-graph.js HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:58:51] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:58:51] "GET /_dash-component-suites/dash/dcc/async-dropdown.js HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:58:51] "GET /_dash-component-suites/dash/dcc/async-plotlyjs.js HTTP/1.1" 200 -

```

```
Exception on /_dash-update-component [POST]
Traceback (most recent call last):
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 2447, in wsgi_app
    response = self.full_dispatch_request()
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1952, in full_dispatch_request
    rv = self.handle_user_exception(e)
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1821, in handle_user_exception
    reraise(exc_type, exc_value, tb)
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\_compat.py", line 39, in reraise
    raise value
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1950, in full_dispatch_request
    rv = self.dispatch_request()
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1936, in dispatch_request
    return self.view_functions[rule.endpoint](**req.view_args)
  File "C:\Users\harsh\anaconda3\lib\site-packages\dash\dash.py", line 1274, in dispatch
    ctx.run(
  File "C:\Users\harsh\anaconda3\lib\site-packages\dash_callback.py", line 440, in add_context
    output_value = func(*func_args, **func_kwargs) # %% callback invoked %%
  File "C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\1407057842.py", line 62, in display_time_series
    df = jan_22_d[str(District)] # replace with your own data source
KeyError: 'None'
```

```
127.0.0.1 - - [31/Jan/2023 21:58:51] "POST /_dash-update-component HTTP/1.1" 500 -
127.0.0.1 - - [31/Jan/2023 21:59:08] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:59:09] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:59:25] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:59:30] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:59:36] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:59:40] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:59:53] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 21:59:55] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:00:00] "POST /_dash-update-component HTTP/1.1" 200 -
```

In []:

In []:

In []:

Yearly analysis

In [103...]: #yearly

```
yearly=[feb_22,march_22,apr_22,may_22,jun_22,jul_22,aug_22,sep_22,oct_22,nov_22,dec_22]
#yearly_df=[]

#for i in yearly:
#    yearly_df.append(pd.DataFrame(i))
```

In [104]: yearwise=jan_22.append(yearly)

C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\467174475.py:1: FutureWarning:

The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.

In []:

In []:

In []:

Statistical summary and handling null values

In [105]: yearwise.size

Out[105]: 1704815

In [106]: yearwise.isnull().sum()

Out[106]:

State	0
District	0
Date	0
Year	0
Month	0
Avg_smlvl_at15cm	0
Agency_name	0

dtype: int64

In [107]: yearwise.columns

Out[107]:

Index(['State', 'District', 'Date', 'Year', 'Month', 'Avg_smlvl_at15cm', 'Agency_name'],	
	dtype='object')

In [108]: `yearwise.head()`

Out[108]:

	State	District	Date	Year	Month	Avg_smlvl_at15cm	Agency_name
90	Andhra Pradesh	Anantapur	2022-01-07	2022	1	19.049744	NRSC VIC MODEL
91	Andhra Pradesh	Anantapur	2022-01-22	2022	1	17.582039	NRSC VIC MODEL
92	Andhra Pradesh	Anantapur	2022-01-01	2022	1	19.926819	NRSC VIC MODEL
93	Andhra Pradesh	Anantapur	2022-01-03	2022	1	19.610792	NRSC VIC MODEL
94	Andhra Pradesh	Anantapur	2022-01-04	2022	1	19.468128	NRSC VIC MODEL

In [109]: `anant=yearwise[yearwise["District"]=="Anantapur"]
anant.count()`

Out[109]:

State	334
District	334
Date	334
Year	334
Month	334
Avg_smlvl_at15cm	334
Agency_name	334
dtype: int64	

In [110]: `yearwise.count()`

Out[110]:

State	243545
District	243545
Date	243545
Year	243545
Month	243545
Avg_smlvl_at15cm	243545
Agency_name	243545
dtype: int64	

In []:

In []:

In []:

Outlier analysis

```
In [111]: lessthan0=yearwise[yearwise["Avg_smlvl_at15cm"]<0]
lessthan0.count()
```

```
Out[111]: State      0
District    0
Date        0
Year         0
Month       0
Avg_smlvl_at15cm 0
Agency_name 0
dtype: int64
```

```
In [112]: #yearwise[yearwise["Avg_smlvl_at15cm"]<0]=0
```

```
In [113]: highval=yearwise[yearwise["Avg_smlvl_at15cm"]>90]
print(highval.count())
```

```
State      0
District    0
Date        0
Year         0
Month       0
Avg_smlvl_at15cm 0
Agency_name 0
dtype: int64
```

```
In [114]: #yearwise[yearwise["Avg_smlvl_at15cm"]>90]=40
```

```
In [115]: val0=yearwise[yearwise["State"]==0]
print(val0.count())

val0s=yearwise[yearwise["District"]==0]
print(val0s.count())
```

```
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
State          0
District       0
Date           0
Year            0
Month           0
Avg_smlvl_at15cm  0
Agency_name     0
dtype: int64
```

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

Plot

```
In [116]: fig = px.line(anant, x=anan... "Date"], y=anan... "Avg_smlvl_at15cm"])
fig.show()
```



In []:

In []:

In []:

Statewise and districtwise df

```
In [117...]: yearly_d={}
for name, group in yearwise.groupby('District'):
    yearly_d[str(name)] = group
```

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

Time series graphs for yearly soil moisture analysis (Dashboard)

```
In [118...]: #yearly

import dash_bootstrap_components as dbc
from dash import Dash, dcc, html, Input, Output
import plotly.express as px
app = Dash(__name__, external_stylesheets=[dbc.themes.MORPH])

app.layout = html.Div([
    html.H4('Soil Moisture Analysis'),
    dcc.Graph(id="time-series-chart"),
    html.P("Select State:"), 
    dcc.Dropdown(
        id="State",
        options=st_name,
        clearable=False,
        searchable=True,
        style={'color': 'red'},
    ),
    html.P("Select District:"), 
    dcc.Dropdown(
        id="District",
        clearable=False,
        searchable=True,
        style={'color': 'red'},
    )
])
```

```

        ),
])

@app.callback(
    Output("District", "options"),
    Input("State", "value"))
def dist_options(State):
    if State is None:
        return [{"label": i, "value": i} for i in dist_names]
    else:
        return [{"label": i, "value": i} for i in st_dist[State]]


@app.callback(
    Output("time-series-chart", "figure"),
    Input("District", "value"),)
def display_time_series(District):
    df = yearly_d[District] # replace with your own data source
    fig = px.line(df, x=df['Date'], y=df["Avg_smlvl_at15cm"])
    return fig


app.run_server(debug=False)

```

Dash is running on http://127.0.0.1:8050/

Dash is running on http://127.0.0.1:8050/

- * Serving Flask app "__main__" (lazy loading)
- * Environment: production

WARNING: This is a development server. Do not use it in a production deployment.

Use a production WSGI server instead.
- * Debug mode: off
- * Running on http://127.0.0.1:8050/ (Press CTRL+C to quit)

```

127.0.0.1 - - [31/Jan/2023 22:08:16] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:16] "GET /_dash-layout HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:16] "GET /_dash-dependencies HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:16] "GET /favicon.ico?v=2.7.0 HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:16] "GET /_dash-component-suites/dashdcc/async-graph.js HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:17] "GET /_dash-component-suites/dashdcc/async-plotlyjs.js HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:17] "POST /_dash-update-component HTTP/1.1" 200 -

```

```
Exception on /_dash-update-component [POST]
Traceback (most recent call last):
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 2447, in wsgi_app
    response = self.full_dispatch_request()
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1952, in full_dispatch_request
    rv = self.handle_user_exception(e)
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1821, in handle_user_exception
    reraise(exc_type, exc_value, tb)
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\_compat.py", line 39, in reraise
    raise value
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1950, in full_dispatch_request
    rv = self.dispatch_request()
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1936, in dispatch_request
    return self.view_functions[rule.endpoint](**req.view_args)
  File "C:\Users\harsh\anaconda3\lib\site-packages\dash\dash.py", line 1274, in dispatch
    ctx.run(
  File "C:\Users\harsh\anaconda3\lib\site-packages\dash_callback.py", line 440, in add_context
    output_value = func(*func_args, **func_kwargs) # %% callback invoked %%
  File "C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\1751192858.py", line 46, in display_time_series
    df = yearly_d[District] # replace with your own data source
KeyError: None

Exception on /_dash-update-component [POST]
Traceback (most recent call last):
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 2447, in wsgi_app
    response = self.full_dispatch_request()
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1952, in full_dispatch_request
    rv = self.handle_user_exception(e)
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1821, in handle_user_exception
    reraise(exc_type, exc_value, tb)
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\_compat.py", line 39, in reraise
    raise value
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1950, in full_dispatch_request
    rv = self.dispatch_request()
  File "C:\Users\harsh\anaconda3\lib\site-packages\flask\app.py", line 1936, in dispatch_request
    return self.view_functions[rule.endpoint](**req.view_args)
  File "C:\Users\harsh\anaconda3\lib\site-packages\dash\dash.py", line 1274, in dispatch
    ctx.run(
  File "C:\Users\harsh\anaconda3\lib\site-packages\dash_callback.py", line 440, in add_context
    output_value = func(*func_args, **func_kwargs) # %% callback invoked %%
  File "C:\Users\harsh\AppData\Local\Temp\ipykernel_29192\1751192858.py", line 46, in display_time_series
    df = yearly_d[District] # replace with your own data source
KeyError: None
```

```
127.0.0.1 - - [31/Jan/2023 22:08:17] "GET /_dash-component-suites/dash/dcc/async-dropdown.js HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:17] "POST /_dash-update-component HTTP/1.1" 500 -
127.0.0.1 - - [31/Jan/2023 22:08:20] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:22] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:25] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:26] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:28] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:30] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:32] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:34] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:39] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:44] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:47] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:50] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:08:55] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:09:21] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:09:23] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:09:28] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:27] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:28] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:31] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:33] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:35] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:38] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:41] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:44] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:51] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:53] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:12:57] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:00] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:03] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:06] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:10] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:15] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:18] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:21] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:23] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:27] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:31] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:34] "POST /_dash-update-component HTTP/1.1" 200 -
127.0.0.1 - - [31/Jan/2023 22:13:39] "POST /_dash-update-component HTTP/1.1" 200 -
```

In []:

In []:

In []:

Connecting the data to the database server to handle dynamic data

In [175...]:

```
import psycopg2 as psg
```

In [201...]:

```
connection = psg.connect(database="Soil Moisture Data", user="postgres", password="Harsh@2805")
cursor = connection.cursor()
```

In [177...]:

```
cursor.execute("create table jan_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15
connection.commit()
```

In [178...]:

```
for i in jan_22.index:
    vals=[jan_22.at[i,col] for col in list(jan_22.columns)]
    q1="insert into jan_22 values('%s','%s','%s','%d','%d','%d','%s')"%(
        vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])
    cursor.execute(q1)

connection.commit()
```

In []:

In [180...]:

```
cursor.execute("create table feb_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15
connection.commit()
```

In [181...]:

```
for i in feb_22.index:
    vals=[feb_22.at[i,col] for col in list(feb_22.columns)]
    q1="insert into feb_22 values('%s','%s','%s','%d','%d','%d','%s')"%(
        vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])
    cursor.execute(q1)

connection.commit()
```

In []:

In [182...]:

```
cursor.execute("create table march_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at
connection.commit()
```

```
In [183...]  
for i in march_22.index:  
    vals=[march_22.at[i,col] for col in list(march_22.columns)]  
    q1="insert into march_22 values('%s','%s','%s','%d','%d','%d','%s')%(vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])"  
    cursor.execute(q1)  
  
connection.commit()
```

```
In [ ]:
```

```
In [184...]  
cursor.execute("create table apr_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15)  
connection.commit()
```

```
In [185...]  
for i in apr_22.index:  
    vals=[apr_22.at[i,col] for col in list(apr_22.columns)]  
    q1="insert into apr_22 values('%s','%s','%s','%d','%d','%d','%s')%(vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])"  
    cursor.execute(q1)  
  
connection.commit()
```

```
In [ ]:
```

```
In [186...]  
cursor.execute("create table may_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15)  
connection.commit()
```

```
In [187...]  
for i in may_22.index:  
    vals=[may_22.at[i,col] for col in list(may_22.columns)]  
    q1="insert into may_22 values('%s','%s','%s','%d','%d','%d','%s')%(vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])"  
    cursor.execute(q1)  
  
connection.commit()
```

```
In [ ]:
```

```
In [188...]  
cursor.execute("create table jun_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15)  
connection.commit()
```

```
In [189...]  
for i in jun_22.index:  
    vals=[jun_22.at[i,col] for col in list(jun_22.columns)]  
    q1="insert into jun_22 values('%s','%s','%s','%d','%d','%d','%s')%(vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])"  
    cursor.execute(q1)
```

```
connection.commit()
```

In []:

```
In [190... cursor.execute("create table jul_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15 connection.commit()
```

```
In [191... for i in jul_22.index:  
    vals=[jul_22.at[i,col] for col in list(jul_22.columns)]  
    q1="insert into jul_22 values('%s','%s','%s','%d','%d','%d','%s')"% (vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])  
    cursor.execute(q1)  
  
connection.commit()
```

In []:

```
In [192... cursor.execute("create table aug_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15 connection.commit()
```

```
In [202... for i in aug_22.index:  
    vals=[aug_22.at[i,col] for col in list(aug_22.columns)]  
    q1="insert into aug_22 values('%s','%s','%s','%d','%d','%d','%s')"% (vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])  
    cursor.execute(q1)  
  
connection.commit()
```

In []:

```
In [203... cursor.execute("create table sep_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15 connection.commit()
```

```
In [204... for i in sep_22.index:  
    vals=[sep_22.at[i,col] for col in list(sep_22.columns)]  
    q1="insert into sep_22 values('%s','%s','%s','%d','%d','%d','%s')"% (vals[0],vals[1],vals[2],vals[3],vals[4],vals[5])  
    cursor.execute(q1)  
  
connection.commit()
```

In []:

```
In [205... cursor.execute("create table oct_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15 connection.commit()
```

```
In [206... for i in oct_22.index:  
    vals=[oct_22.at[i,col] for col in list(oct_22.columns)]  
    q1="insert into oct_22 values('%s','%s','%s','%d','%d','%d','%s')"% (vals[0],vals[1],vals[2],vals[3],vals[4],vals[5]  
    cursor.execute(q1)  
  
connection.commit()
```

```
In [ ]:
```

```
In [207... cursor.execute("create table nov_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15 connection.commit()
```

```
In [208... for i in nov_22.index:  
    vals=[nov_22.at[i,col] for col in list(nov_22.columns)]  
    q1="insert into nov_22 values('%s','%s','%s','%d','%d','%d','%s')"% (vals[0],vals[1],vals[2],vals[3],vals[4],vals[5]  
    cursor.execute(q1)  
  
connection.commit()
```

```
In [ ]:
```

```
In [209... cursor.execute("create table dec_22 (State varchar(64),District varchar(64),Date date,Year int,Month int,Avg_smlvl_at15 connection.commit()
```

```
In [210... for i in dec_22.index:  
    vals=[dec_22.at[i,col] for col in list(dec_22.columns)]  
    q1="insert into dec_22 values('%s','%s','%s','%d','%d','%d','%s')"% (vals[0],vals[1],vals[2],vals[3],vals[4],vals[5]  
    cursor.execute(q1)  
  
connection.commit()
```

```
In [ ]:
```

```
In [161...]
```