1xvrvywbc

July 31, 2023

```python
[10]: import numpy as np
      import pandas as pd
      import matplotlib.pyplot as plt
      import seaborn as sns
```

```python
[11]: from google.colab import drive
      drive.mount('/content/drive')
```

Drive already mounted at /content/drive; to attempt to forcibly remount, call
drive.mount("/content/drive", force_remount=True).

```python
[12]: df=pd.read_csv("/content/drive/MyDrive/mydatasets/23_Vande Bharat.csv")
      df
```

```
[12]:    Sr. No.                                    Train Name Train Number  \
    0        1          New Delhi – Varanasi Vande Bharat Express  22435/22436
    1        2    New Delhi – Shri Mata Vaishno Devi Katra Vande…  22439/22440
    2        3    Mumbai Central – Gandhinagar Capital Vande Bha…  20901/20902
    3        4        New Delhi – Amb Andaura Vande Bharat Express  22447/22448
    4        5    MGR Chennai Central - Mysuru Vande Bharat Express  20607/20608
    5        6           Bilaspur – Nagpur Vande Bharat Express  20825/20826
    6        7      Howrah – New Jalpaiguri Vande Bharat Express  22301/22302
    7        8   Visakhapatnam – Secunderabad Vande Bharat Express  20833/20834
    8        9          Mumbai CSMT – Solapur Vande Bharat Express  22225/22226
    9       10   Mumbai CSMT – Sainagar Shirdi Vande Bharat Exp…  22223/22224
    10      11   Rani Kamalapati (Habibganj) – Hazrat Nizamuddi…  20171/20172
    11      12       Secunderabad – Tirupati Vande Bharat Express  20701/20702
    12      13   MGR Chennai Central – Coimbatore Vande Bharat …  20643/20644
    13      14       Delhi Cantonment – Ajmer Vande Bharat Express  20977/20978
    14      15   Kasaragod – Thiruvananthapuram Vande Bharat Ex…  20633/20634
    15      16              Howrah – Puri Vande Bharat Express  22895/22896
    16      17   Anand Vihar Terminal – Dehradun Vande Bharat E…  22457/22458
    17      18    New Jalpaiguri – Guwahati Vande Bharat Express  22227/22228
    18      19         Mumbai CSMT – Madgaon Vande Bharat Express  22229/22230
    19      19         Mumbai CSMT – Madgaon Vande Bharat Express  22229/22230
    20      20            Patna – Ranchi Vande Bharat Express  22349/22350
    21      21       KSR Bengaluru – Dharwad Vande Bharat Express  20661/20662
    22      22   Rani Kamalapati (Habibganj) – Jabalpur Vande B…  20173/20174
```

```
23        23              Indore - Bhopal Vande Bharat Express   20911/20912
24        24  Jodhpur - Sabarmati (Ahmedabad) Vande Bharat E…   12461/12462
25        25  Gorakhpur - Lucknow Charbagh Vande Bharat Express   22549/22550

           Originating City        Originating Station      Terminal City  \
0                    Delhi                  New Delhi              Varanasi
1                    Delhi                  New Delhi                 Katra
2                   Mumbai             Mumbai Central           Gandhinagar
3                    Delhi                  New Delhi               Andaura
4                  Chennai            Chennai Central                Mysuru
5     Bilaspur, Chhattisgarh        Bilaspur Junction                Nagpur
6                  Kolkata            Howrah Junction              Siliguri
7            Visakhapatnam      Visakhapatnam Junction            Hyderabad
8                   Mumbai  Chhatrapati Shivaji Terminus           Solapur
9                   Mumbai  Chhatrapati Shivaji Terminus            Shirdi
10                  Bhopal  Habibganj (Rani Kamalapati)             Delhi
11               Hyderabad       Secunderabad Junction             Tirupati
12                 Chennai            Chennai Central            Coimbatore
13                   Delhi           Delhi Cantonment                Ajmer
14               Kasaragod                  Kasaragod  Thiruvananthapuram
15                 Kolkata            Howrah Junction                  Puri
16                   Delhi        Anand Vihar Terminal             Dehradun
17                Siliguri     New Jalpaiguri Junction             Guwahati
18                  Mumbai  Chhatrapati Shivaji Terminus           Madgaon
19                  Mumbai  Chhatrapati Shivaji Terminus           Madgaon
20                   Patna             Patna Junction                Ranchi
21               Bangalore             Bangalore City    Hubballi - Dharwad
22                  Bhopal  Habibganj (Rani Kamalapati)           Jabalpur
23                  Indore            Indore Junction                Bhopal
24                 Jodhpur           Jodhpur Junction             Ahmedabad
25               Gorakhpur         Gorakhpur Junction              Charbagh

              Terminal Station Operator  No. of Cars  \
0               Varanasi Junction       NR           16
1     Shri Mata Vaishno Devi Katra      NR           16
2              Gandhinagar Capital      WR           16
3                      Amb Andaura      NR           16
4                  Mysore Junction      SR           16
5                  Nagpur Junction    SECR            8
6          New Jalpaiguri Junction      ER           16
7            Secunderabad Junction    ECoR           16
8                          Solapur      CR           16
9                  Sainagar Shirdi      CR           16
10               Hazrat Nizamuddin     WCR           16
11                        Tirupati     SCR           16
12              Coimbatore Junction      SR            8
13                   Ajmer Junction     NWR           16
```

```
14      Thiruvananthapuram Central        SR            16
15                              Puri     SER            16
16           Dehradun Terminal           NR             8
17                     Guwahati          NFR            8
18          Madgaon Junction             CR            16
19          Madgaon Junction             CR            16
20           Ranchi Junction             ECR            8
21                      Dharwad          SWR            8
22         Jabalpur Junction             WCR            8
23           Bhopal Junction             WR             8
24        Sabarmati Junction             NWR            8
25          Lucknow Charbagh             NER            8
```

```
                                              Frequency           Distance  \
0                                       Except Thursdays  759 km (472 mi)
1                                        Except Tuesdays  655 km (407 mi)
2                                      Except Wednesdays  522 km (324 mi)
3                                         Except Fridays  412 km (256 mi)
4                                      Except Wednesdays  496 km (308 mi)
5                                       Except Saturdays  412 km (256 mi)
6                                      Except Wednesdays  565 km (351 mi)
7                                         Except Sundays  698 km (434 mi)
8   Except Wednesdays (22225) , Except Thursdays (…  452 km (281 mi)
9                                        Except Tuesdays  339 km (211 mi)
10                                      Except Saturdays  702 km (436 mi)
11                                       Except Tuesdays  661 km (411 mi)
12                                     Except Wednesdays  495 km (308 mi)
13                                     Except Wednesdays  428 km (266 mi)
14                                      Except Thursdays  587 km (365 mi)
15                                      Except Thursdays  500 km (310 mi)
16                                     Except Wednesdays  304 km (189 mi)
17                                       Except Tuesdays  407 km (253 mi)
18                       Except Fridays\n(Non-Monsoon)  586 km (364 mi)
19  Monday, Wednesday, Friday (22229)\nTuesday, Th…  586 km (364 mi)
20                                       Except Tuesdays  379 km (235 mi)
21                                       Except Tuesdays  490 km (300 mi)
22                                       Except Tuesdays  337 km (209 mi)
23                                        Except Sundays  250 km (160 mi)
24                                       Except Tuesdays  449 km (279 mi)
25                                      Except Saturdays  296 km (184 mi)
```

```
            Travel Time             Speed  \
0               08h 00m  130 km/h (81 mph)
1               08h 00m  130 km/h (81 mph)
2               06h 25m  130 km/h (81 mph)
3               05h 10m  130 km/h (81 mph)
4               06h 30m  130 km/h (81 mph)
```

5	05h 30m	130 km/h (81 mph)
6	07h 30m	130 km/h (81 mph)
7	08h 30m	130 km/h (81 mph)
8	06h 30m	110 km/h (68 mph)
9	05h 20m	110 km/h (68 mph)
10	07h 30m	160 km/h (99 mph)
11	08h 15m	130 km/h (81 mph)
12	05h 50m	130 km/h (81 mph)
13	05h 15m	110 km/h (68 mph)
14	08h 05m	110 km/h (68 mph)
15	06h 25m	130 km/h (81 mph)
16	04h 45m	130 km/h (81 mph)
17	05h 30m	110 km/h (68 mph)
18	07h 45m\n(Non-Monsoon)	120 km/h (75 mph)
19	10h 05m\n(Monsoon)	120 km/h (75 mph)
20	06h 00m	130 km/h (81 mph)
21	06h 25m	130 km/h (81 mph)
22	04h 40m	110 km/h (68 mph)
23	03h 05m	110 km/h (68 mph)
24	06h 10m	130 km/h (81 mph)
25	04h 15m	110 km/h (68 mph)

	Average Speed	Inauguration	Average occupancy
0	95 km/h (59 mph)	2/15/2019	126%
1	82 km/h (51 mph)	10/3/2019	114%
2	82 km/h (51 mph)	9/30/2022	132%
3	79 km/h (49 mph)	10/13/2022	70%
4	79 km/h (49 mph)	11/11/2022	75%
5	75 km/h (47 mph)	12/11/2022	96%
6	75 km/h (47 mph)	12/30/2022	100%
7	82 km/h (51 mph)	1/15/2023	120%
8	70 km/h (43 mph)	2/10/2023	100%
9	64 km/h (40 mph)	2/10/2023	93%
10	94 km/h (58 mph)	4/1/2023	90%
11	80 km/h (50 mph)	4/8/2023	110%
12	85 km/h (53 mph)	4/8/2023	150%
13	82 km/h (51 mph)	4/12/2023	70%
14	73 km/h (45 mph)	4/25/2023	177%
15	78 km/h (48 mph)	5/18/2023	99%
16	64 km/h (40 mph)	5/25/2023	100%
17	74 km/h (46 mph)	5/29/2023	91%
18	75 km/h (47 mph)\n(Non-Monsoon)	6/27/2023	94%
19	57 km/h (35 mph)\n(Monsoon)	6/27/2023	94%
20	63 km/h (39 mph)	6/27/2023	118%
21	76 km/h (47 mph)	6/27/2023	72%
22	73 km/h (45 mph)	6/27/2023	44%
23	82 km/h (51 mph)	6/27/2023	37%

```
24                      73 km/h (45 mph)      7/7/2023                    53%
25                      71 km/h (44 mph)      7/7/2023                    77%
```

[13]: `df.head()`

[13]:
```
    Sr. No.                                      Train Name Train Number  \
0         1          New Delhi – Varanasi Vande Bharat Express  22435/22436
1         2  New Delhi – Shri Mata Vaishno Devi Katra Vande…  22439/22440
2         3  Mumbai Central – Gandhinagar Capital Vande Bha…  20901/20902
3         4         New Delhi – Amb Andaura Vande Bharat Express  22447/22448
4         5  MGR Chennai Central – Mysuru Vande Bharat Express  20607/20608

  Originating City Originating Station Terminal City  \
0            Delhi           New Delhi      Varanasi
1            Delhi           New Delhi         Katra
2           Mumbai      Mumbai Central   Gandhinagar
3            Delhi           New Delhi       Andaura
4          Chennai      Chennai Central        Mysuru

                    Terminal Station Operator  No. of Cars          Frequency  \
0                  Varanasi Junction       NR           16    Except Thursdays
1  Shri Mata Vaishno Devi Katra       NR           16     Except Tuesdays
2                Gandhinagar Capital       WR           16  Except Wednesdays
3                       Amb Andaura       NR           16      Except Fridays
4                    Mysore Junction       SR           16  Except Wednesdays

           Distance Travel Time             Speed      Average Speed  \
0  759 km (472 mi)      08h 00m  130 km/h (81 mph)  95 km/h (59 mph)
1  655 km (407 mi)      08h 00m  130 km/h (81 mph)  82 km/h (51 mph)
2  522 km (324 mi)      06h 25m  130 km/h (81 mph)  82 km/h (51 mph)
3  412 km (256 mi)      05h 10m  130 km/h (81 mph)  79 km/h (49 mph)
4  496 km (308 mi)      06h 30m  130 km/h (81 mph)  79 km/h (49 mph)

   Inauguration Average occupancy
0    2/15/2019              126%
1    10/3/2019              114%
2    9/30/2022              132%
3   10/13/2022               70%
4   11/11/2022               75%
```

1 Data Cleaning and Data Preprocessing

[14]: `df.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 26 entries, 0 to 25
```

```
Data columns (total 16 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   Sr. No.             26 non-null     int64
 1   Train Name          26 non-null     object
 2   Train Number        26 non-null     object
 3   Originating City    26 non-null     object
 4   Originating Station 26 non-null     object
 5   Terminal City       26 non-null     object
 6   Terminal Station    26 non-null     object
 7   Operator            26 non-null     object
 8   No. of Cars         26 non-null     int64
 9   Frequency           26 non-null     object
 10  Distance            26 non-null     object
 11  Travel Time         26 non-null     object
 12  Speed               26 non-null     object
 13  Average Speed       26 non-null     object
 14  Inauguration        26 non-null     object
 15  Average occupancy   26 non-null     object
dtypes: int64(2), object(14)
memory usage: 3.4+ KB
```

[15]: `df.describe()`

[15]:
```
          Sr. No.  No. of Cars
count  26.000000    26.000000
mean   13.230769    12.923077
std     7.306478     3.969112
min     1.000000     8.000000
25%     7.250000     8.000000
50%    13.500000    16.000000
75%    19.000000    16.000000
max    25.000000    16.000000
```
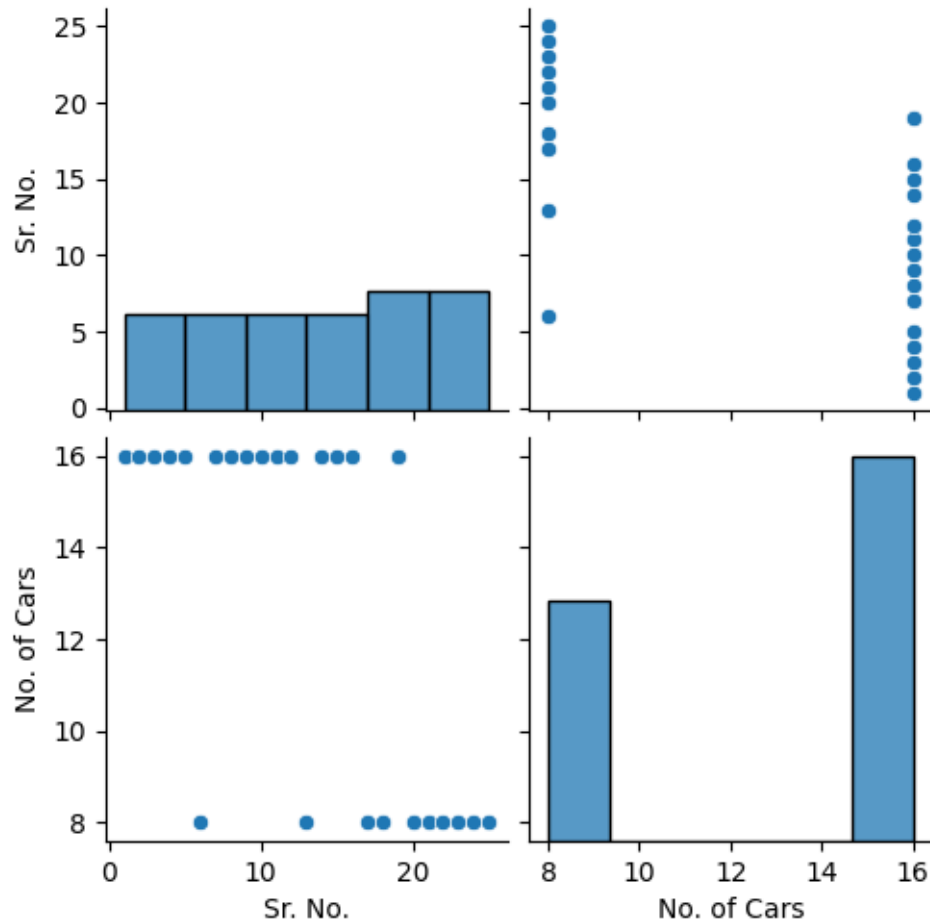
[16]: `df.columns`

[16]:
```
Index(['Sr. No.', 'Train Name', 'Train Number', 'Originating City',
       'Originating Station', 'Terminal City', 'Terminal Station', 'Operator',
       'No. of Cars', 'Frequency', 'Distance', 'Travel Time', 'Speed',
       'Average Speed', 'Inauguration', 'Average occupancy'],
      dtype='object')
```

2 EDA and Visualization

[17]: `sns.pairplot(df)`

[17]: `<seaborn.axisgrid.PairGrid at 0x798442207d60>`

```
[18]: sns.distplot(df['No. of Cars'])
```

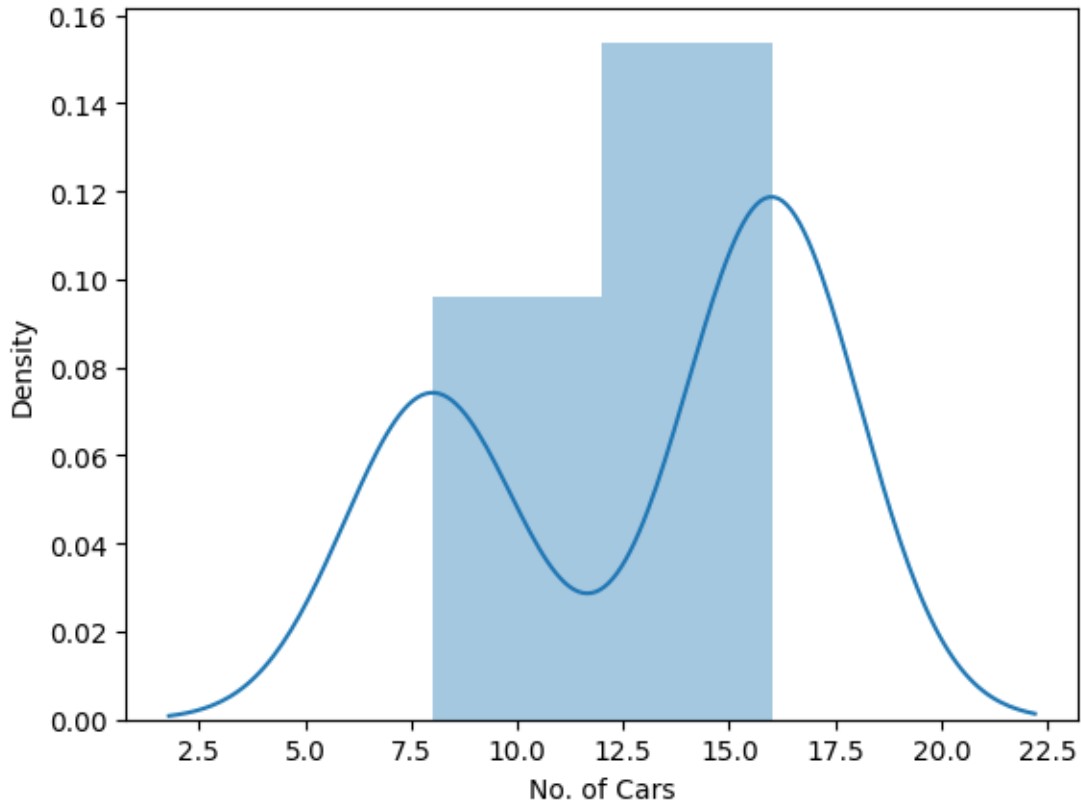<ipython-input-18-e5d0e796fc56>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

```
  sns.distplot(df['No. of Cars'])
```

```
[18]: <Axes: xlabel='No. of Cars', ylabel='Density'>
```

7

```
[19]: df1=df[['Sr. No.', 'Train Name', 'Train Number', 'Originating City',
          'Originating Station', 'Terminal City', 'Terminal Station', 'Operator',
          'No. of Cars', 'Frequency', 'Distance', 'Travel Time', 'Speed',
          'Average Speed', 'Inauguration', 'Average occupancy']]
      df1
```

```
[19]:     Sr. No.                                    Train Name Train Number  \
      0         1          New Delhi – Varanasi Vande Bharat Express  22435/22436
      1         2   New Delhi – Shri Mata Vaishno Devi Katra Vande…  22439/22440
      2         3   Mumbai Central – Gandhinagar Capital Vande Bha…  20901/20902
      3         4          New Delhi – Amb Andaura Vande Bharat Express  22447/22448
      4         5   MGR Chennai Central – Mysuru Vande Bharat Express  20607/20608
      5         6           Bilaspur – Nagpur Vande Bharat Express  20825/20826
      6         7       Howrah – New Jalpaiguri Vande Bharat Express  22301/22302
      7         8   Visakhapatnam – Secunderabad Vande Bharat Express  20833/20834
      8         9          Mumbai CSMT – Solapur Vande Bharat Express  22225/22226
      9        10   Mumbai CSMT – Sainagar Shirdi Vande Bharat Exp…  22223/22224
      10       11   Rani Kamalapati (Habibganj) – Hazrat Nizamuddi…  20171/20172
      11       12        Secunderabad – Tirupati Vande Bharat Express  20701/20702
      12       13   MGR Chennai Central – Coimbatore Vande Bharat …  20643/20644
      13       14       Delhi Cantonment – Ajmer Vande Bharat Express  20977/20978
```

```
14        15    Kasaragod - Thiruvananthapuram Vande Bharat Ex…  20633/20634
15        16                  Howrah - Puri Vande Bharat Express  22895/22896
16        17    Anand Vihar Terminal - Dehradun Vande Bharat E…  22457/22458
17        18      New Jalpaiguri - Guwahati Vande Bharat Express  22227/22228
18        19         Mumbai CSMT - Madgaon Vande Bharat Express  22229/22230
19        19         Mumbai CSMT - Madgaon Vande Bharat Express  22229/22230
20        20              Patna - Ranchi Vande Bharat Express  22349/22350
21        21       KSR Bengaluru - Dharwad Vande Bharat Express  20661/20662
22        22    Rani Kamalapati (Habibganj) - Jabalpur Vande B…  20173/20174
23        23                 Indore - Bhopal Vande Bharat Express  20911/20912
24        24    Jodhpur - Sabarmati (Ahmedabad) Vande Bharat E…  12461/12462
25        25    Gorakhpur - Lucknow Charbagh Vande Bharat Express  22549/22550
```

	Originating City	Originating Station	Terminal City
0	Delhi	New Delhi	Varanasi
1	Delhi	New Delhi	Katra
2	Mumbai	Mumbai Central	Gandhinagar
3	Delhi	New Delhi	Andaura
4	Chennai	Chennai Central	Mysuru
5	Bilaspur, Chhattisgarh	Bilaspur Junction	Nagpur
6	Kolkata	Howrah Junction	Siliguri
7	Visakhapatnam	Visakhapatnam Junction	Hyderabad
8	Mumbai	Chhatrapati Shivaji Terminus	Solapur
9	Mumbai	Chhatrapati Shivaji Terminus	Shirdi
10	Bhopal	Habibganj (Rani Kamalapati)	Delhi
11	Hyderabad	Secunderabad Junction	Tirupati
12	Chennai	Chennai Central	Coimbatore
13	Delhi	Delhi Cantonment	Ajmer
14	Kasaragod	Kasaragod	Thiruvananthapuram
15	Kolkata	Howrah Junction	Puri
16	Delhi	Anand Vihar Terminal	Dehradun
17	Siliguri	New Jalpaiguri Junction	Guwahati
18	Mumbai	Chhatrapati Shivaji Terminus	Madgaon
19	Mumbai	Chhatrapati Shivaji Terminus	Madgaon
20	Patna	Patna Junction	Ranchi
21	Bangalore	Bangalore City	Hubbali – Dharwad
22	Bhopal	Habibganj (Rani Kamalapati)	Jabalpur
23	Indore	Indore Junction	Bhopal
24	Jodhpur	Jodhpur Junction	Ahmedabad
25	Gorakhpur	Gorakhpur Junction	Charbagh

	Terminal Station	Operator	No. of Cars
0	Varanasi Junction	NR	16
1	Shri Mata Vaishno Devi Katra	NR	16
2	Gandhinagar Capital	WR	16
3	Amb Andaura	NR	16
4	Mysore Junction	SR	16

```
5                    Nagpur Junction       SECR        8
6          New Jalpaiguri Junction         ER        16
7            Secunderabad Junction       ECoR        16
8                          Solapur         CR        16
9                  Sainagar Shirdi         CR        16
10             Hazrat Nizamuddin         WCR        16
11                        Tirupati        SCR        16
12            Coimbatore Junction         SR         8
13                 Ajmer Junction        NWR        16
14      Thiruvananthapuram Central        SR        16
15                            Puri        SER        16
16            Dehradun Terminal          NR         8
17                        Guwahati        NFR         8
18            Madgaon Junction           CR        16
19            Madgaon Junction           CR        16
20            Ranchi Junction           ECR         8
21                         Dharwad        SWR         8
22            Jabalpur Junction         WCR         8
23              Bhopal Junction          WR         8
24           Sabarmati Junction         NWR         8
25            Lucknow Charbagh         NER         8
```

```
                                        Frequency          Distance  \
0                                  Except Thursdays  759 km (472 mi)
1                                   Except Tuesdays  655 km (407 mi)
2                                 Except Wednesdays  522 km (324 mi)
3                                     Except Fridays  412 km (256 mi)
4                                 Except Wednesdays  496 km (308 mi)
5                                   Except Saturdays  412 km (256 mi)
6                                 Except Wednesdays  565 km (351 mi)
7                                     Except Sundays  698 km (434 mi)
8   Except Wednesdays (22225) , Except Thursdays (…  452 km (281 mi)
9                                    Except Tuesdays  339 km (211 mi)
10                                  Except Saturdays  702 km (436 mi)
11                                   Except Tuesdays  661 km (411 mi)
12                                 Except Wednesdays  495 km (308 mi)
13                                 Except Wednesdays  428 km (266 mi)
14                                  Except Thursdays  587 km (365 mi)
15                                  Except Thursdays  500 km (310 mi)
16                                 Except Wednesdays  304 km (189 mi)
17                                   Except Tuesdays  407 km (253 mi)
18                        Except Fridays\n(Non-Monsoon)  586 km (364 mi)
19  Monday, Wednesday, Friday (22229)\nTuesday, Th…  586 km (364 mi)
20                                   Except Tuesdays  379 km (235 mi)
21                                   Except Tuesdays  490 km (300 mi)
22                                   Except Tuesdays  337 km (209 mi)
23                                     Except Sundays  250 km (160 mi)
```

```
24                                    Except Tuesdays  449 km (279 mi)
25                                    Except Saturdays  296 km (184 mi)


            Travel Time              Speed  \
0              08h 00m  130 km/h (81 mph)
1              08h 00m  130 km/h (81 mph)
2              06h 25m  130 km/h (81 mph)
3              05h 10m  130 km/h (81 mph)
4              06h 30m  130 km/h (81 mph)
5              05h 30m  130 km/h (81 mph)
6              07h 30m  130 km/h (81 mph)
7              08h 30m  130 km/h (81 mph)
8              06h 30m  110 km/h (68 mph)
9              05h 20m  110 km/h (68 mph)
10             07h 30m  160 km/h (99 mph)
11             08h 15m  130 km/h (81 mph)
12             05h 50m  130 km/h (81 mph)
13             05h 15m  110 km/h (68 mph)
14             08h 05m  110 km/h (68 mph)
15             06h 25m  130 km/h (81 mph)
16             04h 45m  130 km/h (81 mph)
17             05h 30m  110 km/h (68 mph)
18  07h 45m\n(Non-Monsoon)  120 km/h (75 mph)
19      10h 05m\n(Monsoon)  120 km/h (75 mph)
20             06h 00m  130 km/h (81 mph)
21             06h 25m  130 km/h (81 mph)
22             04h 40m  110 km/h (68 mph)
23             03h 05m  110 km/h (68 mph)
24             06h 10m  130 km/h (81 mph)
25             04h 15m  110 km/h (68 mph)


            Average Speed Inauguration Average occupancy
0    95 km/h (59 mph)    2/15/2019             126%
1    82 km/h (51 mph)    10/3/2019             114%
2    82 km/h (51 mph)    9/30/2022             132%
3    79 km/h (49 mph)   10/13/2022              70%
4    79 km/h (49 mph)   11/11/2022              75%
5    75 km/h (47 mph)   12/11/2022              96%
6    75 km/h (47 mph)   12/30/2022             100%
7    82 km/h (51 mph)    1/15/2023             120%
8    70 km/h (43 mph)    2/10/2023             100%
9    64 km/h (40 mph)    2/10/2023              93%
10   94 km/h (58 mph)     4/1/2023              90%
11   80 km/h (50 mph)     4/8/2023             110%
12   85 km/h (53 mph)     4/8/2023             150%
13   82 km/h (51 mph)    4/12/2023              70%
14   73 km/h (45 mph)    4/25/2023             177%
```

11

```
15                78 km/h (48 mph)   5/18/2023    99%
16                64 km/h (40 mph)   5/25/2023   100%
17                74 km/h (46 mph)   5/29/2023    91%
18  75 km/h (47 mph)\n(Non-Monsoon)  6/27/2023    94%
19    57 km/h (35 mph)\n(Monsoon)    6/27/2023    94%
20                63 km/h (39 mph)   6/27/2023   118%
21                76 km/h (47 mph)   6/27/2023    72%
22                73 km/h (45 mph)   6/27/2023    44%
23                82 km/h (51 mph)   6/27/2023    37%
24                73 km/h (45 mph)    7/7/2023    53%
25                71 km/h (44 mph)    7/7/2023    77%
```
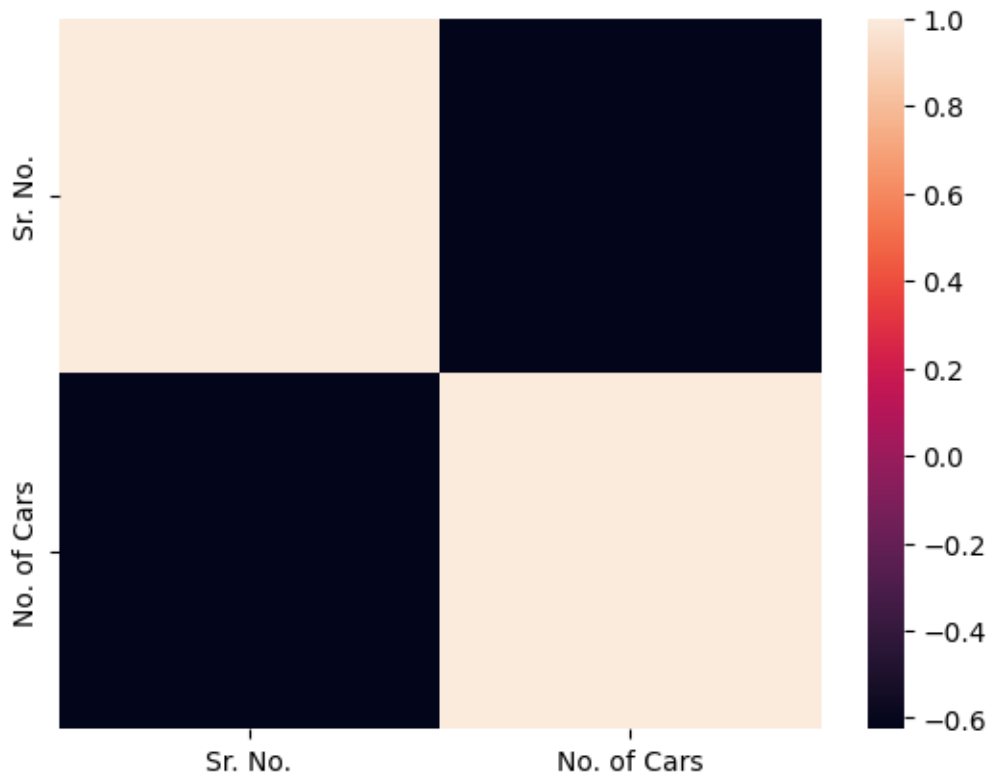
[20]: `sns.heatmap(df1.corr())`

<ipython-input-20-3ed1a1a51dc0>:1: FutureWarning: The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the value of numeric_only to silence this warning.
  sns.heatmap(df1.corr())

[20]: <Axes: >

```
[21]: x=df1[['Sr. No.','Sr. No.']]
      y=df1['No. of Cars']
```

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

```
[23]: from sklearn.linear_model import LinearRegression
      lr=LinearRegression()
      lr.fit(x_train,y_train)
```

```
[23]: LinearRegression()
```

```
[24]: print(lr.intercept_)
```

```
      17.618302850126025
```

```
[25]: coeff=pd.DataFrame(lr.coef_,x.columns,columns=['Co-efficient'])
      coeff
```

```
[25]:         Co-efficient
      Sr. No.     -0.185872
      Sr. No.     -0.185872
```

```
[26]: prediction =lr.predict(x_test)
      plt.scatter(y_test,prediction)
```

```
[26]: <matplotlib.collections.PathCollection at 0x79843fb0c6a0>
```
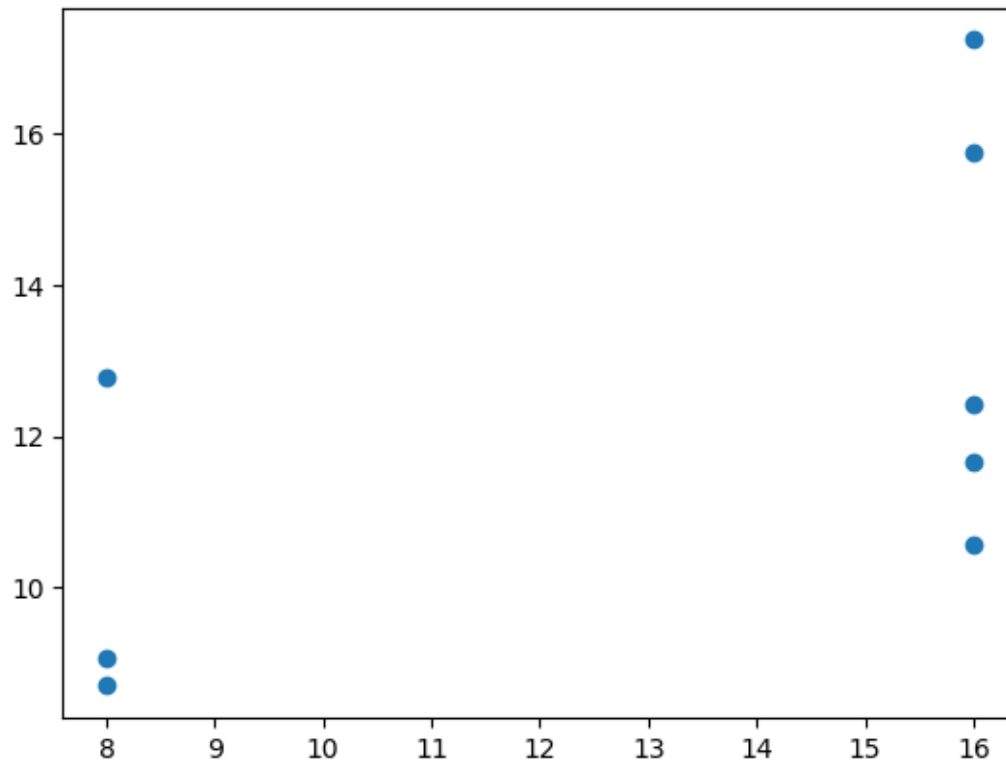
[27]: `lr.score(x_test,y_test)`

[27]: 0.27173348247432116

[28]: `lr.score(x_train,y_train)`

[28]: 0.4339028773204434

[29]:
```python
from sklearn.linear_model import Ridge,Lasso
```

[30]:
```python
rr=Ridge(alpha=10)
rr.fit(x_train,y_train)
```

[30]: `Ridge(alpha=10)`

[31]: `rr.score(x_test,y_test)`

[31]: 0.27334693109786934

[32]: `rr.score(x_train,y_train)`

[32]: 0.433888366535222

```
[33]: la=Lasso(alpha=10)
      la.fit(x_train,y_train)
```

[33]: Lasso(alpha=10)

```
[34]: la.score(x_test,y_test)
```

[34]: 0.2546770170115573

```
[35]: la.score(x_train,y_train)
```

[35]: 0.29623113911874965

```
[36]: from sklearn.linear_model import ElasticNet
      en=ElasticNet()
      en.fit(x_train,y_train)
```

[36]: ElasticNet()

```
[37]: en.coef_
```

[37]: array([-0.18053795, -0.17886385])

```
[38]: en.intercept_
```

[38]: 17.461278460100907

```
[39]: prediction = en.predict(x_test)
      prediction
```

[39]: array([12.42965326, 12.78905506, 9.19503705, 11.71084965, 17.10187666,
             10.63264425, 15.66426946, 8.83563525])

```
[40]: en.score(x_test,y_test)
```

[40]: 0.2804917533276329

```
[41]: from sklearn import metrics
```

```
[42]: print("Mean Absolute Error: ", metrics.mean_absolute_error(y_test,prediction))
```

      Mean Absolute Error: 2.685523424687383

```
[43]: print("Mean Squared Error: ", metrics.mean_squared_error(y_test,prediction))
```

      Mean Squared Error: 10.792623700085507

```
[44]: print("Root Mean Squared Error: ", np.sqrt(metrics.
        ↪mean_squared_error(y_test,prediction)))
```

Root Mean Squared Error: 3.285212885048016

```
[45]: import pickle
      filename='prediction'
      pickle.dump(lr,open(filename,'wb'))
```

```
[46]: model = pickle.load(open(filename, 'rb'))
      real=[[10,2],[11,45]]
      result = model.predict(real)
      result
```

/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does
not have valid feature names, but LinearRegression was fitted with feature names
  warnings.warn(

```
[46]: array([15.38783688,  7.20946164])
```