

# Avocado\_sales

July 3, 2025

```
[477]: import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

```
[8]: Avocado_sales=pd.read_csv("avocado.csv")
```

```
[10]: Avocado_sales.head()#first five rows
```

```
[10]: Unnamed: 0      Date  AveragePrice  Total Volume      4046      4225  \
0          0  12/27/2015          1.33      64236.62  1036.74  54454.85
1          1  12/20/2015          1.35      54876.98   674.28  44638.81
2          2  12/13/2015          0.93     118220.22   794.70 109149.67
3          3   12/6/2015          1.08      78992.15  1132.00   71976.41
4          4  11/29/2015          1.28      51039.60   941.48   43838.39

      4770  Total Bags  Small Bags  Large Bags  XLarge Bags      type  \
0    48.16    8696.87    8603.62      93.25          0.0  conventional
1    58.33    9505.56    9408.07      97.49          0.0  conventional
2   130.50    8145.35    8042.21     103.14          0.0  conventional
3    72.58    5811.16    5677.40     133.76          0.0  conventional
4    75.78    6183.95    5986.26     197.69          0.0  conventional

      year  region
0   2015  Albany
1   2015  Albany
2   2015  Albany
3   2015  Albany
4   2015  Albany
```

```
[12]: Avocado_sales.tail()#last five rows
```

```
[12]: Unnamed: 0      Date  AveragePrice  Total Volume      4046      4225  \
18244          7   2/4/2018          1.63      17074.83  2046.96  1529.20
18245          8  1/28/2018          1.71      13888.04  1191.70  3431.50
18246          9  1/21/2018          1.87      13766.76  1191.92  2452.79
18247         10  1/14/2018          1.93      16205.22  1527.63  2981.04
18248         11   1/7/2018          1.62      17489.58  2894.77  2356.13
```

	4770	Total Bags	Small Bags	Large Bags	XLarge Bags	type	year	\
18244	0.00	13498.67	13066.82	431.85	0.0	organic	2018	
18245	0.00	9264.84	8940.04	324.80	0.0	organic	2018	
18246	727.94	9394.11	9351.80	42.31	0.0	organic	2018	
18247	727.01	10969.54	10919.54	50.00	0.0	organic	2018	
18248	224.53	12014.15	11988.14	26.01	0.0	organic	2018	

	region
18244	WestTexNewMexico
18245	WestTexNewMexico
18246	WestTexNewMexico
18247	WestTexNewMexico
18248	WestTexNewMexico

```
[14]: Avocado_sales.describe()#find the descriptive statistics
```

```
[14]:
```

	Unnamed: 0	AveragePrice	Total Volume	4046	4225	\
count	18249.000000	18249.000000	1.824900e+04	1.824900e+04	1.824900e+04	
mean	24.232232	1.405978	8.506440e+05	2.930084e+05	2.951546e+05	
std	15.481045	0.402677	3.453545e+06	1.264989e+06	1.204120e+06	
min	0.000000	0.440000	8.456000e+01	0.000000e+00	0.000000e+00	
25%	10.000000	1.100000	1.083858e+04	8.540700e+02	3.008780e+03	
50%	24.000000	1.370000	1.073768e+05	8.645300e+03	2.906102e+04	
75%	38.000000	1.660000	4.329623e+05	1.110202e+05	1.502069e+05	
max	52.000000	3.250000	6.250565e+07	2.274362e+07	2.047057e+07	

	4770	Total Bags	Small Bags	Large Bags	XLarge Bags	\
count	1.824900e+04	1.824900e+04	1.824900e+04	1.824900e+04	18249.000000	
mean	2.283974e+04	2.396392e+05	1.821947e+05	5.433809e+04	3106.426507	
std	1.074641e+05	9.862424e+05	7.461785e+05	2.439660e+05	17692.894652	
min	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000	
25%	0.000000e+00	5.088640e+03	2.849420e+03	1.274700e+02	0.000000	
50%	1.849900e+02	3.974383e+04	2.636282e+04	2.647710e+03	0.000000	
75%	6.243420e+03	1.107834e+05	8.333767e+04	2.202925e+04	132.500000	
max	2.546439e+06	1.937313e+07	1.338459e+07	5.719097e+06	551693.650000	

	year
count	18249.000000
mean	2016.147899
std	0.939938
min	2015.000000
25%	2015.000000
50%	2016.000000
75%	2017.000000
max	2018.000000

```
[16]: Avocado_sales.info()#check for null vaues
```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 18249 entries, 0 to 18248
Data columns (total 14 columns):
#   Column                Non-Null Count  Dtype
---  -
0   Unnamed: 0            18249 non-null  int64
1   Date                  18249 non-null  object
2   AveragePrice          18249 non-null  float64
3   Total Volume         18249 non-null  float64
4   4046                  18249 non-null  float64
5   4225                  18249 non-null  float64
6   4770                  18249 non-null  float64
7   Total Bags            18249 non-null  float64
8   Small Bags            18249 non-null  float64
9   Large Bags            18249 non-null  float64
10  XLarge Bags           18249 non-null  float64
11  type                  18249 non-null  object
12  year                  18249 non-null  int64
13  region                18249 non-null  object
dtypes: float64(9), int64(2), object(3)
memory usage: 1.9+ MB

```

```
[24]: print(Avocado_sales.dtypes)#check the data types for columns
```

```

Unnamed: 0      int64
Date            object
AveragePrice    float64
Total Volume    float64
4046            float64
4225            float64
4770            float64
Total Bags      float64
Small Bags      float64
Large Bags      float64
XLarge Bags     float64
type            object
year            int64
region          object
dtype: object

```

```
[28]: Avocado_sales.isnull().sum()#check for null values
```

```

[28]: Unnamed: 0      0
      Date           0
      AveragePrice    0
      Total Volume    0
      4046            0
      4225            0

```

```

4770      0
Total Bags      0
Small Bags      0
Large Bags      0
XLarge Bags     0
type            0
year           0
region         0
dtype: int64

```

```
[32]: print(Avocado_sales.drop_duplicates())
```

	Unnamed: 0	Date	AveragePrice	Total Volume	4046	4225	\
0	0	12/27/2015	1.33	64236.62	1036.74	54454.85	
1	1	12/20/2015	1.35	54876.98	674.28	44638.81	
2	2	12/13/2015	0.93	118220.22	794.70	109149.67	
3	3	12/6/2015	1.08	78992.15	1132.00	71976.41	
4	4	11/29/2015	1.28	51039.60	941.48	43838.39	
...	...	...	...	...	...	...	
18244	7	2/4/2018	1.63	17074.83	2046.96	1529.20	
18245	8	1/28/2018	1.71	13888.04	1191.70	3431.50	
18246	9	1/21/2018	1.87	13766.76	1191.92	2452.79	
18247	10	1/14/2018	1.93	16205.22	1527.63	2981.04	
18248	11	1/7/2018	1.62	17489.58	2894.77	2356.13	

	4770	Total Bags	Small Bags	Large Bags	XLarge Bags	type	\
0	48.16	8696.87	8603.62	93.25	0.0	conventional	
1	58.33	9505.56	9408.07	97.49	0.0	conventional	
2	130.50	8145.35	8042.21	103.14	0.0	conventional	
3	72.58	5811.16	5677.40	133.76	0.0	conventional	
4	75.78	6183.95	5986.26	197.69	0.0	conventional	
...	...	...	...	...	...	...	
18244	0.00	13498.67	13066.82	431.85	0.0	organic	
18245	0.00	9264.84	8940.04	324.80	0.0	organic	
18246	727.94	9394.11	9351.80	42.31	0.0	organic	
18247	727.01	10969.54	10919.54	50.00	0.0	organic	
18248	224.53	12014.15	11988.14	26.01	0.0	organic	

	year	region
0	2015	Albany
1	2015	Albany
2	2015	Albany
3	2015	Albany
4	2015	Albany
...	...	...
18244	2018	WestTexNewMexico
18245	2018	WestTexNewMexico
18246	2018	WestTexNewMexico

```
18247 2018 WestTexNewMexico
18248 2018 WestTexNewMexico
```

[18249 rows x 14 columns]

```
[44]: Avocado_sales.query('region=="Albany"')#rows with ovacodo in the region of
      ↪Albany
```

```
[44]:      Unnamed: 0      Date  AveragePrice  Total Volume      4046      4225  \
0          0  12/27/2015          1.33      64236.62  1036.74  54454.85
1          1  12/20/2015          1.35      54876.98   674.28  44638.81
2          2  12/13/2015          0.93     118220.22   794.70  109149.67
3          3   12/6/2015          1.08      78992.15  1132.00   71976.41
4          4  11/29/2015          1.28      51039.60   941.48   43838.39
...      ...      ...      ...      ...      ...      ...
17608      7    2/4/2018          1.52      4124.96   118.38    420.36
17609      8    1/28/2018          1.32      6987.56   433.66    374.96
17610      9    1/21/2018          1.54      3346.54    14.67    253.01
17611     10    1/14/2018          1.47      4140.95     7.30    301.87
17612     11    1/7/2018          1.54      4816.90    43.51    412.17
```

```
      4770  Total Bags  Small Bags  Large Bags  XLarge Bags      type  \
0      48.16    8696.87    8603.62      93.25         0.0  conventional
1      58.33    9505.56    9408.07      97.49         0.0  conventional
2     130.50    8145.35    8042.21     103.14         0.0  conventional
3      72.58    5811.16    5677.40     133.76         0.0  conventional
4      75.78    6183.95    5986.26     197.69         0.0  conventional
...      ...      ...      ...      ...      ...
17608     0.00    3586.22    3586.22       0.00         0.0      organic
17609     0.00    6178.94    6178.94       0.00         0.0      organic
17610     0.00    3078.86    3078.86       0.00         0.0      organic
17611     0.00    3831.78    3831.78       0.00         0.0      organic
17612     0.00    4361.22    4357.89       3.33         0.0      organic
```

```
      year  region
0      2015  Albany
1      2015  Albany
2      2015  Albany
3      2015  Albany
4      2015  Albany
...      ...      ...
17608  2018  Albany
17609  2018  Albany
17610  2018  Albany
17611  2018  Albany
17612  2018  Albany
```

[338 rows x 14 columns]

```
[64]: Avocado_sales.groupby("year").sum()#display all the years in the dataset
```

```
[64]: Unnamed: 0 Date \
year
2015      143157  12/27/201512/20/201512/13/201512/6/201511/29/2...
2016      143208  12/25/201612/18/201612/11/201612/4/201611/27/2...
2017      148721  12/31/201712/24/201712/17/201712/10/201712/3/2...
2018         7128  3/25/20183/18/20183/11/20183/4/20182/25/20182/...

      AveragePrice  Total Volume      4046      4225      4770 \
year
2015      7723.94  4.385469e+09  1.709450e+09  1.761054e+09  1.427724e+08
2016      7517.80  4.820890e+09  1.525123e+09  1.672728e+09  1.598798e+08
2017      8669.56  4.934306e+09  1.652038e+09  1.544735e+09  9.121751e+07
2018      1746.40  1.382738e+09  4.604997e+08  4.077587e+08  2.293259e+07

      Total Bags      Small Bags      Large Bags  XLarge Bags \
year
2015  7.721922e+08  6.346827e+08  1.320664e+08   5443128.28
2016  1.463159e+09  1.106494e+09  3.366263e+08  20038284.84
2017  1.646289e+09  1.222953e+09  3.993390e+08  23997172.34
2018  4.915359e+08  3.607414e+08  1.235840e+08   7210591.87

      type \
year
2015  conventionalconventionalconventionalconvention...
2016  conventionalconventionalconventionalconvention...
2017  conventionalconventionalconventionalconvention...
2018  conventionalconventionalconventionalconvention...

      region
year
2015  AlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlba...
2016  AlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlba...
2017  AlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlba...
2018  AlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlba...
```

```
[74]: Avocado_sales.groupby("year")["Small Bags"].sum()# total number of small bags
      sold per year
```

```
[74]: year
2015      6.346827e+08
2016      1.106494e+09
2017      1.222953e+09
2018      3.607414e+08
```

Name: Small Bags, dtype: float64

```
[76]: Avocado_sales.groupby("year")["Large Bags"].sum()# total number of large bags sold per year
```

```
[76]: year
      2015    1.320664e+08
      2016    3.366263e+08
      2017    3.993390e+08
      2018    1.235840e+08
      Name: Large Bags, dtype: float64
```

```
[78]: Avocado_sales.groupby("year")["XLarge Bags"].sum()# total number of xlarge bags sold per year
```

```
[78]: year
      2015    5443128.28
      2016    20038284.84
      2017    23997172.34
      2018     7210591.87
      Name: XLarge Bags, dtype: float64
```

```
[80]: Avocado_sales.groupby("year")["XLarge Bags"].sum().reset_index()#convert the series to a dataframe
```

```
[80]:   year  XLarge Bags
0  2015    5443128.28
1  2016   20038284.84
2  2017   23997172.34
3  2018    7210591.87
```

```
[82]: Avocado_sales.groupby("year")["Large Bags"].sum().reset_index()
```

```
[82]:   year    Large Bags
0  2015    1.320664e+08
1  2016    3.366263e+08
2  2017    3.993390e+08
3  2018    1.235840e+08
```

```
[84]: Avocado_sales.groupby("year")["Small Bags"].sum().reset_index()
```

```
[84]:   year    Small Bags
0  2015    6.346827e+08
1  2016    1.106494e+09
2  2017    1.222953e+09
3  2018    3.607414e+08
```

```
[124]: Avocado_sales.groupby("region").sum()#display all regions and their total  
      ↪values
```

```
[124]: Unnamed: 0  \  
region  
Albany          8192  
Atlanta         8192  
BaltimoreWashington 8192  
Boise           8192  
Boston          8192  
BuffaloRochester 8192  
California      8192  
Charlotte       8192  
Chicago         8192  
CincinnatiDayton 8192  
Columbus        8192  
DallasFtWorth   8192  
Denver          8192  
Detroit         8192  
GrandRapids     8192  
GreatLakes      8192  
HarrisburgScranton 8192  
HartfordSpringfield 8192  
Houston         8192  
Indianapolis    8192  
Jacksonville    8192  
LasVegas        8192  
LosAngeles      8192  
Louisville      8192  
MiamiFtLauderdale 8192  
Midsouth        8192  
Nashville       8192  
NewOrleansMobile 8192  
NewYork         8192  
Northeast       8192  
NorthernNewEngland 8192  
Orlando         8192  
Philadelphia    8192  
PhoenixTucson   8192  
Pittsburgh      8192  
Plains          8192  
Portland        8192  
RaleighGreensboro 8192  
RichmondNorfolk 8192  
Roanoke         8192  
Sacramento      8192  
SanDiego        8192
```



SanFrancisco	8192
Seattle	8192
SouthCarolina	8192
SouthCentral	8192
Southeast	8192
Spokane	8192
StLouis	8192
Syracuse	8192
Tampa	8192
TotalUS	8192
West	8192
WestTexNewMexico	8038

Date \

region	
Albany	12/27/201512/20/201512/13/201512/6/201511/29/2...
Atlanta	12/27/201512/20/201512/13/201512/6/201511/29/2...
BaltimoreWashington	12/27/201512/20/201512/13/201512/6/201511/29/2...
Boise	12/27/201512/20/201512/13/201512/6/201511/29/2...
Boston	12/27/201512/20/201512/13/201512/6/201511/29/2...
BuffaloRochester	12/27/201512/20/201512/13/201512/6/201511/29/2...
California	12/27/201512/20/201512/13/201512/6/201511/29/2...
Charlotte	12/27/201512/20/201512/13/201512/6/201511/29/2...
Chicago	12/27/201512/20/201512/13/201512/6/201511/29/2...
CincinnatiDayton	12/27/201512/20/201512/13/201512/6/201511/29/2...
Columbus	12/27/201512/20/201512/13/201512/6/201511/29/2...
DallasFtWorth	12/27/201512/20/201512/13/201512/6/201511/29/2...
Denver	12/27/201512/20/201512/13/201512/6/201511/29/2...
Detroit	12/27/201512/20/201512/13/201512/6/201511/29/2...
GrandRapids	12/27/201512/20/201512/13/201512/6/201511/29/2...
GreatLakes	12/27/201512/20/201512/13/201512/6/201511/29/2...
HarrisburgScranton	12/27/201512/20/201512/13/201512/6/201511/29/2...
HartfordSpringfield	12/27/201512/20/201512/13/201512/6/201511/29/2...
Houston	12/27/201512/20/201512/13/201512/6/201511/29/2...
Indianapolis	12/27/201512/20/201512/13/201512/6/201511/29/2...
Jacksonville	12/27/201512/20/201512/13/201512/6/201511/29/2...
LasVegas	12/27/201512/20/201512/13/201512/6/201511/29/2...
LosAngeles	12/27/201512/20/201512/13/201512/6/201511/29/2...
Louisville	12/27/201512/20/201512/13/201512/6/201511/29/2...
MiamiFtLauderdale	12/27/201512/20/201512/13/201512/6/201511/29/2...
Midsouth	12/27/201512/20/201512/13/201512/6/201511/29/2...
Nashville	12/27/201512/20/201512/13/201512/6/201511/29/2...
NewOrleansMobile	12/27/201512/20/201512/13/201512/6/201511/29/2...
NewYork	12/27/201512/20/201512/13/201512/6/201511/29/2...
Northeast	12/27/201512/20/201512/13/201512/6/201511/29/2...
NorthernNewEngland	12/27/201512/20/201512/13/201512/6/201511/29/2...
Orlando	12/27/201512/20/201512/13/201512/6/201511/29/2...

Philadelphia	12/27/201512/20/201512/13/201512/6/201511/29/2...
PhoenixTucson	12/27/201512/20/201512/13/201512/6/201511/29/2...
Pittsburgh	12/27/201512/20/201512/13/201512/6/201511/29/2...
Plains	12/27/201512/20/201512/13/201512/6/201511/29/2...
Portland	12/27/201512/20/201512/13/201512/6/201511/29/2...
RaleighGreensboro	12/27/201512/20/201512/13/201512/6/201511/29/2...
RichmondNorfolk	12/27/201512/20/201512/13/201512/6/201511/29/2...
Roanoke	12/27/201512/20/201512/13/201512/6/201511/29/2...
Sacramento	12/27/201512/20/201512/13/201512/6/201511/29/2...
SanDiego	12/27/201512/20/201512/13/201512/6/201511/29/2...
SanFrancisco	12/27/201512/20/201512/13/201512/6/201511/29/2...
Seattle	12/27/201512/20/201512/13/201512/6/201511/29/2...
SouthCarolina	12/27/201512/20/201512/13/201512/6/201511/29/2...
SouthCentral	12/27/201512/20/201512/13/201512/6/201511/29/2...
Southeast	12/27/201512/20/201512/13/201512/6/201511/29/2...
Spokane	12/27/201512/20/201512/13/201512/6/201511/29/2...
StLouis	12/27/201512/20/201512/13/201512/6/201511/29/2...
Syracuse	12/27/201512/20/201512/13/201512/6/201511/29/2...
Tampa	12/27/201512/20/201512/13/201512/6/201511/29/2...
TotalUS	12/27/201512/20/201512/13/201512/6/201511/29/2...
West	12/27/201512/20/201512/13/201512/6/201511/29/2...
WestTexNewMexico	12/27/201512/20/201512/13/201512/6/201511/29/2...

	AveragePrice	Total	Volume	4046	4225 \
region					
Albany	527.63	1.606780e+07	6.165396e+05	1.271597e+07	
Atlanta	452.23	8.860512e+07	4.938750e+07	1.055186e+07	
BaltimoreWashington	518.57	1.347139e+08	1.205180e+07	8.314222e+07	
Boise	455.67	1.441319e+07	6.766594e+06	1.170049e+06	
Boston	517.44	9.727398e+07	1.688178e+06	7.240631e+07	
BuffaloRochester	512.69	2.296247e+07	6.005149e+05	1.070242e+07	
California	471.62	1.028982e+09	3.989670e+08	3.514914e+08	
Charlotte	542.84	3.555554e+07	7.563811e+06	1.238027e+07	
Chicago	526.19	1.337023e+08	1.084408e+07	8.602744e+07	
CincinnatiDayton	408.71	4.452201e+07	1.829154e+06	2.063791e+07	
Columbus	423.44	2.999336e+07	1.258613e+07	5.715680e+06	
DallasFtWorth	366.93	2.084193e+08	1.105565e+08	4.717049e+07	
Denver	411.88	1.389025e+08	2.642885e+07	5.081051e+07	
Detroit	431.32	6.342242e+07	1.878315e+07	1.176218e+07	
GrandRapids	508.69	3.021174e+07	4.932665e+05	1.724153e+07	
GreatLakes	452.43	5.896425e+08	9.371701e+07	2.672577e+08	
HarrisburgScranton	511.49	4.180886e+07	7.515521e+06	2.068974e+07	
HartfordSpringfield	614.70	5.067054e+07	1.319654e+06	3.784762e+07	
Houston	354.20	2.031679e+08	9.977290e+07	4.772443e+07	
Indianapolis	444.13	3.026339e+07	2.425510e+06	1.446384e+07	
Jacksonville	510.70	2.879000e+07	1.547171e+07	3.526740e+06	
LasVegas	466.75	5.437691e+07	1.978713e+07	1.536442e+07	

LosAngeles	411.01	5.078965e+08	2.238794e+08	1.021340e+08
Louisville	434.90	1.609700e+07	7.095510e+05	8.412668e+06
MiamiFtLauderdale	482.83	9.767322e+07	5.914010e+07	1.491128e+07
Midsouth	474.81	5.083494e+08	1.104306e+08	2.223731e+08
Nashville	409.69	3.561209e+07	1.818888e+07	3.810509e+06
NewOrleansMobile	441.02	4.569514e+07	2.680474e+07	4.413219e+06
NewYork	583.92	2.407341e+08	7.639327e+06	1.633538e+08
Northeast	541.45	7.132809e+08	3.499121e+07	4.744847e+08
NorthernNewEngland	499.36	7.153289e+07	2.703231e+06	5.360925e+07
Orlando	509.10	5.866070e+07	3.339091e+07	8.359597e+06
Philadelphia	551.66	7.183880e+07	4.615201e+06	4.274843e+07
PhoenixTucson	413.86	1.956433e+08	1.154277e+08	3.915799e+07
Pittsburgh	461.14	1.880635e+07	3.972436e+06	7.301481e+06
Plains	485.54	3.111885e+08	1.435114e+08	8.733534e+07
Portland	445.39	1.105522e+08	2.320793e+07	3.498566e+07
RaleighGreensboro	525.63	4.820273e+07	1.182081e+07	1.667812e+07
RichmondNorfolk	436.47	4.223085e+07	1.247685e+07	1.607636e+07
Roanoke	421.80	2.504201e+07	7.452946e+06	7.971539e+06
Sacramento	548.09	7.516375e+07	2.345140e+07	4.117691e+07
SanDiego	472.58	8.979192e+07	3.408267e+07	2.925846e+07
SanFrancisco	609.82	1.358302e+08	3.413689e+07	8.315306e+07
Seattle	487.59	1.092142e+08	2.146665e+07	3.604078e+07
SouthCarolina	474.31	6.075377e+07	2.841036e+07	1.263186e+07
SouthCentral	372.22	1.011280e+09	5.350414e+08	2.204500e+08
Southeast	472.53	6.152384e+08	3.396871e+08	9.086044e+07
Spokane	488.61	1.556528e+07	4.104071e+06	4.926610e+06
StLouis	483.55	3.207283e+07	1.351085e+07	3.799460e+06
Syracuse	513.87	1.094267e+07	3.317887e+05	6.390341e+06
Tampa	476.19	6.600454e+07	3.574775e+07	1.072111e+07
TotalUS	445.83	5.864740e+09	2.054936e+09	2.015012e+09
West	430.01	1.086779e+09	3.985905e+08	3.007589e+08
WestTexNewMexico	422.67	1.445218e+08	8.407739e+07	2.217846e+07

	4770	Total Bags	Small Bags	Large Bags \
region				
Albany	5.503733e+04	2.680255e+06	2.246945e+06	3.898817e+05
Atlanta	1.052484e+05	2.856051e+07	1.744274e+07	1.083968e+07
BaltimoreWashington	4.213755e+06	3.530615e+07	3.411761e+07	9.815468e+05
Boise	1.077134e+06	5.399412e+06	4.677933e+06	7.110283e+05
Boston	1.684016e+06	2.149548e+07	1.991043e+07	1.500167e+06
BuffaloRochester	4.878556e+04	1.161075e+07	1.026843e+07	1.260419e+06
California	3.184105e+07	2.466822e+08	2.290977e+08	1.231194e+07
Charlotte	3.913522e+06	1.169794e+07	1.064385e+07	9.844872e+05
Chicago	1.996539e+07	1.686540e+07	1.479465e+07	1.691875e+06
CincinnatiDayton	1.156307e+06	2.089792e+07	5.661894e+06	1.497219e+07
Columbus	1.675076e+06	1.001639e+07	8.070793e+06	1.724880e+06
DallasFtWorth	4.222574e+06	4.646975e+07	4.082174e+07	5.215721e+06

Denver	2.706165e+06	5.895701e+07	1.876361e+07	4.014092e+07
Detroit	8.614803e+06	2.426007e+07	1.993907e+07	2.671969e+06
GrandRapids	3.307837e+06	9.169094e+06	7.533477e+06	7.968005e+05
GreatLakes	5.007597e+07	1.785756e+08	1.232875e+08	4.889564e+07
HarrisburgScranton	7.434063e+04	1.352925e+07	1.277287e+07	6.017658e+05
HartfordSpringfield	1.702536e+05	1.133301e+07	1.077856e+07	4.768482e+05
Houston	5.455471e+06	5.021506e+07	3.252517e+07	1.736376e+07
Indianapolis	1.391161e+06	1.198081e+07	6.611064e+06	5.086256e+06
Jacksonville	7.342605e+04	9.718127e+06	4.339787e+06	5.273004e+06
LasVegas	1.172357e+06	1.805299e+07	8.977623e+06	9.059315e+06
LosAngeles	1.361869e+07	1.682645e+08	1.557261e+08	8.463145e+06
Louisville	3.394967e+05	6.635289e+06	2.814241e+06	3.713125e+06
MiamiFtLauderdale	1.054005e+05	2.351644e+07	1.121997e+07	1.199081e+07
Midsouth	1.903196e+07	1.565136e+08	1.343644e+08	2.077087e+07
Nashville	6.455284e+05	1.296717e+07	1.004279e+07	2.812894e+06
NewOrleansMobile	2.082379e+05	1.426894e+07	1.185955e+07	1.896699e+06
NewYork	1.746802e+06	6.799416e+07	5.840168e+07	9.232998e+06
Northeast	6.816645e+06	1.969884e+08	1.736230e+08	2.205605e+07
NorthernNewEngland	1.315387e+06	1.390503e+07	1.127697e+07	2.517406e+06
Orlando	4.856253e+04	1.686164e+07	8.927879e+06	7.690514e+06
Philadelphia	5.999311e+05	2.387523e+07	2.141702e+07	2.352056e+06
PhoenixTucson	2.149380e+06	3.890824e+07	2.227263e+07	1.648070e+07
Pittsburgh	2.869658e+05	7.245462e+06	5.408180e+06	1.779697e+06
Plains	2.494474e+06	7.784720e+07	6.876062e+07	7.973644e+06
Portland	2.854265e+06	4.950436e+07	4.150862e+07	7.917725e+06
RaleighGreensboro	4.027114e+06	1.567668e+07	1.504048e+07	5.411461e+05
RichmondNorfolk	1.169414e+06	1.250823e+07	1.165650e+07	7.279409e+05
Roanoke	2.653218e+04	9.590988e+06	8.456339e+06	1.055164e+06
Sacramento	1.553161e+06	8.982268e+06	8.696841e+06	7.671504e+04
SanDiego	3.108122e+06	2.334267e+07	2.027579e+07	2.921824e+06
SanFrancisco	3.649315e+06	1.489092e+07	1.450235e+07	1.769392e+05
Seattle	1.015345e+06	5.069140e+07	4.244714e+07	8.175948e+06
SouthCarolina	1.558374e+06	1.815317e+07	1.341335e+07	4.513256e+06
SouthCentral	2.239579e+07	2.333924e+08	1.848155e+08	4.593684e+07
Southeast	3.163231e+06	1.815276e+08	1.069033e+08	7.210761e+07
Spokane	2.802191e+05	6.254376e+06	5.368312e+06	8.788816e+05
StLouis	2.648867e+04	1.473603e+07	1.193186e+07	2.579377e+06
Syracuse	2.811058e+04	4.192427e+06	3.645651e+06	5.050151e+05
Tampa	3.898951e+04	1.949669e+07	1.060807e+07	8.653438e+06
TotalUS	1.561752e+08	1.638601e+09	1.243561e+09	3.735843e+08
West	2.035607e+07	3.670736e+08	2.227093e+08	1.435317e+08
WestTexNewMexico	2.969474e+06	3.529652e+07	1.993176e+07	1.505125e+07

XLarge Bags \

region

Albany 43429.16

Atlanta 278101.68

BaltimoreWashington	206985.36
Boise	10449.34
Boston	84879.99
BuffaloRochester	81901.94
California	5272577.91
Charlotte	69603.59
Chicago	378872.71
CincinnatiDayton	263830.73
Columbus	220715.52
DallasFtWorth	432293.08
Denver	52481.28
Detroit	1649024.44
GrandRapids	838815.37
GreatLakes	6392523.96
HarrisburgScranton	154618.16
HartfordSpringfield	77601.72
Houston	326132.75
Indianapolis	283489.96
Jacksonville	105335.77
LasVegas	16054.32
LosAngeles	4075279.95
Louisville	107922.98
MiamiFtLauderdale	305657.99
Midsouth	1378317.13
Nashville	111486.16
NewOrleansMobile	512688.70
NewYork	359477.68
Northeast	1309367.56
NorthernNewEngland	110650.28
Orlando	243247.03
Philadelphia	106151.72
PhoenixTucson	154908.38
Pittsburgh	57585.02
Plains	1112937.29
Portland	78012.09
RaleighGreensboro	95048.10
RichmondNorfolk	123783.85
Roanoke	79483.35
Sacramento	208711.11
SanDiego	145054.97
SanFrancisco	211634.59
Seattle	68310.44
SouthCarolina	226570.63
SouthCentral	2640111.14
Southeast	2516762.93
Spokane	7182.72
StLouis	224797.89

Syracuse	41761.94
Tampa	235178.73
TotalUS	21455230.54
West	832634.65
WestTexNewMexico	313511.05

		type	year
region			
Albany	conventionalconventionalconventionalconvention...		681458
Atlanta	conventionalconventionalconventionalconvention...		681458
BaltimoreWashington	conventionalconventionalconventionalconvention...		681458
Boise	conventionalconventionalconventionalconvention...		681458
Boston	conventionalconventionalconventionalconvention...		681458
BuffaloRochester	conventionalconventionalconventionalconvention...		681458
California	conventionalconventionalconventionalconvention...		681458
Charlotte	conventionalconventionalconventionalconvention...		681458
Chicago	conventionalconventionalconventionalconvention...		681458
CincinnatiDayton	conventionalconventionalconventionalconvention...		681458
Columbus	conventionalconventionalconventionalconvention...		681458
DallasFtWorth	conventionalconventionalconventionalconvention...		681458
Denver	conventionalconventionalconventionalconvention...		681458
Detroit	conventionalconventionalconventionalconvention...		681458
GrandRapids	conventionalconventionalconventionalconvention...		681458
GreatLakes	conventionalconventionalconventionalconvention...		681458
HarrisburgScranton	conventionalconventionalconventionalconvention...		681458
HartfordSpringfield	conventionalconventionalconventionalconvention...		681458
Houston	conventionalconventionalconventionalconvention...		681458
Indianapolis	conventionalconventionalconventionalconvention...		681458
Jacksonville	conventionalconventionalconventionalconvention...		681458
LasVegas	conventionalconventionalconventionalconvention...		681458
LosAngeles	conventionalconventionalconventionalconvention...		681458
Louisville	conventionalconventionalconventionalconvention...		681458
MiamiFtLauderdale	conventionalconventionalconventionalconvention...		681458
Midsouth	conventionalconventionalconventionalconvention...		681458
Nashville	conventionalconventionalconventionalconvention...		681458
NewOrleansMobile	conventionalconventionalconventionalconvention...		681458
NewYork	conventionalconventionalconventionalconvention...		681458
Northeast	conventionalconventionalconventionalconvention...		681458
NorthernNewEngland	conventionalconventionalconventionalconvention...		681458
Orlando	conventionalconventionalconventionalconvention...		681458
Philadelphia	conventionalconventionalconventionalconvention...		681458
PhoenixTucson	conventionalconventionalconventionalconvention...		681458
Pittsburgh	conventionalconventionalconventionalconvention...		681458
Plains	conventionalconventionalconventionalconvention...		681458
Portland	conventionalconventionalconventionalconvention...		681458
RaleighGreensboro	conventionalconventionalconventionalconvention...		681458
RichmondNorfolk	conventionalconventionalconventionalconvention...		681458

Roanoke	conventional	conventional	conventional	convention...	681458
Sacramento	conventional	conventional	conventional	convention...	681458
SanDiego	conventional	conventional	conventional	convention...	681458
SanFrancisco	conventional	conventional	conventional	convention...	681458
Seattle	conventional	conventional	conventional	convention...	681458
SouthCarolina	conventional	conventional	conventional	convention...	681458
SouthCentral	conventional	conventional	conventional	convention...	681458
Southeast	conventional	conventional	conventional	convention...	681458
Spokane	conventional	conventional	conventional	convention...	681458
StLouis	conventional	conventional	conventional	convention...	681458
Syracuse	conventional	conventional	conventional	convention...	681458
Tampa	conventional	conventional	conventional	convention...	681458
TotalUS	conventional	conventional	conventional	convention...	681458
West	conventional	conventional	conventional	convention...	681458
WestTexNewMexico	conventional	conventional	conventional	convention...	675409

```
[112]: Avocado_sales.groupby(["region","type","year"])[["AveragePrice","Small Bags"]].
        ↪max().reset_index()
```

```
[112]:
```

	region	type	year	AveragePrice	Small Bags
0	Albany	conventional	2015	1.45	29663.19
1	Albany	conventional	2016	1.63	23926.35
2	Albany	conventional	2017	1.80	13277.29
3	Albany	conventional	2018	1.69	30126.31
4	Albany	organic	2015	2.09	1648.14
..	...	...	...	...	...
427	WestTexNewMexico	conventional	2018	0.94	164965.35
428	WestTexNewMexico	organic	2015	2.19	4715.39
429	WestTexNewMexico	organic	2016	2.93	12843.07
430	WestTexNewMexico	organic	2017	2.50	25191.62
431	WestTexNewMexico	organic	2018	1.93	16510.32

[432 rows x 5 columns]

```
[116]: Avocado_sales.groupby(["region","type","year"])[["AveragePrice","Large Bags"]].
        ↪max().reset_index()
```

```
[116]:
```

	region	type	year	AveragePrice	Large Bags
0	Albany	conventional	2015	1.45	778.26
1	Albany	conventional	2016	1.63	2157.76
2	Albany	conventional	2017	1.80	27205.98
3	Albany	conventional	2018	1.69	10707.93
4	Albany	organic	2015	2.09	17.83
..	...	...	...	...	...
427	WestTexNewMexico	conventional	2018	0.94	229786.03
428	WestTexNewMexico	organic	2015	2.19	1550.10
429	WestTexNewMexico	organic	2016	2.93	9206.67

430	WestTexNewMexico	organic	2017	2.50	10219.71
431	WestTexNewMexico	organic	2018	1.93	431.85

[432 rows x 5 columns]

```
[156]: Avocado_sales.groupby(["region","type","year"])[["Total Volume","Large Bags"]].
        ↪agg({"Total Volume":'mean',"Large Bags":"sum"}).reset_index()
```

```
[156]:
```

	region	type	year	Total Volume	Large Bags
0	Albany	conventional	2015	76208.734231	17997.07
1	Albany	conventional	2016	99453.155000	23166.87
2	Albany	conventional	2017	95778.543208	292874.25
3	Albany	conventional	2018	124160.870000	55741.51
4	Albany	organic	2015	1289.274038	48.58
..	...	...	...	...	...
427	WestTexNewMexico	conventional	2018	966639.193333	1915457.47
428	WestTexNewMexico	organic	2015	9220.607647	18963.98
429	WestTexNewMexico	organic	2016	18164.837500	108983.18
430	WestTexNewMexico	organic	2017	18022.184118	59633.25
431	WestTexNewMexico	organic	2018	16762.538333	2589.55

[432 rows x 5 columns]

```
[174]: Avocado_sales.groupby(["region","type","year"])[["Total Volume","XLarge Bags"]].
        ↪agg({"Total Volume":'mean',"XLarge Bags":"sum"}).reset_index()
```

```
[174]:
```

	region	type	year	Total Volume	XLarge Bags
0	Albany	conventional	2015	76208.734231	137.50
1	Albany	conventional	2016	99453.155000	21692.94
2	Albany	conventional	2017	95778.543208	18663.17
3	Albany	conventional	2018	124160.870000	2935.55
4	Albany	organic	2015	1289.274038	0.00
..	...	...	...	...	...
427	WestTexNewMexico	conventional	2018	966639.193333	25368.38
428	WestTexNewMexico	organic	2015	9220.607647	0.00
429	WestTexNewMexico	organic	2016	18164.837500	0.00
430	WestTexNewMexico	organic	2017	18022.184118	28.83
431	WestTexNewMexico	organic	2018	16762.538333	0.00

[432 rows x 5 columns]

```
[211]: grouped=Avocado_sales.groupby(["region","type","year"])[["Total Volume","Small_
        ↪Bags"]].agg({"Total Volume":'mean',"Small Bags":"sum"}).reset_index()
        grouped
```

```
[211]:
```

	region	type	year	Total Volume	Small Bags
0	Albany	conventional	2015	76208.734231	644231.60



1	Albany	conventional	2016	99453.155000	714231.33
2	Albany	conventional	2017	95778.543208	388024.75
3	Albany	conventional	2018	124160.870000	186563.69
4	Albany	organic	2015	1289.274038	57240.85
..	...	...	...	...	...
427	WestTexNewMexico	conventional	2018	966639.193333	1606546.61
428	WestTexNewMexico	organic	2015	9220.607647	109799.96
429	WestTexNewMexico	organic	2016	18164.837500	294897.90
430	WestTexNewMexico	organic	2017	18022.184118	542490.16
431	WestTexNewMexico	organic	2018	16762.538333	146552.35

[432 rows x 5 columns]

```
[356]: grouped=Avocado_sales.groupby(["region"])[["Total Volume","XLarge Bags"]].
        ↪agg({"Total Volume":'mean',"XLarge Bags':"sum"}).reset_index()
grouped
```

```
[356]:
```

	region	Total Volume	XLarge Bags
0	Albany	4.753787e+04	43429.16
1	Atlanta	2.621453e+05	278101.68
2	BaltimoreWashington	3.985619e+05	206985.36
3	Boise	4.264257e+04	10449.34
4	Boston	2.877929e+05	84879.99
5	BuffaloRochester	6.793630e+04	81901.94
6	California	3.044324e+06	5272577.91
7	Charlotte	1.051939e+05	69603.59
8	Chicago	3.955690e+05	378872.71
9	CincinnatiDayton	1.317219e+05	263830.73
10	Columbus	8.873776e+04	220715.52
11	DallasFtWorth	6.166251e+05	432293.08
12	Denver	4.109542e+05	52481.28
13	Detroit	1.876403e+05	1649024.44
14	GrandRapids	8.938383e+04	838815.37
15	GreatLakes	1.744505e+06	6392523.96
16	HarrisburgScranton	1.236948e+05	154618.16
17	HartfordSpringfield	1.499128e+05	77601.72
18	Houston	6.010884e+05	326132.75
19	Indianapolis	8.953666e+04	283489.96
20	Jacksonville	8.517753e+04	105335.77
21	LasVegas	1.608784e+05	16054.32
22	LosAngeles	1.502653e+06	4075279.95
23	Louisville	4.762427e+04	107922.98
24	MiamiFtLauderdale	2.889740e+05	305657.99
25	Midsouth	1.503992e+06	1378317.13
26	Nashville	1.053612e+05	111486.16
27	NewOrleansMobile	1.351927e+05	512688.70
28	NewYork	7.122311e+05	359477.68

29	Northeast	2.110299e+06	1309367.56
30	NorthernNewEngland	2.116358e+05	110650.28
31	Orlando	1.735524e+05	243247.03
32	Philadelphia	2.125408e+05	106151.72
33	PhoenixTucson	5.788264e+05	154908.38
34	Pittsburgh	5.564008e+04	57585.02
35	Plains	9.206761e+05	1112937.29
36	Portland	3.270775e+05	78012.09
37	RaleighGreensboro	1.426116e+05	95048.10
38	RichmondNorfolk	1.249433e+05	123783.85
39	Roanoke	7.408879e+04	79483.35
40	Sacramento	2.223779e+05	208711.11
41	SanDiego	2.656566e+05	145054.97
42	SanFrancisco	4.018645e+05	211634.59
43	Seattle	3.231189e+05	68310.44
44	SouthCarolina	1.797449e+05	226570.63
45	SouthCentral	2.991952e+06	2640111.14
46	Southeast	1.820232e+06	2516762.93
47	Spokane	4.605111e+04	7182.72
48	StLouis	9.489004e+04	224797.89
49	Syracuse	3.237476e+04	41761.94
50	Tampa	1.952797e+05	235178.73
51	TotalUS	1.735130e+07	21455230.54
52	West	3.215323e+06	832634.65
53	WestTexNewMexico	4.314085e+05	313511.05

```
[209]: Avocado_sales.groupby(["year", "region"])["Large Bags"].sum().reset_index()
```

```
[209]:
```

	year	region	Large Bags
0	2015	Albany	18045.65
1	2015	Atlanta	1114614.35
2	2015	BaltimoreWashington	262347.80
3	2015	Boise	33605.66
4	2015	Boston	77618.26
..	...	...	...
211	2018	Syracuse	217051.00
212	2018	Tampa	788126.52
213	2018	TotalUS	47192750.71
214	2018	West	21649829.52
215	2018	WestTexNewMexico	1918047.02

[216 rows x 3 columns]

```
[207]: filtered_Avocado_sales = Avocado_sales[Avocado_sales['region'] == 'Albany']
filtered_Avocado_sales
```

```
[207]:      Unnamed: 0      Date  AveragePrice  Total Volume      4046      4225  \
0          0  12/27/2015          1.33      64236.62  1036.74  54454.85
1          1  12/20/2015          1.35      54876.98   674.28  44638.81
2          2  12/13/2015          0.93     118220.22   794.70  109149.67
3          3   12/6/2015          1.08      78992.15  1132.00   71976.41
4          4  11/29/2015          1.28      51039.60   941.48   43838.39
...      ...      ...      ...      ...      ...      ...
17608      7    2/4/2018          1.52      4124.96   118.38    420.36
17609      8    1/28/2018          1.32      6987.56   433.66    374.96
17610      9    1/21/2018          1.54      3346.54    14.67    253.01
17611     10    1/14/2018          1.47      4140.95     7.30    301.87
17612     11    1/7/2018          1.54      4816.90    43.51    412.17
```

```
      4770  Total Bags  Small Bags  Large Bags  XLarge Bags      type  \
0      48.16    8696.87    8603.62     93.25         0.0  conventional
1      58.33    9505.56    9408.07     97.49         0.0  conventional
2     130.50    8145.35    8042.21    103.14         0.0  conventional
3      72.58    5811.16    5677.40    133.76         0.0  conventional
4      75.78    6183.95    5986.26    197.69         0.0  conventional
...      ...      ...      ...      ...      ...      ...
17608     0.00    3586.22    3586.22         0.00         0.0      organic
17609     0.00    6178.94    6178.94         0.00         0.0      organic
17610     0.00    3078.86    3078.86         0.00         0.0      organic
17611     0.00    3831.78    3831.78         0.00         0.0      organic
17612     0.00    4361.22    4357.89         3.33         0.0      organic
```

```
      year  region
0      2015  Albany
1      2015  Albany
2      2015  Albany
3      2015  Albany
4      2015  Albany
...      ...      ...
17608  2018  Albany
17609  2018  Albany
17610  2018  Albany
17611  2018  Albany
17612  2018  Albany
```

[338 rows x 14 columns]

```
[241]: filtered=grouped[grouped["region"]=="Albany"]
filtered
```

```
[241]:      region      type  year  Total Volume  Small Bags
0  Albany  conventional  2015   76208.734231   644231.60
1  Albany  conventional  2016   99453.155000   714231.33
```

2	Albany	conventional	2017	95778.543208	388024.75
3	Albany	conventional	2018	124160.870000	186563.69
4	Albany	organic	2015	1289.274038	57240.85
5	Albany	organic	2016	1784.067885	79185.31
6	Albany	organic	2017	2930.546981	135934.44
7	Albany	organic	2018	4337.977500	41532.76

```
[235]: filtered2 = grouped[(grouped["year"] == 2018) & (grouped["region"] ==
↳ "Albany")]#the region Albany in 2018
filtered2
```

```
[235]:      region      type  year  Total Volume  Small Bags
3  Albany  conventional  2018    124160.8700    186563.69
7  Albany      organic  2018      4337.9775     41532.76
```

```
[247]: filteredy=grouped[grouped["year"]==2015]#total small bags in the year 2015
filteredy
```

```
[247]:      region      type  year  Total Volume  Small Bags
0      Albany  conventional  2015    7.620873e+04    644231.60
4      Albany      organic  2015    1.289274e+03     57240.85
8      Atlanta  conventional  2015    4.403464e+05    1862749.40
12     Atlanta      organic  2015    6.416981e+03     18744.96
16  BaltimoreWashington  conventional  2015    7.681415e+05    9073242.93
..      ...      ...      ...      ...      ...
412     TotalUS      organic  2015    6.455636e+05    5896901.23
416      West  conventional  2015    5.655314e+06    35859556.76
420      West      organic  2015    2.037310e+05     416843.63
424  WestTexNewMexico  conventional  2015    7.894951e+05    4682858.49
428  WestTexNewMexico      organic  2015    9.220608e+03    109799.96
```

[108 rows x 5 columns]

```
[249]: filtered=grouped[grouped["year"]==2018]#total small bags in the year 2018
filtered
```

```
[249]:      region      type  year  Total Volume  Small Bags
3      Albany  conventional  2018    1.241609e+05    186563.69
7      Albany      organic  2018    4.337977e+03     41532.76
11     Atlanta  conventional  2018    6.696200e+05    2581046.81
15     Atlanta      organic  2018    1.633185e+04     99778.28
19  BaltimoreWashington  conventional  2018    9.622416e+05    3281729.42
..      ...      ...      ...      ...      ...
415     TotalUS      organic  2018    1.510488e+06    9888581.74
419      West  conventional  2018    7.451445e+06    15121922.88
423      West      organic  2018    2.549791e+05    1079220.16
427  WestTexNewMexico  conventional  2018    9.666392e+05    1606546.61
```

```
431      WestTexNewMexico      organic  2018  1.676254e+04  146552.35
```

```
[108 rows x 5 columns]
```

```
[254]: grouped1=Avocado_sales.groupby(["region","type","year"])[["Total Volume","Large
      ↪Bags"]].agg({"Total Volume":'mean',"Large Bags":"sum"}).reset_index()
      grouped1
```

```
[254]:
```

	region	type	year	Total Volume	Large Bags
0	Albany	conventional	2015	76208.734231	17997.07
1	Albany	conventional	2016	99453.155000	23166.87
2	Albany	conventional	2017	95778.543208	292874.25
3	Albany	conventional	2018	124160.870000	55741.51
4	Albany	organic	2015	1289.274038	48.58
..	...	...	...	...	...
427	WestTexNewMexico	conventional	2018	966639.193333	1915457.47
428	WestTexNewMexico	organic	2015	9220.607647	18963.98
429	WestTexNewMexico	organic	2016	18164.837500	108983.18
430	WestTexNewMexico	organic	2017	18022.184118	59633.25
431	WestTexNewMexico	organic	2018	16762.538333	2589.55

```
[432 rows x 5 columns]
```

```
[256]: filteredf=grouped[grouped["year"]==2015]#total small bags in the year 2015
      filteredf
```

```
[256]:
```

	region	type	year	Total Volume	Small Bags
0	Albany	conventional	2015	7.620873e+04	644231.60
4	Albany	organic	2015	1.289274e+03	57240.85
8	Atlanta	conventional	2015	4.403464e+05	1862749.40
12	Atlanta	organic	2015	6.416981e+03	18744.96
16	BaltimoreWashington	conventional	2015	7.681415e+05	9073242.93
..	...	...	...	...	...
412	TotalUS	organic	2015	6.455636e+05	5896901.23
416	West	conventional	2015	5.655314e+06	35859556.76
420	West	organic	2015	2.037310e+05	416843.63
424	WestTexNewMexico	conventional	2015	7.894951e+05	4682858.49
428	WestTexNewMexico	organic	2015	9.220608e+03	109799.96

```
[108 rows x 5 columns]
```

```
[258]: grouped2=Avocado_sales.groupby(["region","type","year"])[["Total
      ↪Volume","XLarge Bags"]].agg({"Total Volume":'mean',"XLarge Bags":"sum"}).
      ↪reset_index()
      grouped2
```

```
[258]:
```

	region	type	year	Total Volume	XLarge Bags
0	Albany	conventional	2015	76208.734231	137.50
1	Albany	conventional	2016	99453.155000	21692.94
2	Albany	conventional	2017	95778.543208	18663.17
3	Albany	conventional	2018	124160.870000	2935.55
4	Albany	organic	2015	1289.274038	0.00
..	...	...	...	...	...
427	WestTexNewMexico	conventional	2018	966639.193333	25368.38
428	WestTexNewMexico	organic	2015	9220.607647	0.00
429	WestTexNewMexico	organic	2016	18164.837500	0.00
430	WestTexNewMexico	organic	2017	18022.184118	28.83
431	WestTexNewMexico	organic	2018	16762.538333	0.00

[432 rows x 5 columns]

```
[262]: filteredg=grouped[grouped["year"]==2016]#total small bags in the year 2016
filteredg
```

```
[262]:
```

	region	type	year	Total Volume	Small Bags
1	Albany	conventional	2016	9.945315e+04	714231.33
5	Albany	organic	2016	1.784068e+03	79185.31
9	Atlanta	conventional	2016	5.337463e+05	5401789.10
13	Atlanta	organic	2016	1.100132e+04	44617.38
17	BaltimoreWashington	conventional	2016	7.681303e+05	9666255.44
..	...	...	...	...	...
413	TotalUS	organic	2016	9.403799e+05	15792332.92
417	West	conventional	2016	6.404892e+06	82758806.85
421	West	organic	2016	2.215953e+05	2036082.92
425	WestTexNewMexico	conventional	2016	8.242858e+05	6347663.19
429	WestTexNewMexico	organic	2016	1.816484e+04	294897.90

[108 rows x 5 columns]

```
[266]: Avocado_sales.groupby("type").count()#displays the type of ovacado in the
↪dataset and how many times the appear
```

```
[266]:
```

	Unnamed: 0	Date	AveragePrice	Total Volume	4046	4225	4770	\
type								
conventional	9126	9126	9126	9126	9126	9126	9126	
organic	9123	9123	9123	9123	9123	9123	9123	

	Total Bags	Small Bags	Large Bags	XLarge Bags	year	region
type						
conventional	9126	9126	9126	9126	9126	9126
organic	9123	9123	9123	9123	9123	9123

```
[270]: Avocado_sales.groupby("type").sum()#displays the type of ovacado in the
↳dataset and total value in each column per type they appear
```

```
[270]: Unnamed: 0 Date \
type
conventional 221184 12/27/2015 12/20/2015 12/13/2015 12/6/2015 11/29/2...
organic      221030 12/27/2015 12/20/2015 12/13/2015 12/6/2015 11/29/2...

AveragePrice Total Volume 4046 4225 \
type
conventional 10568.27 1.508722e+10 5.280410e+09 5.245673e+09
organic      15089.43 4.361817e+08 6.670082e+07 1.406024e+08

4770 Total Bags Small Bags Large Bags \
type
conventional 4.143733e+08 4.146764e+09 3.164183e+09 9.259030e+08
organic      2.429041e+06 2.264115e+08 1.606877e+08 6.571281e+07

XLarge Bags year \
type
conventional 56678255.60 18399366
organic      10921.73 18393317

region
type
conventional AlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlba...
organic      AlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlbanyAlba...
```

```
[278]: #total amount of avocados sold in eacg region per year
Avocado_sales["Total amount"]=Avocado_sales["Total
↳Volume"]*Avocado_sales["AveragePrice"]
Avocado_sales["Total amount"]
```

```
[278]: 0      85434.7046
1      74083.9230
2     109944.8046
3      85311.5220
4      65330.6880
...
18244   27831.9729
18245   23748.5484
18246   25743.8412
18247   31276.0746
18248   28333.1196
Name: Total amount, Length: 18249, dtype: float64
```

```
[282]: Avocado_sales #displays the new dataset with the new column that is Total_
      ↪amount
```

```
[282]:      Unnamed: 0      Date  AveragePrice  Total Volume      4046      4225  \
0          0  12/27/2015          1.33      64236.62  1036.74  54454.85
1          1  12/20/2015          1.35      54876.98   674.28  44638.81
2          2  12/13/2015          0.93     118220.22   794.70  109149.67
3          3   12/6/2015          1.08      78992.15  1132.00   71976.41
4          4  11/29/2015          1.28      51039.60   941.48   43838.39
...      ...      ...      ...      ...      ...
18244      7    2/4/2018          1.63      17074.83  2046.96   1529.20
18245      8    1/28/2018          1.71      13888.04  1191.70   3431.50
18246      9    1/21/2018          1.87      13766.76  1191.92   2452.79
18247     10    1/14/2018          1.93      16205.22  1527.63   2981.04
18248     11    1/7/2018          1.62      17489.58  2894.77   2356.13
```

```
      4770  Total Bags  Small Bags  Large Bags  XLarge Bags      type  \
0      48.16      8696.87      8603.62      93.25          0.0  conventional
1      58.33      9505.56      9408.07      97.49          0.0  conventional
2     130.50      8145.35      8042.21     103.14          0.0  conventional
3      72.58      5811.16      5677.40     133.76          0.0  conventional
4      75.78      6183.95      5986.26     197.69          0.0  conventional
...      ...      ...      ...      ...      ...
18244    0.00     13498.67     13066.82      431.85          0.0      organic
18245    0.00      9264.84      8940.04      324.80          0.0      organic
18246   727.94      9394.11      9351.80       42.31          0.0      organic
18247   727.01     10969.54     10919.54       50.00          0.0      organic
18248   224.53     12014.15     11988.14       26.01          0.0      organic
```

```
      year      region  total amount  Total amount
0     2015      Albany      85434.7046      85434.7046
1     2015      Albany      74083.9230      74083.9230
2     2015      Albany     109944.8046     109944.8046
3     2015      Albany      85311.5220      85311.5220
4     2015      Albany      65330.6880      65330.6880
...      ...      ...      ...      ...
18244   2018  WestTexNewMexico      27831.9729      27831.9729
18245   2018  WestTexNewMexico      23748.5484      23748.5484
18246   2018  WestTexNewMexico      25743.8412      25743.8412
18247   2018  WestTexNewMexico      31276.0746      31276.0746
18248   2018  WestTexNewMexico      28333.1196      28333.1196
```

[18249 rows x 16 columns]

```
[288]: group=Avocado_sales.groupby(["region","year"])["Total amount"].agg({"Total_
      ↪amount":"sum"}).reset_index()
group
```



```
[288]:
```

	region	year	Total amount
0	Albany	2015	4.764514e+06
1	Albany	2016	7.009219e+06
2	Albany	2017	7.947717e+06
3	Albany	2018	2.045274e+06
4	Atlanta	2015	2.451546e+07
..	...	...	...
211	West	2018	9.193581e+07
212	WestTexNewMexico	2015	3.224248e+07
213	WestTexNewMexico	2016	3.694199e+07
214	WestTexNewMexico	2017	4.216226e+07
215	WestTexNewMexico	2018	1.021870e+07

[216 rows x 3 columns]

```
[296]: #displays the total amount in 2018 per region
filtered1=group[group["year"]==2018]
filtered1
```

```
[296]:
```

	region	year	Total amount
3	Albany	2018	2.045274e+06
7	Atlanta	2018	8.339581e+06
11	BaltimoreWashington	2018	1.566348e+07
15	Boise	2018	1.438547e+06
19	Boston	2018	1.153194e+07
23	BuffaloRochester	2018	2.633623e+06
27	California	2018	9.034425e+07
31	Charlotte	2018	4.453160e+06
35	Chicago	2018	1.609179e+07
39	CincinnatiDayton	2018	3.523148e+06
43	Columbus	2018	2.759200e+06
47	DallasFtWorth	2018	1.465330e+07
51	Denver	2018	1.239395e+07
55	Detroit	2018	6.160858e+06
59	GrandRapids	2018	3.334383e+06
63	GreatLakes	2018	6.033832e+07
67	HarrisburgScranton	2018	4.739598e+06
71	HartfordSpringfield	2018	6.249778e+06
75	Houston	2018	1.420732e+07
79	Indianapolis	2018	2.871794e+06
83	Jacksonville	2018	3.197798e+06
87	LasVegas	2018	4.768083e+06
91	LosAngeles	2018	3.873506e+07
95	Louisville	2018	1.543766e+06
99	MiamiFtLauderdale	2018	1.178728e+07
103	Midsouth	2018	5.612362e+07
107	Nashville	2018	3.371480e+06

111	NewOrleansMobile	2018	4.133354e+06
115	NewYork	2018	3.216514e+07
119	Northeast	2018	8.704928e+07
123	NorthernNewEngland	2018	8.463886e+06
127	Orlando	2018	7.001486e+06
131	Philadelphia	2018	8.498704e+06
135	PhoenixTucson	2018	1.222926e+07
139	Pittsburgh	2018	2.195973e+06
143	Plains	2018	3.119327e+07
147	Portland	2018	9.342334e+06
151	RaleighGreensboro	2018	5.716847e+06
155	RichmondNorfolk	2018	4.314430e+06
159	Roanoke	2018	2.517748e+06
163	Sacramento	2018	7.866914e+06
167	SanDiego	2018	7.469141e+06
171	SanFrancisco	2018	1.516027e+07
175	Seattle	2018	1.045717e+07
179	SouthCarolina	2018	6.668763e+06
183	SouthCentral	2018	7.351737e+07
187	Southeast	2018	6.857768e+07
191	Spokane	2018	1.446206e+06
195	StLouis	2018	2.989996e+06
199	Syracuse	2018	1.309824e+06
203	Tampa	2018	7.912084e+06
207	TotalUS	2018	5.586906e+08
211	West	2018	9.193581e+07
215	WestTexNewMexico	2018	1.021870e+07

```
[318]: #regions with total amount more than 20million
filtered2=group[(group["Total amount"]>20000000) & (group["year"]==2018)]
filtered2
```

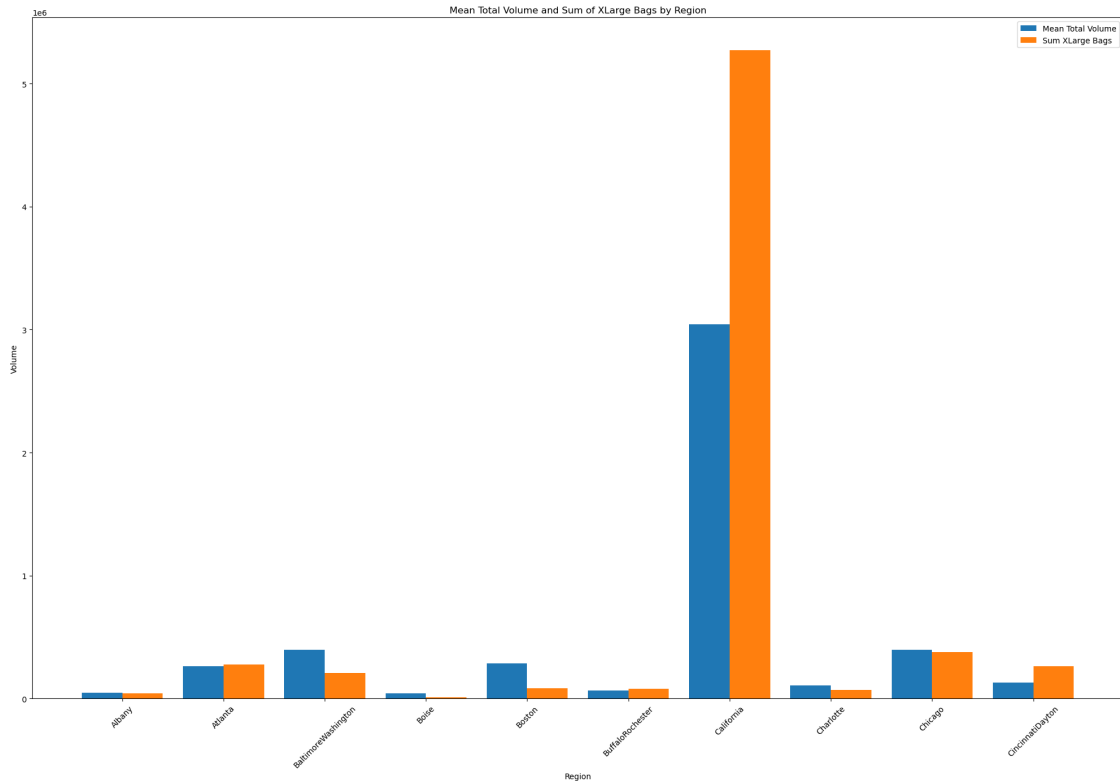
```
[318]:
```

	region	year	Total amount
27	California	2018	9.034425e+07
63	GreatLakes	2018	6.033832e+07
91	LosAngeles	2018	3.873506e+07
103	Midsouth	2018	5.612362e+07
115	NewYork	2018	3.216514e+07
119	Northeast	2018	8.704928e+07
143	Plains	2018	3.119327e+07
183	SouthCentral	2018	7.351737e+07
187	Southeast	2018	6.857768e+07
207	TotalUS	2018	5.586906e+08
211	West	2018	9.193581e+07

```
[344]: Avocado_sales.columns#displays the columns in the dataset
```

```
[344]: Index(['Unnamed: 0', 'Date', 'AveragePrice', 'Total Volume', '4046', '4225',  
          '4770', 'Total Bags', 'Small Bags', 'Large Bags', 'XLarge Bags', 'type',  
          'year', 'region', 'total amount', 'Total amount'],  
          dtype='object')
```

```
[364]: #Mean Total Volume and Sum of XLarge Bags by Region  
grouped=grouped.head(10)  
# Set up bar width and positions  
regions = grouped['region']  
x = range(len(regions))  
  
plt.figure(figsize=(20, 14))  
  
# Plot bars  
plt.bar(x, grouped['Total Volume'], width=0.4, label='Mean Total Volume',  
        align='center')  
plt.bar([i + 0.4 for i in x], grouped['XLarge Bags'], width=0.4, label='Sum  
XLarge Bags', align='center')  
  
# Customize chart  
plt.xlabel("Region")  
plt.ylabel("Volume")  
plt.title("Mean Total Volume and Sum of XLarge Bags by Region")  
plt.xticks([i + 0.2 for i in x], regions, rotation=45)  
plt.legend()  
  
plt.tight_layout()  
plt.show()
```



```
[378]: Avocado_salesdf=Avocado_sales.
        ↳groupby(["year","type","region"])["AveragePrice"].agg({"AveragePrice":
        ↳"mean"}).reset_index()
        Avocado_salesdf
```

```
[378]:
```

	year	type	region	AveragePrice
0	2015	conventional	Albany	1.171923
1	2015	conventional	Atlanta	1.052308
2	2015	conventional	BaltimoreWashington	1.168077
3	2015	conventional	Boise	1.054038
4	2015	conventional	Boston	1.144038
..	...	...	...	...
427	2018	organic	Syracuse	1.242500
428	2018	organic	Tampa	1.452500
429	2018	organic	TotalUS	1.554167
430	2018	organic	West	1.613333
431	2018	organic	WestTexNewMexico	1.645000

[432 rows x 4 columns]

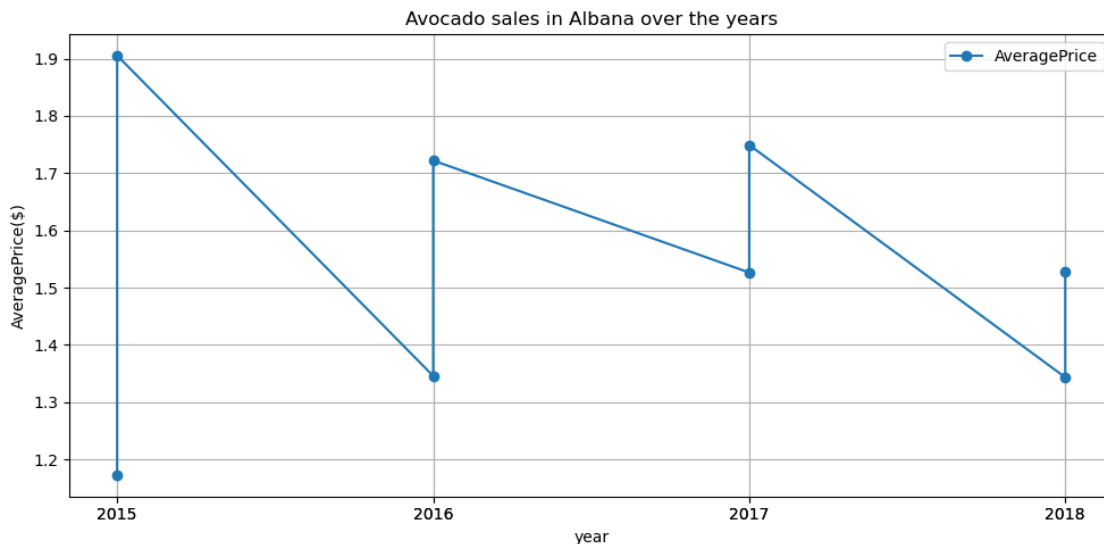
```
[374]: filterede_Avocado_sales = Avocado_salesdf[Avocado_salesdf['region'] == 'Albany']
        filterede_Avocado_sales
```

```
[374]:
```

	year	type	region	AveragePrice
0	2015	conventional	Albany	1.171923
54	2015	organic	Albany	1.905577
108	2016	conventional	Albany	1.345769
162	2016	organic	Albany	1.722115
216	2017	conventional	Albany	1.526415
270	2017	organic	Albany	1.749245
324	2018	conventional	Albany	1.343333
378	2018	organic	Albany	1.528333

```
[412]: #Avocado sales in Albana over the years
filterede_Avocado_sales.
    plot(x="year",y="AveragePrice",kind="line",marker="o",figsize=(10,5))
plt.title("Avocado sales in Albana over the years")
plt.ylabel("AveragePrice($)")
plt.xticks(filterede_Avocado_sales["year"])
plt.grid(True)
plt.tight_layout()
plt.show
```

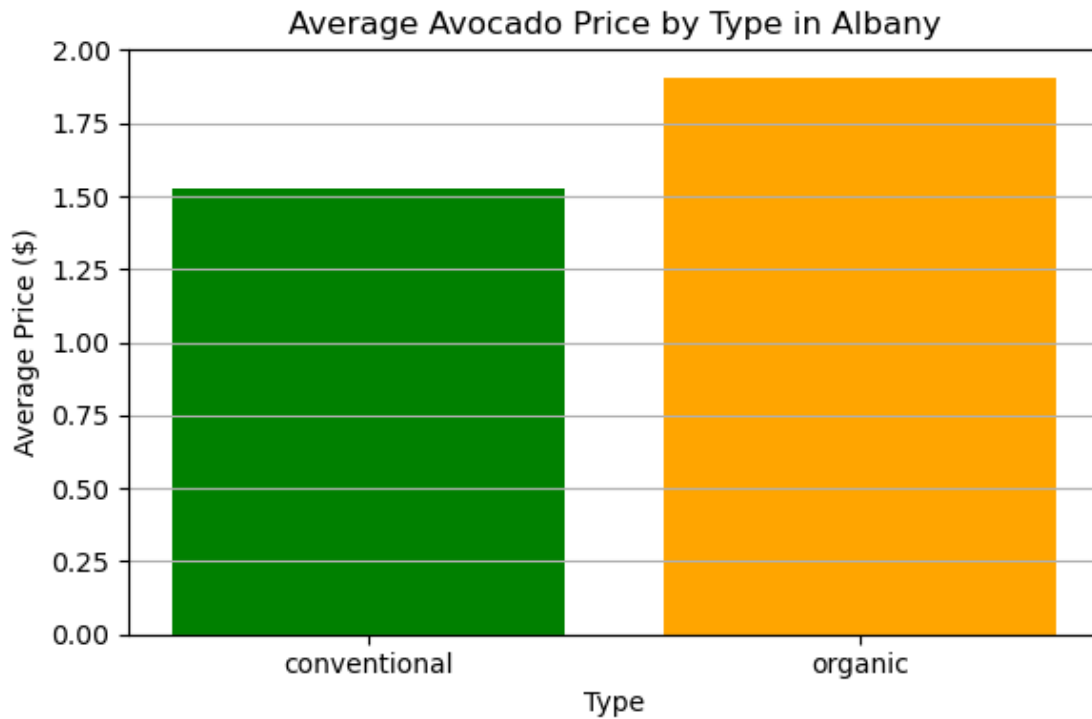
```
[412]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[414]: #Average Avocado Price by Type in Albany
plt.figure(figsize=(6, 4))
plt.bar(filterede_Avocado_sales["type"],_
    filterede_Avocado_sales["AveragePrice"], color=["green", "orange"])

plt.title("Average Avocado Price by Type in Albany")
```

```
plt.xlabel("Type")
plt.ylabel("Average Price ($)")
plt.grid(axis="y")
plt.tight_layout()
plt.show()
```



```
[422]: #average price for the four whole years per region
Groupedg=Avocado_sales.groupby("region")["AveragePrice"].mean().reset_index()
Groupedg
```

```
[422]:
```

	region	AveragePrice
0	Albany	1.561036
1	Atlanta	1.337959
2	BaltimoreWashington	1.534231
3	Boise	1.348136
4	Boston	1.530888
5	BuffaloRochester	1.516834
6	California	1.395325
7	Charlotte	1.606036
8	Chicago	1.556775
9	CincinnatiDayton	1.209201
10	Columbus	1.252781
11	DallasFtWorth	1.085592

12	Denver	1.218580
13	Detroit	1.276095
14	GrandRapids	1.505000
15	GreatLakes	1.338550
16	HarrisburgScranton	1.513284
17	HartfordSpringfield	1.818639
18	Houston	1.047929
19	Indianapolis	1.313994
20	Jacksonville	1.510947
21	LasVegas	1.380917
22	LosAngeles	1.216006
23	Louisville	1.286686
24	MiamiFtLauderdale	1.428491
25	Midsouth	1.404763
26	Nashville	1.212101
27	NewOrleansMobile	1.304793
28	NewYork	1.727574
29	Northeast	1.601923
30	NorthernNewEngland	1.477396
31	Orlando	1.506213
32	Philadelphia	1.632130
33	PhoenixTucson	1.224438
34	Pittsburgh	1.364320
35	Plains	1.436509
36	Portland	1.317722
37	RaleighGreensboro	1.555118
38	RichmondNorfolk	1.291331
39	Roanoke	1.247929
40	Sacramento	1.621568
41	SanDiego	1.398166
42	SanFrancisco	1.804201
43	Seattle	1.442574
44	SouthCarolina	1.403284
45	SouthCentral	1.101243
46	Southeast	1.398018
47	Spokane	1.445592
48	StLouis	1.430621
49	Syracuse	1.520325
50	Tampa	1.408846
51	TotalUS	1.319024
52	West	1.272219
53	WestTexNewMexico	1.261701

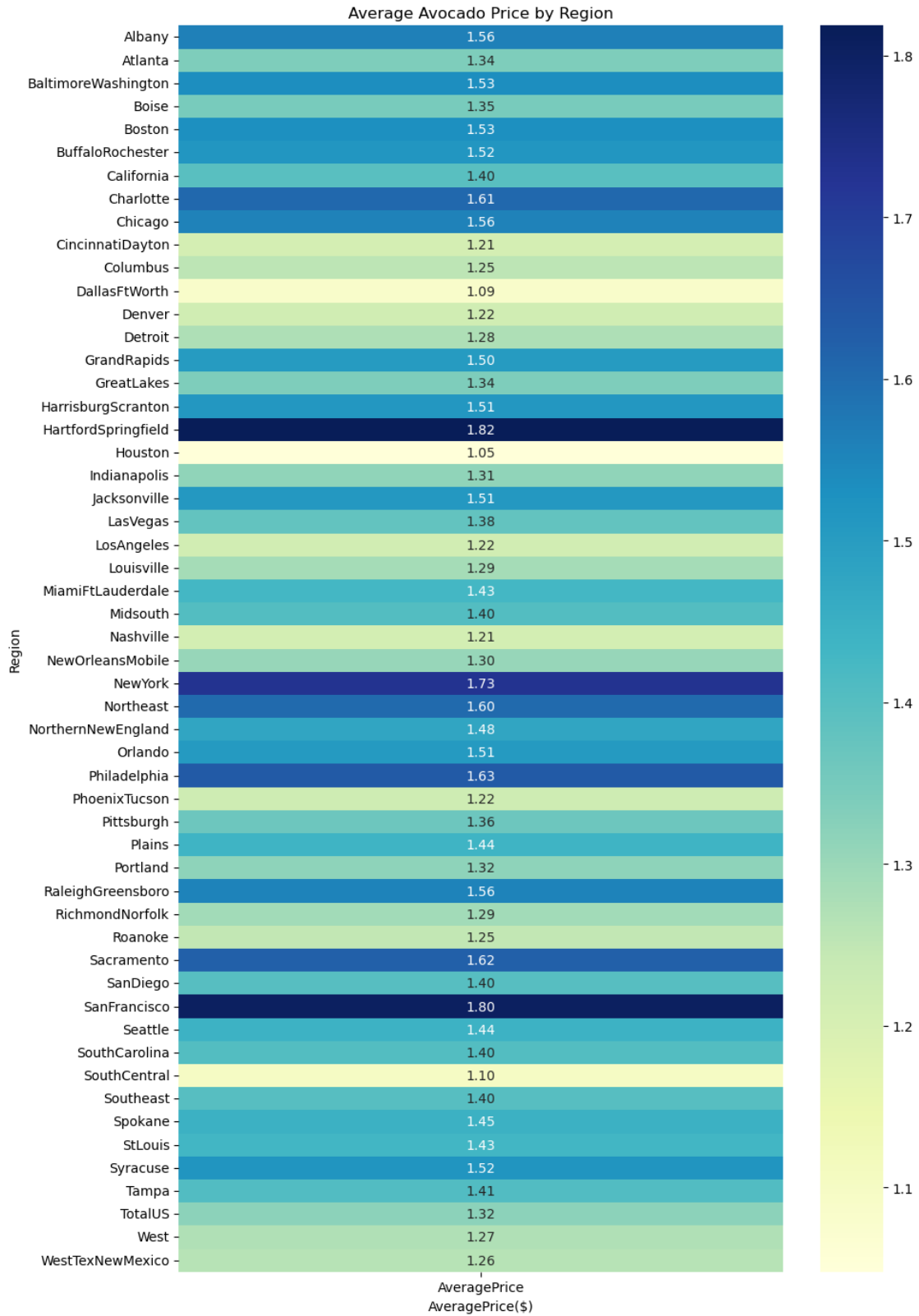
```
[428]: pivot = Groupedg.pivot_table(values="AveragePrice", index="region")

import seaborn as sns
plt.figure(figsize=(10,14))
```

```
sns.heatmap(pivot,annot=True,fmt=".2f",cmap="YlGnBu")
plt.title("Average Avocado Price by Region")
plt.xlabel("AveragePrice($)")
plt.ylabel("Region")
plt.tight_layout()
plt.show
```

[428]: <function matplotlib.pyplot.show(close=None, block=None)>





```
[471]: df=Avocado_sales.groupby(["region","type"])["Total Volume"].mean().
        ↪reset_index()
df
```

```
[471]:
```

	region	type	Total Volume
0	Albany	conventional	9.290303e+04
1	Albany	organic	2.172713e+03
2	Atlanta	conventional	5.127893e+05
3	Atlanta	organic	1.150135e+04
4	BaltimoreWashington	conventional	7.736425e+05
..	...	...	...
103	TotalUS	organic	9.675657e+05
104	West	conventional	6.209234e+06
105	West	organic	2.214116e+05
106	WestTexNewMexico	conventional	8.401582e+05
107	WestTexNewMexico	organic	1.527171e+04

[108 rows x 3 columns]

```
[469]: !pip install plotly#install plotly
```

Requirement already satisfied: plotly in c:\users\admin\anaconda3\lib\site-packages (5.22.0)

Requirement already satisfied: tenacity>=6.2.0 in

c:\users\admin\anaconda3\lib\site-packages (from plotly) (8.2.2)

Requirement already satisfied: packaging in c:\users\admin\anaconda3\lib\site-packages (from plotly) (23.2)

```
[475]: #display some of the regions with AveragePrice of Avocado in a geo map
import pandas as pd
import plotly.express as px

# Your region-average data
region_avg = pd.DataFrame({
    "region": ["Albany", "Atlanta", "BaltimoreWashington", "Boise", "Boston",
        ↪"Chicago", "Houston", "SanFrancisco"],
    "AveragePrice": [1.56, 1.33, 1.53, 1.34, 1.53, 1.55, 1.04, 1.80]
})

# Coordinates for each region
coords = {
    "Albany": (42.6526, -73.7562),
    "Atlanta": (33.7490, -84.3880),
    "BaltimoreWashington": (39.2904, -76.6122),
    "Boise": (43.6150, -116.2023),
    "Boston": (42.3601, -71.0589),
    "Chicago": (41.8781, -87.6298),
    "Houston": (29.7604, -95.3698),
```

```

    "SanFrancisco": (37.7749, -122.4194)
}

coords_df = pd.DataFrame.from_dict(coords, orient="index", columns=["lat", "lon"]).reset_index()
coords_df.columns = ["region", "lat", "lon"]

# Merge the data with coordinates
geo_df = pd.merge(region_avg, coords_df, on="region")

# Create the geomap
fig = px.scatter_geo(
    geo_df,
    lat="lat",
    lon="lon",
    color="AveragePrice",
    size="AveragePrice",
    hover_name="region",
    scope="usa",
    color_continuous_scale="YlOrRd",
    title="Average Avocado Price by Region"
)

fig.show()

```

Average Avocado Price by Region



[ ]: