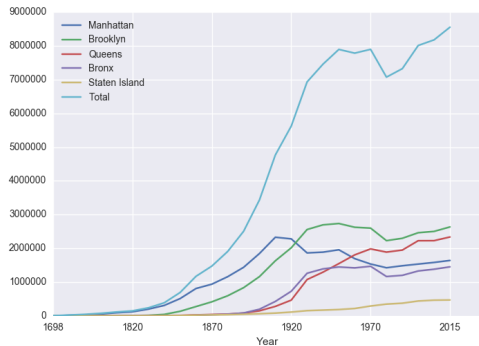


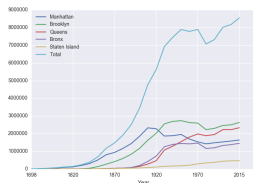
MfA: Python in the City



Katherine St. John
City University of New York
American Museum of Natural History

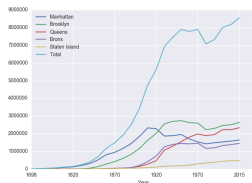
Goal: Every table have at most one from each school, one from each discipline.

Outline



- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

Outline

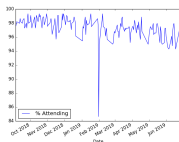
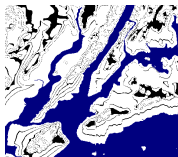


- **Recap**
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

Recap: Workshop Overview

Three sessions:

- ① Flood Maps (arrays & images)
- ② Noisiest Street (structured data, file I/O)
- ③ Mapping Collisions (using objects, mapping coordinates)



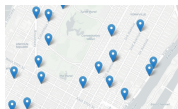
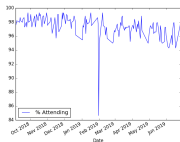
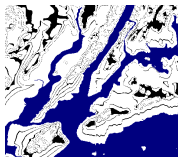
Recap: Workshop Overview

Three sessions:

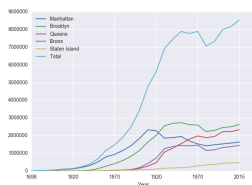
- 1 Flood Maps (arrays & images)
- 2 Noisiest Street (structured data, file I/O)
- 3 Mapping Collisions (using objects, mapping coordinates)

Each session:

- Design Challenge
 - ▶ Analyze a publicly available dataset
 - ▶ Introduce computing concepts & packages
 - ▶ Write a program to solve the problem
- Variations on the theme
- Design a Challenge

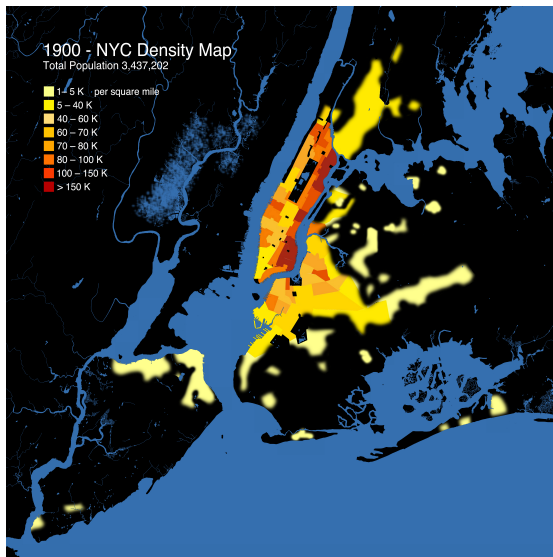


Outline



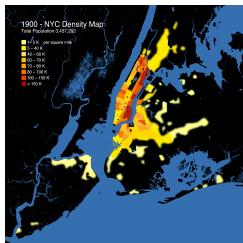
- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

Design Challenge: NYC Population



(Myles Zhang, wiki)

Design Challenge: NYC Population

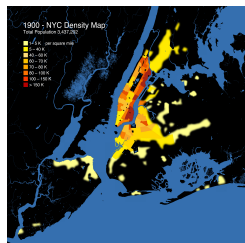


Working in Groups: graph NYC population (and growth) since 1900.

(Myles Zhang, wiki)

you need?

Data: Population

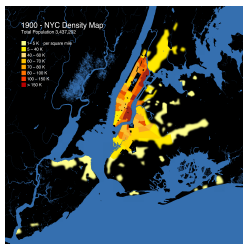


(Myles Zhang, wiki)

Input: What data do you need?

- Populations of the city in 1900 to today.
- Wikipedia page on NYC Historical Population.

Data: Population



(Myles Zhang, wiki)

Input: What data do you need?

- Populations of the city in 1900 to today.
- Wikipedia page on NYC Historical Population.
- Saved as a CSV file at:
`stjohn.github.io/service/mfa/f19.html`
(Download to your computer to use for the following slides.)

CSV File: stjohngithub.io/service/mfa/f19.html

Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,
All population figures are consistent with present-day boundaries.
First census after the consolidation of the five boroughs,

Year,

Manhattan, Brooklyn, Queens, Bronx, Staten Island, Total

1698	4937	2017	727	7681		
1771	21863	3623	2847	28423		
1790	33131	4549	6159	1781	3827	49447
1800	60515	5740	6642	1755	4563	79215
1810	96373	8303	7444	2267	5347	119734
1820	123706	11187	8246	2782	6135	152056
1830	202589	20535	9049	3023	7082	242278
1840	312710	47613	14480	5346	10965	391114
1850	515547	138882	18593	8032	15061	696115
1860	813669	279122	32903	23593	25492	1174779
1870	942292	419921	45468	37393	33029	1478103
1880	1164673	599495	56559	51980	38991	1911698
1890	1441216	838547	87050	88908	51693	2507414
1900	1850093	1166582	152999	200507	67021	3437202
1910	2331542	1634351	284041	430980	85969	4766883
1920	2284103	2018356	469042	732016	116531	5620048
1930	1867312	2560401	1079129	1265258	158346	6930446
1940	1889924	2698285	1297634	1394711	174441	7454995
1950	1960101	2738175	1550849	1451277	191555	7891957
1960	1698281	2627319	1809578	1424815	221991	7781984
1970	1539233	2602012	1986473	1471701	295443	7894862
1980	1428285	2230936	1891325	1168972	352121	7071639
1990	1487536	2300664	1951598	1203789	378977	7322564
2000	1537195	2465326	2229379	1332650	443728	8008278
2010	1585873	2504700	2230722	1385108	468730	8175133
2015	1644518	2636735	2339150	1455444	474558	8550405

nycHistPop.csv

CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,
First census after the consolidation of the five boroughs,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1164582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4768883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809576,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- Excel .xls files have much extra formatting.

CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,,
First census after the consolidation of the five boroughs,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1164582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809576,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- Excel .xls files have much extra formatting.
- The text file version is called **CSV** for comma separated values.

CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,,
First census after the consolidation of the five boroughs,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1164582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809576,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- Excel .xls files have much extra formatting.
- The text file version is called **CSV** for comma separated values.
- Each row is a line in the file.

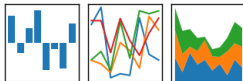
CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,,
First census after the consolidation of the five boroughs,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1164582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809576,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1324650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- Excel .xls files have much extra formatting.
- The text file version is called **CSV** for comma separated values.
- Each row is a line in the file.
- Columns are separated by commas on each line.

Structured Data

pandas
 $y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$

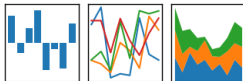


- We will use the popular Python Data Analysis Library (**Pandas**).

Structured Data

pandas

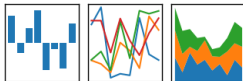
$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



- We will use the popular Python Data Analysis Library (**Pandas**).
- Open source and freely available (part of anaconda distribution).

Structured Data

pandas
 $y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$



- We will use the popular Python Data Analysis Library (**Pandas**).
- Open source and freely available (part of anaconda distribution).
- To use, add to the top of your file:

```
import pandas as pd
```

Reading in CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,,
First census after the consolidation of the five boroughs,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,,,727,7681
1771,21863,3623,,,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809578,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- To read in a CSV file: `myVar = pd.read_csv("myFile.csv")`

Reading in CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,
First census after the consolidation of the five boroughs,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809578,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- To read in a CSV file: `myVar = pd.read_csv("myFile.csv")`
- Pandas has its own type, **DataFrame**, that is perfect for holding a sheet of data.

Reading in CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,
First census after the consolidation of the five boroughs,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809578,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- To read in a CSV file: `myVar = pd.read_csv("myFile.csv")`
- Pandas has its own type, **DataFrame**, that is perfect for holding a sheet of data.
- Often abbreviated: `df`.

Reading in CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,
All population figures are consistent with present-day boundaries,,,,,,
First census after the consolidation of the five boroughs,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,60515,5740,6642,1755,4563,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018356,469042,732016,116531,5620048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1809578,1424815,221991,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300664,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1585873,2504700,2230722,1385108,468730,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

- To read in a CSV file: `myVar = pd.read_csv("myFile.csv")`
- Pandas has its own type, **DataFrame**, that is perfect for holding a sheet of data.
- Often abbreviated: `df`.
- It also has **Series**, that is perfect for holding a row or column of data.

Your Turn: Reading in CSV Files

```
Source: https://en.wikipedia.org/wiki/Demographics\_of\_New\_York\_City,....  
All population figures are consistent with present-day boundaries.....  
First census after the consolidation of the five boroughs,.....
```

```
.....  
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total  
1696,4937,2017,,727,7481  
1771,21863,3623,,2847,28423  
1790,32131,4549,6159,1781,3827,49467  
1800,40535,5740,6642,1755,4543,79215  
1810,96373,8303,7444,2267,5347,119734  
1820,123706,11187,8246,2782,6135,152056  
1830,202389,20535,3040,3023,7082,242278  
1840,312710,47613,34686,5346,10965,391114  
1850,515547,138882,18593,8032,15061,696115  
1860,813669,279122,32903,23593,25492,1174779  
1870,942292,419921,45468,37393,33029,1478103  
1880,1144673,599495,56559,51980,38991,1911690  
1890,1443216,838547,87050,88908,51693,2507414  
1900,1850093,1166582,152999,200507,67021,3437202  
1910,2332042,1634351,284041,430980,89949,4768803  
1920,2284103,2018356,469042,732016,116531,5420048  
1930,1867312,2560401,1079129,1265258,158346,6930446  
1940,1889924,2680285,1297634,1384111,174644,7454995  
1950,1960101,2738175,1550849,1451277,191555,7891957  
1960,1698281,2627319,1609578,1424815,221991,7761984  
1970,1539233,2602012,1866479,1473701,295643,7894862  
1980,1428285,2230936,1891325,1168972,352121,7071639  
1990,1487536,2300644,1951598,1203789,278971,7322564  
2000,1537135,2465326,2229378,1326550,443728,8008270  
2010,1585873,2504750,2230722,1385108,468739,8179133  
2015,1644518,2636735,2339150,1455446,474558,8550405
```

nycHistPop.csv

Your Turn: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

```
Source: https://en.wikipedia.org/wiki/Demographics\_of\_New\_York\_City,....
All population figures are consistent with present-day boundaries.....
First census after the consolidation of the five boroughs,.....
.....
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,...,727,7481
1771,21863,3623,...,2847,28423
1790,32131,4549,6159,1781,3827,49467
1800,40535,5740,6642,1755,4543,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,25035,30440,3023,7082,242278
1840,312710,47613,34686,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1144673,599495,56559,51980,38991,1911690
1890,1443216,838547,87050,88908,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2332042,1634351,284041,430980,80949,4768803
1920,2284103,2018356,469042,732016,116531,5420048
1930,1867312,2560401,1079129,1265258,158346,6930446
1940,1889924,2680285,1297634,1384111,174644,7454995
1950,1960101,2738175,1550849,1451277,191555,7891957
1960,1698281,2627319,1609578,1424815,221991,7761984
1970,1539233,2602012,1866479,1473701,295643,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300644,1951598,1203789,278977,7322564
2000,1537195,2465326,2229379,1326550,443728,8008270
2010,1585873,2504750,2230722,1385108,468739,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

nycHistPop.csv

Your Turn: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

```
pop = pd.read_csv('nycHistPop.csv',skiprows=5)
```

```
Source: https://en.wikipedia.org/wiki/Demographics\_of\_New\_York\_City,....  
All population figures are consistent with present-day boundaries.....  
First census after the consolidation of the five boroughs,.....
```

```
.....  
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total  
1698,4937,2017,...,727,7481  
1771,21863,3623,...,2847,28423  
1790,32131,4549,6159,1781,3827,49467  
1800,40535,5740,6642,1755,4543,79215  
1810,96373,8303,7444,2267,5347,119734  
1820,123706,11187,8246,2782,6135,152056  
1830,202589,20535,9040,3023,7082,242278  
1840,312710,47613,14480,5346,10965,391114  
1850,515547,138882,18593,8032,15061,696115  
1860,813669,279122,32903,23593,25492,1174779  
1870,942292,419921,45468,37393,33029,1478103  
1880,1144673,599495,56559,51980,38991,1911690  
1890,1443216,838547,87050,88900,51693,2507414  
1900,1850093,1166582,152999,200507,67021,3437202  
1910,2332042,1634351,284041,430980,80940,4768803  
1920,2884103,2018356,469042,732016,116531,5420048  
1930,3867312,2560401,1079129,1265258,158346,6930446  
1940,4889204,2690285,1297634,1384111,174644,7454995  
1950,5960101,2738175,1550849,1451277,191555,7891957  
1960,698281,2627319,1609578,1424815,221991,7761984  
1970,1539233,2602012,1866479,1473701,295643,7894862  
1980,1428285,2230936,1891325,1168972,352121,7071639  
1990,1487536,2300644,1951598,1203789,278977,7322564  
2000,1537135,2465326,2229378,1326550,443728,8008270  
2010,1585873,2504750,2230722,1385100,468739,8175133  
2015,1644518,2636735,2339150,1455444,474558,8550405
```

nycHistPop.csv

Your Turn: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

```
pop = pd.read_csv('nycHistPop.csv', skiprows=5)
```

```
pop.plot(x="Year")
plt.show()
```

```
Source: https://en.wikipedia.org/wiki/Demographics\_of\_New\_York\_City,.....
All population figures are consistent with present-day boundaries.....
First census after the consolidation of the five boroughs.....
```

```
.....
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,...,727,7481
1771,21863,3623,...,2847,28423
1790,32131,4549,6159,1781,3827,49467
1800,40535,5740,6642,1755,4543,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9040,3023,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33029,1478103
1880,1144673,599495,56559,51980,38991,1911690
1890,1443210,838547,87050,88900,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2332042,1634351,284041,430980,80940,4768803
1920,2884103,2018356,449042,732016,116531,5420048
1930,3867312,2560401,1079129,1265258,158346,6930446
1940,4889204,2680285,1297634,1384111,174644,7454095
1950,5960101,2738175,1550849,1451277,191555,7891957
1960,698281,2627319,1609578,1424815,221991,7781984
1970,1539233,2602032,1886479,1473701,295643,7894862
1980,1428285,2230936,1891325,1168972,352121,7071639
1990,1487536,2300644,1951598,1203789,278971,7322564
2000,1537135,2465326,2229378,1326550,443728,8008270
2010,1585873,2504750,2230722,1385100,468739,8175133
2015,1644518,2636735,2339150,1455444,474558,8550405
```

nycHistPop.csv

Your Turn: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

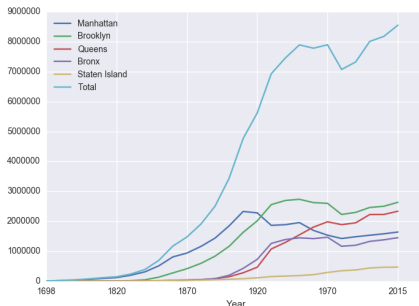
```
pop = pd.read_csv('nycHistPop.csv', skiprows=5)
```

```
pop.plot(x="Year")
plt.show()
```

Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,.....
All population figures are consistent with present-day boundaries.....
First census after the consolidation of the five boroughs.....

```
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island,Total
1698,4937,2017,...,727,7481
1771,21863,3623,...,2847,28423
1790,32131,4549,6159,1781,3827,49467
1800,40535,5740,6642,1755,4543,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9040,3623,7082,242278
1840,312710,47613,14480,5346,10965,391114
1850,515547,138882,18593,8032,15041,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33229,1478103
1880,1144673,599495,56559,53980,38991,1911490
1890,1443216,838547,87050,88908,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2333042,1634351,284041,430980,80948,4768803
1920,2884103,2018356,469042,732016,116531,5420048
1930,3867312,2560401,1079129,1265258,158346,6930446
1940,4889204,2690285,1397634,1394111,174444,7454995
1950,5960101,2738175,1550849,1451277,191555,7891957
1960,698281,267319,1609578,1424815,221991,7761984
1970,7539233,2602012,1866473,1473701,295443,7894862
1980,7428285,2230936,1891325,1168972,352121,7071439
1990,7487536,2300644,1951598,1203789,278977,7322564
2000,7537195,2465326,2229378,1328550,443728,8008270
2010,7585873,2504750,2230722,1385100,468739,8175133
2015,7644518,2636735,2339150,1455444,474558,8550405
```

nycHistPop.csv



Your Turn: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

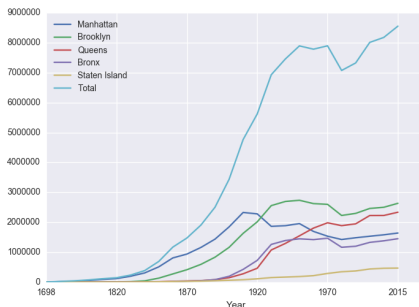
```
pop = pd.read_csv('nycHistPop.csv', skiprows=5)
```

```
pop.plot(x="Year")
plt.show()
```

Source: https://en.wikipedia.org/wiki/Demographics_of_New_York_City,
All population figures are consistent with present-day boundaries.
First census after the consolidation of the five boroughs.

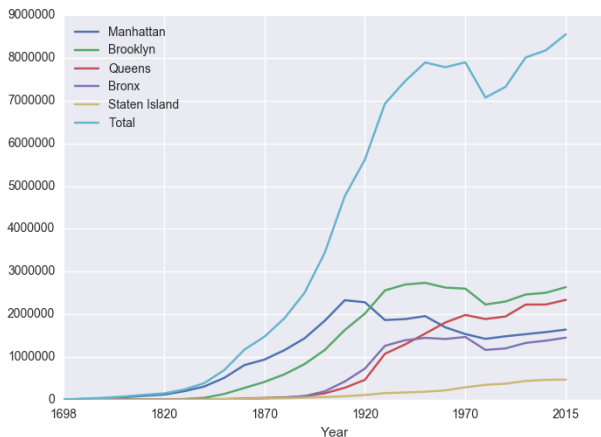
```
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,727,7481
1771,21863,3623,,2847,28423
1790,32131,4549,6159,1781,3827,49467
1800,40535,5740,6642,1755,4543,79215
1810,96373,8303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9040,3023,7082,242278
1840,312710,47613,14480,5346,10945,391114
1850,515547,138882,18593,8032,15041,696115
1860,813669,279122,32903,23593,25492,1174779
1870,942292,419921,45468,37393,33229,1478103
1880,1144673,599495,56559,53980,38991,1911490
1890,1443210,838547,87050,88900,51693,2507414
1900,1850093,1166582,152999,200507,67021,3437202
1910,2333042,1634351,284041,430980,80940,4768803
1920,2884103,2018356,469042,732016,116531,5420048
1930,3867312,2560401,1079129,1265258,158346,6930446
1940,4889204,2690285,1397634,1394111,174444,7454995
1950,5960101,2738175,1550849,1451277,191555,7891957
1960,698281,267319,1609578,1424815,221991,7761984
1970,7539233,2602012,1896473,1473701,295443,7894862
1980,7428285,2230936,1891325,1168972,352121,7071639
1990,7487536,2300644,1951598,1203789,278977,7322564
2000,7537195,2465326,2229378,1326550,443728,8008270
2010,7585873,2504750,2230722,1385100,468739,8175133
2015,7644518,2636735,2339150,1455444,474558,8550405
```

nycHistPop.csv

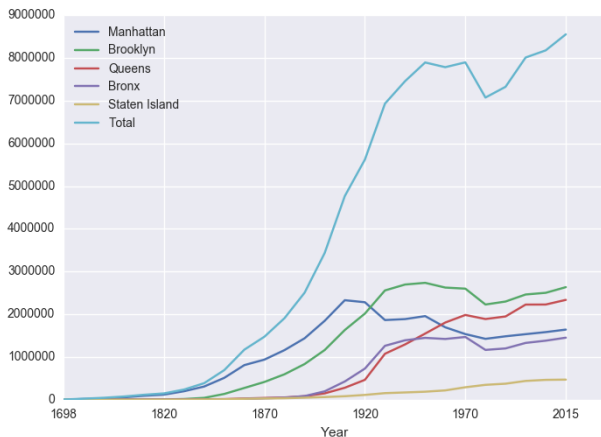


(To get above color scheme, import seaborn.)

Nice Graph, But Doesn't Answer the Question

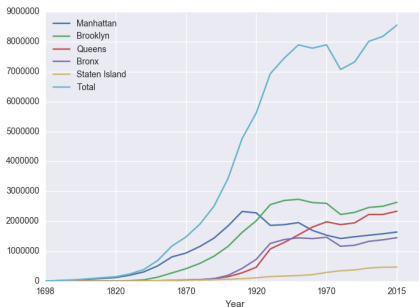


Nice Graph, But Doesn't Answer the Question



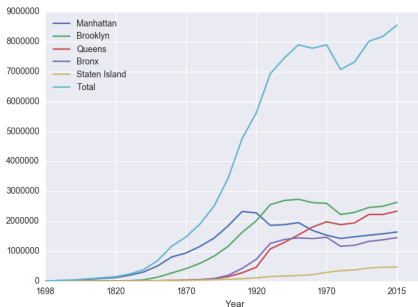
Let's survey what else you can do with pandas....

Series in Pandas



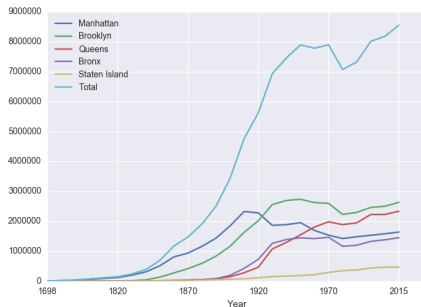
- Series can store a column or row of a DataFrame.

Series in Pandas



- Series can store a column or row of a DataFrame.
- Example: `pop["Manhattan"]` is the Series corresponding to the column of Manhattan data.

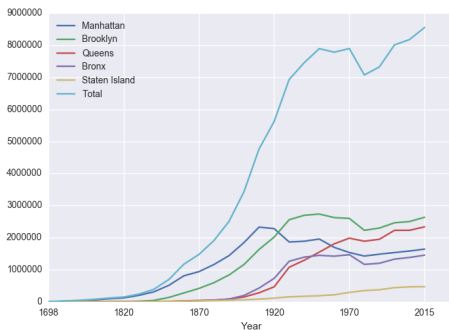
Series in Pandas



- Series can store a column or row of a DataFrame.
- Example: `pop["Manhattan"]` is the Series corresponding to the column of Manhattan data.
- Example:

```
print("The largest number living in the Bronx is",\n      pop["Bronx"].max())
```

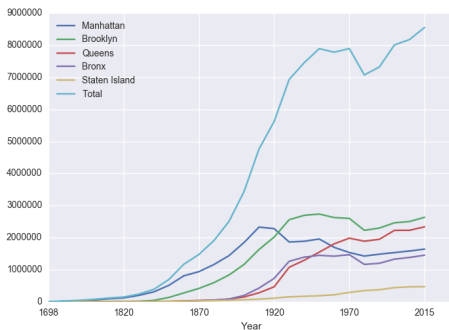
In Groups



Predict what the following will do:

● `print("Queens:", pop["Queens"].min())`

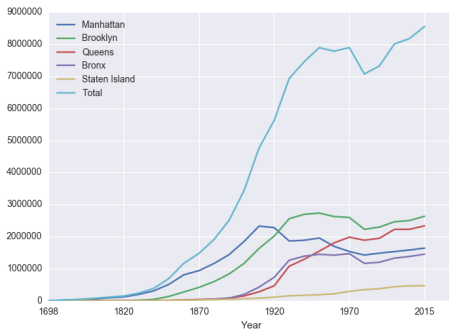
In Groups



Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
- `print("S I:", pop["Staten Island"].mean())`

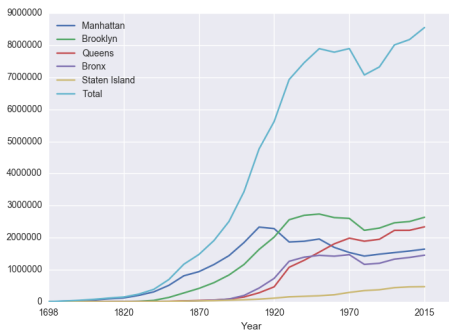
In Groups



Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
- `print("S I:", pop["Staten Island"].mean())`
- `print("S I:", pop["Staten Island"].std())`

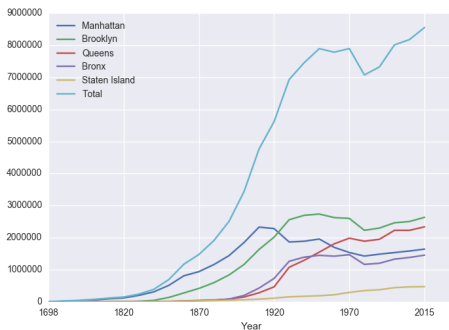
In Groups



Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
- `print("S I:", pop["Staten Island"].mean())`
- `print("S I:", pop["Staten Island"].std())`
- `pop.plot.bar(x="Year")`

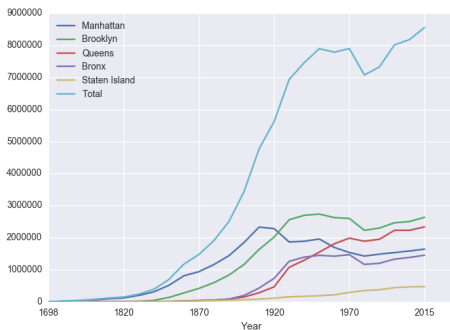
In Groups



Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
- `print("S I:", pop["Staten Island"].mean())`
- `print("S I:", pop["Staten Island"].std())`
- `pop.plot.bar(x="Year")`
- `pop.plot.scatter(x="Brooklyn", y= "Total")`

In Groups



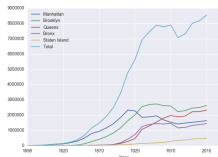
Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
- `print("S I:", pop["Staten Island"].mean())`
- `print("S I:", pop["Staten Island"].std())`
- `pop.plot.bar(x="Year")`
- `pop.plot.scatter(x="Brooklyn", y= "Total")`
- `pop["Fraction"] = pop["Bronx"]/pop["Total"]`

Solutions

Predict what the following will do:

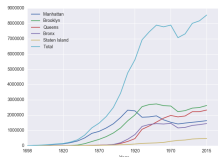
- `print("Queens:", pop["Queens"].min())`



Solutions

Predict what the following will do:

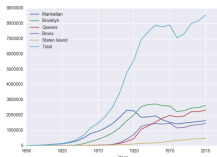
- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".



Solutions

Predict what the following will do:

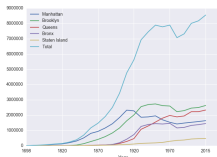
- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`



Solutions

Predict what the following will do:

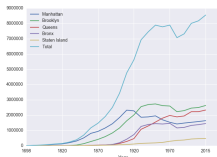
- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".



Solutions

Predict what the following will do:

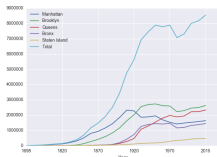
- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`



Solutions

Predict what the following will do:

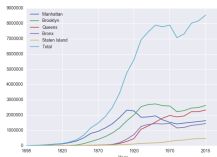
- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`
Standard deviation of values in the column "Staten Island".



Solutions

Predict what the following will do:

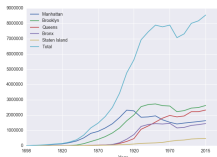
- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`
Standard deviation of values in the column "Staten Island".
- `pop.plot.bar(x="Year")`



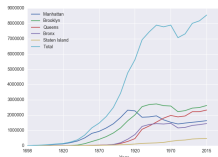
Solutions

Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`
Standard deviation of values in the column "Staten Island".
- `pop.plot.bar(x="Year")`
Bar chart with x-axis "Year".



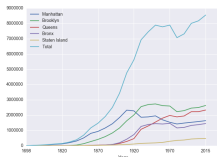
Solutions



Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`
Standard deviation of values in the column "Staten Island".
- `pop.plot.bar(x="Year")`
Bar chart with x-axis "Year".
- `pop.plot.scatter(x="Brooklyn", y="Total")`

Solutions



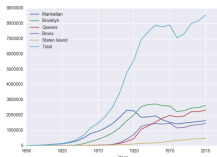
Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`
Standard deviation of values in the column "Staten Island".
- `pop.plot.bar(x="Year")`
Bar chart with x-axis "Year".
- `pop.plot.scatter(x="Brooklyn", y="Total")`
Scatter plot of Brooklyn versus Total values.

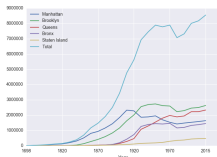
Solutions

Predict what the following will do:

- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`
Standard deviation of values in the column "Staten Island".
- `pop.plot.bar(x="Year")`
Bar chart with x-axis "Year".
- `pop.plot.scatter(x="Brooklyn", y= "Total")`
Scatter plot of Brooklyn versus Total values.
- `pop["Fraction"] = pop["Bronx"]/pop["Total"]`



Solutions



Predict what the following will do:

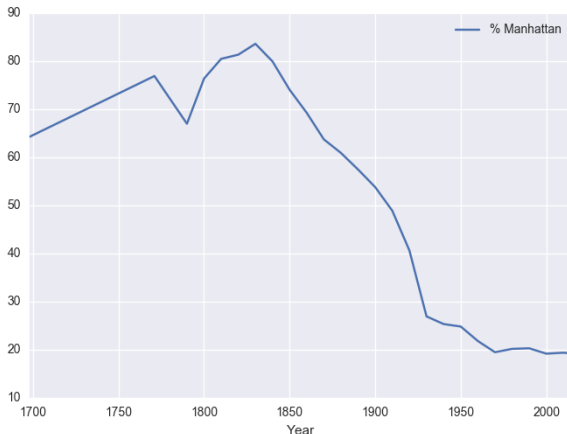
- `print("Queens:", pop["Queens"].min())`
Minimum value in the column with label "Queens".
- `print("S I:", pop["Staten Island"].mean())`
Average of values in the column "Staten Island".
- `print("S I :", pop["Staten Island"].std())`
Standard deviation of values in the column "Staten Island".
- `pop.plot.bar(x="Year")`
Bar chart with x-axis "Year".
- `pop.plot.scatter(x="Brooklyn", y= "Total")`
Scatter plot of Brooklyn versus Total values.
- `pop["Fraction"] = pop["Bronx"]/pop["Total"]`
New column with the fraction of population that lives in the Bronx.

In Groups

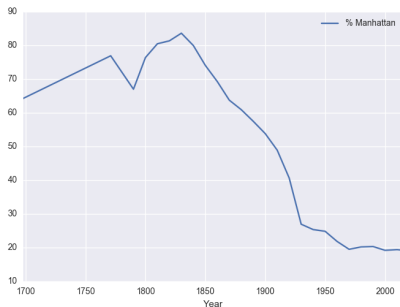
Graph the percentage of the total population that live in Manhattan:

In Groups

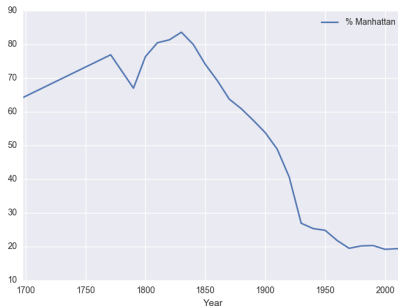
Graph the percentage of the total population that live in Manhattan:



Percent of Population in Manhattan, Over Time

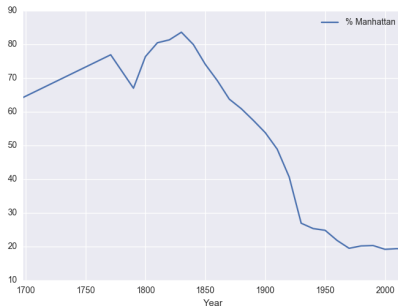


Percent of Population in Manhattan, Over Time



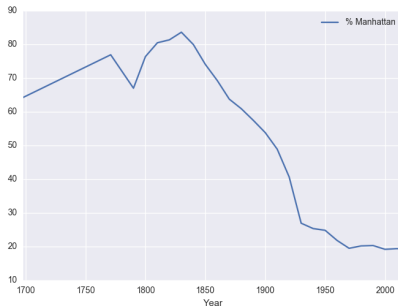
```
import matplotlib.pyplot as plt
import pandas as pd
```

Percent of Population in Manhattan, Over Time



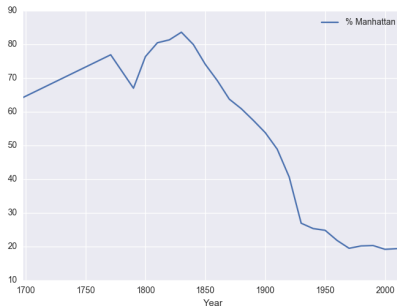
```
import matplotlib.pyplot as plt
import pandas as pd
import seaborn
```

Percent of Population in Manhattan, Over Time



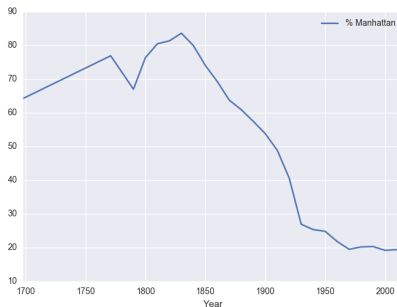
```
import matplotlib.pyplot as plt
import pandas as pd
import seaborn
pop = pd.read_csv('nycHistPop.csv',skiprows=5)
```

Percent of Population in Manhattan, Over Time



```
import matplotlib.pyplot as plt
import pandas as pd
import seaborn
pop = pd.read_csv('nycHistPop.csv',skiprows=5)
pop["% Manhattan"] = 100*pop["Manhattan"]/pop["Total"]
```

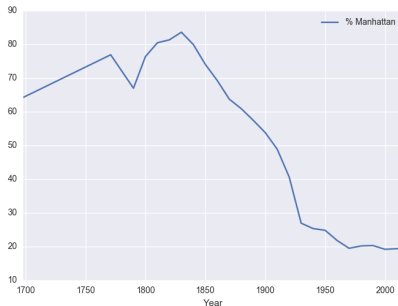
Percent of Population in Manhattan, Over Time



```
import matplotlib.pyplot as plt
import pandas as pd
import seaborn

pop = pd.read_csv('nycHistPop.csv', skiprows=5)
pop["% Manhattan"] = 100*pop["Manhattan"]/pop["Total"]
pop.plot(x="Year", y="% Manhattan")
```

Percent of Population in Manhattan, Over Time

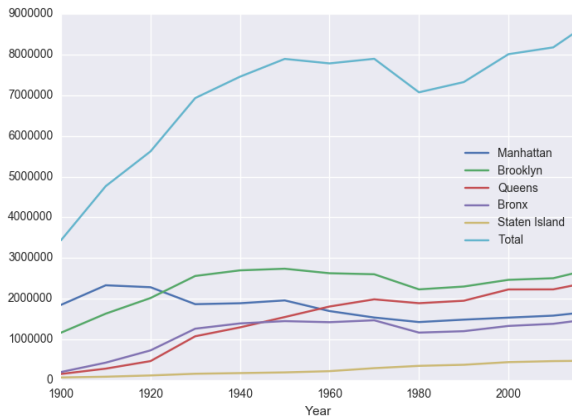


```
import matplotlib.pyplot as plt
import pandas as pd
import seaborn

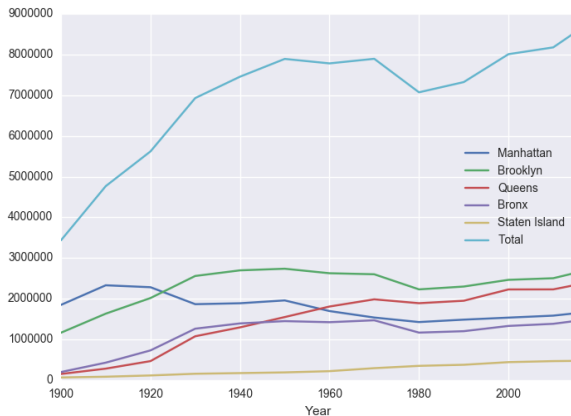
pop = pd.read_csv('nycHistPop.csv', skiprows=5)
pop["% Manhattan"] = 100*pop["Manhattan"]/pop["Total"]
pop.plot(x="Year", y="% Manhattan")

plt.show()
```

Population Since 1900

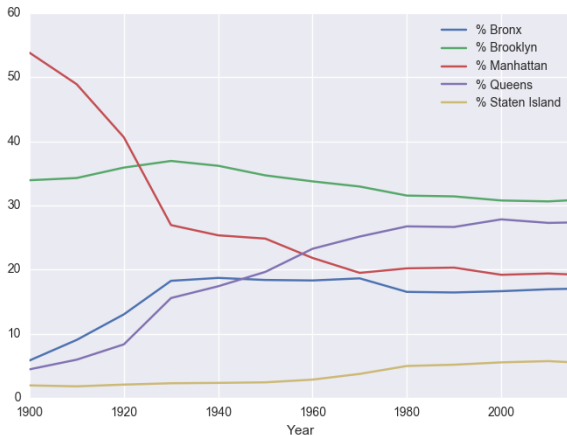


Population Since 1900

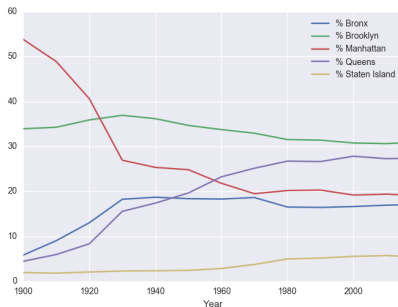


```
pop1900 = pop[pop['Year'] >= 1900]
pop1900.plot(x="Year")
plt.show()
```

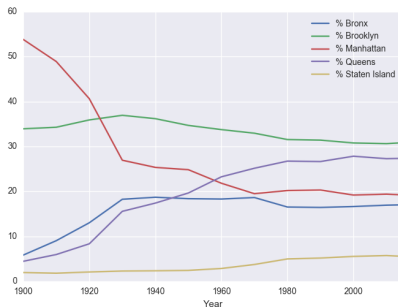

Population Percentage by Borough



Population Percentage by Borough

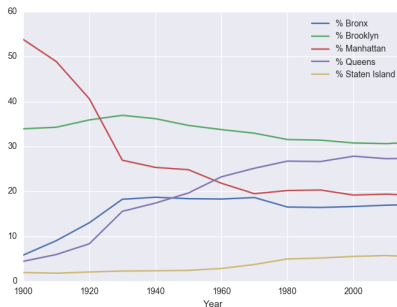


Population Percentage by Borough



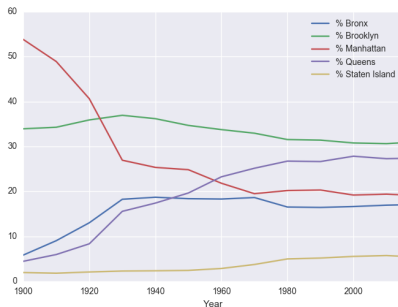
```
boros = ["Bronx", "Brooklyn", "Manhattan", "Queens", "Staten Island"]
```

Population Percentage by Borough



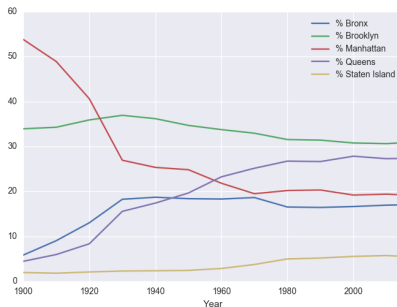
```
boros = ["Bronx","Brooklyn","Manhattan","Queens","Staten Island"]  
percentCol = ["% " + boro for boro in boros] #List comprehension
```

Population Percentage by Borough



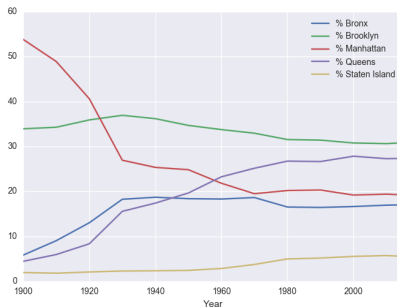
```
boros = ["Bronx", "Brooklyn", "Manhattan", "Queens", "Staten Island"]  
percentCol = ["% " + boro for boro in boros] #List comprehension  
for boro in boros:
```

Population Percentage by Borough



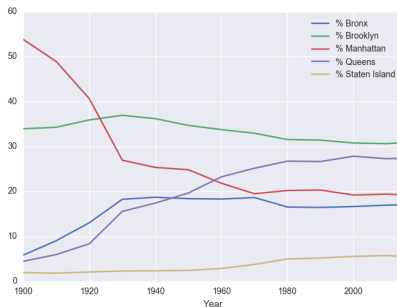
```
boros = ["Bronx","Brooklyn","Manhattan","Queens","Staten Island"]
percentCol = ["% " + boro for boro in boros] #List comprehension
for boro in boros:
    print('Computing percentage for', boro)
    pop["% " + boro] = 100*pop2[boro]/pop["Total"]
```

Population Percentage by Borough



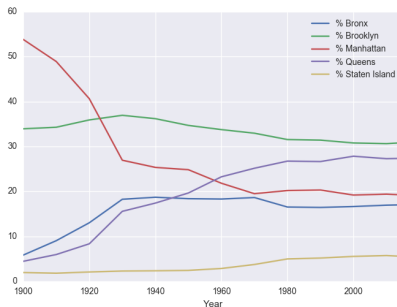
```
boros = ["Bronx","Brooklyn","Manhattan","Queens","Staten Island"]
percentCol = ["% " + boro for boro in boros] #List comprehension
for boro in boros:
    print('Computing percentage for', boro)
    pop["% " + boro] = 100*pop2[boro]/pop["Total"]
pop = pop.drop(boros, axis = 1)
```

Population Percentage by Borough



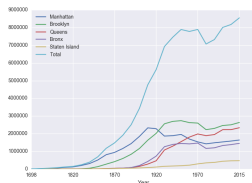
```
boros = ["Bronx","Brooklyn","Manhattan","Queens","Staten Island"]
percentCol = ["% " + boro for boro in boros] #List comprehension
for boro in boros:
    print('Computing percentage for', boro)
    pop["% " + boro] = 100*pop2[boro]/pop["Total"]
pop = pop.drop(boros, axis = 1)
pop = pop.drop("Total", axis = 1)
```


Population Percentage by Borough



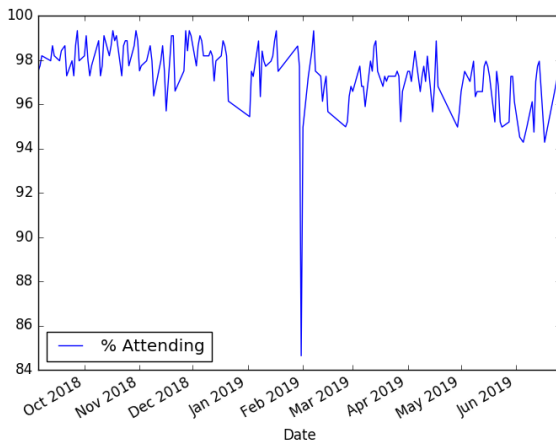
```
boros = ["Bronx","Brooklyn","Manhattan","Queens","Staten Island"]
percentCol = ["% " + boro for boro in boros] #List comprehension
for boro in boros:
    print('Computing percentage for', boro)
    pop["% " + boro] = 100*pop2[boro]/pop["Total"]
pop = pop.drop(boros, axis = 1)
pop = pop.drop("Total", axis = 1)
pop.plot(x = "Year")
plt.show()
```

Outline



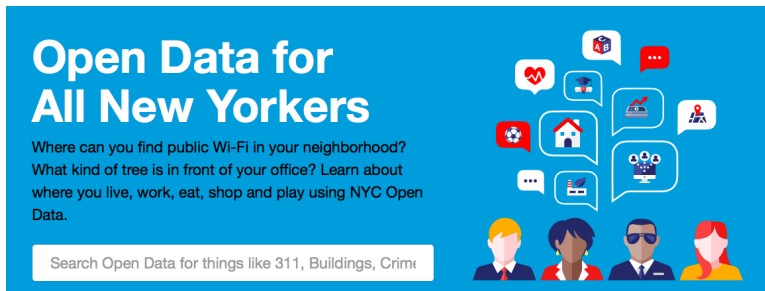
- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

Variations on the Theme: School Attendance



Manhattan Hunter HS, 2018-2019

Accessing Structured Data: NYC Open Data

A blue banner for NYC Open Data. On the left, the text 'Open Data for All New Yorkers' is in large white font. Below it, a paragraph asks questions about public Wi-Fi, trees, and living/working/eating/shopping, encouraging users to learn about NYC Open Data. At the bottom left is a white search bar with the placeholder text 'Search Open Data for things like 311, Buildings, Crime'. On the right, there are several white speech bubbles containing icons for a heart with a pulse line, a graduation cap, a soccer ball, a house, a factory, a person with a location pin, a laptop with a bar chart, and a group of people. Below the speech bubbles are four stylized avatars of diverse people.

Open Data for All New Yorkers

Where can you find public Wi-Fi in your neighborhood? What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.


Search Open Data for things like 311, Buildings, Crime

- Freely available source of data.

Accessing Structured Data: NYC Open Data

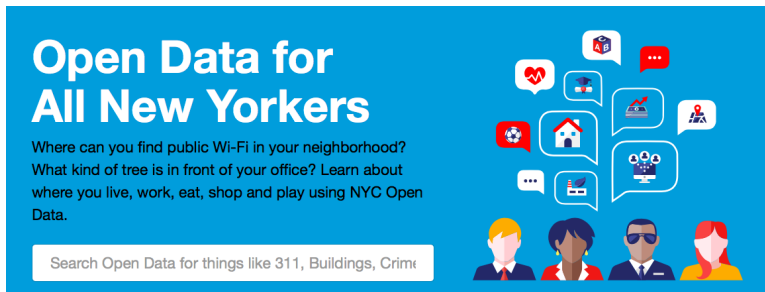
Open Data for All New Yorkers

Where can you find public Wi-Fi in your neighborhood? What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.



- Freely available source of data.
- Maintained by the NYC data analytics team.

Accessing Structured Data: NYC Open Data

A blue banner for NYC Open Data. On the left, the text 'Open Data for All New Yorkers' is in large white font. Below it, a paragraph asks: 'Where can you find public Wi-Fi in your neighborhood? What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.' At the bottom left is a white search bar with the text 'Search Open Data for things like 311, Buildings, Crime'. On the right, there are several speech bubbles containing icons for a heart with a pulse line, a house, a soccer ball, a factory, a person with a magnifying glass, and a group of people. Below the speech bubbles are four stylized human avatars with different hair colors and styles.

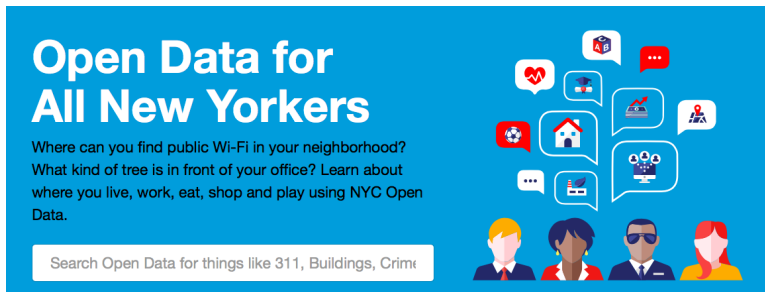
Open Data for All New Yorkers

Where can you find public Wi-Fi in your neighborhood? What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

- Freely available source of data.
- Maintained by the NYC data analytics team.
- Will use `pandas`, `pyplot` & `folium` libraries to analyze, visualize and map the data.

Accessing Structured Data: NYC Open Data



Open Data for All New Yorkers

Where can you find public Wi-Fi in your neighborhood? What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

The banner features a blue background with white text. On the right side, there are several speech bubbles containing icons: a heart with a pulse line, a house, a soccer ball, a factory, a laptop with a bar chart, a location pin, and a group of people. Below the speech bubbles are four stylized human figures with different hair colors and styles.

- Freely available source of data.
- Maintained by the NYC data analytics team.
- Will use `pandas`, `pyplot` & `folium` libraries to analyze, visualize and map the data.
- More on downloading NYC OpenData datasets after break.

Variations on the Theme: School Attendance

- NYC OpenData has daily population counts for schools.



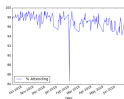
Variations on the Theme: School Attendance

- NYC OpenData has daily population counts for schools.
- 2018-2019 data for Manhattan Hunter linked on webpage.

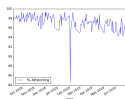


Variations on the Theme: School Attendance

- NYC OpenData has daily population counts for schools.
- 2018-2019 data for Manhattan Hunter linked on webpage.
[Download now to work through the exercise.](#)

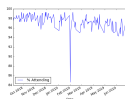


Variations on the Theme: School Attendance



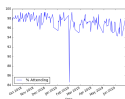
- NYC OpenData has daily population counts for schools.
- 2018-2019 data for Manhattan Hunter linked on webpage.
[Download now to work through the exercise.](#)
- Can download your own from OpenData NYC (view data and filter by “School DBN”).

Variations on the Theme: School Attendance



- NYC OpenData has daily population counts for schools.
- 2018-2019 data for Manhattan Hunter linked on webpage.
[Download now to work through the exercise.](#)
- Can download your own from OpenData NYC (view data and filter by “School DBN”).
- Dates need to be converted from 'YYYYMMDD' to a datetime format:

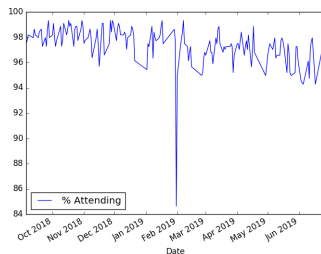
Variations on the Theme: School Attendance



- NYC OpenData has daily population counts for schools.
- 2018-2019 data for Manhattan Hunter linked on webpage.
[Download now to work through the exercise.](#)
- Can download your own from OpenData NYC (view data and filter by “School DBN”).
- Dates need to be converted from 'YYYYMMDD' to a datetime format:

```
df["Date"] = pd.to_datetime(df["Date"].apply(str))
```
- [Goal: Make a plot of daily attendance \(as percentage of enrolled\).](#)

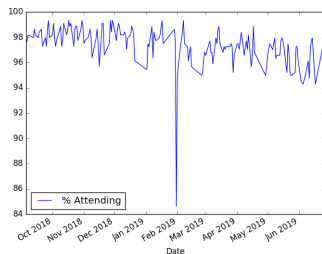
Variations on the Theme: School Attendance



C

```
df = pd.read_csv('dailyAttendance.csv') #Read file to a dataframe
```

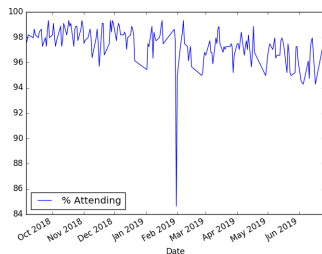
Variations on the Theme: School Attendance



C

```
df = pd.read_csv('dailyAttendance.csv') #Read file to a dataframe  
df["Date"] = pd.to_datetime(df["Date"].apply(str))
```

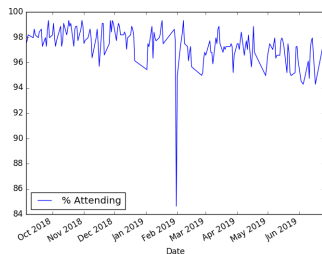
Variations on the Theme: School Attendance



C

```
df = pd.read_csv('dailyAttendance.csv') #Read file to a dataframe
df["Date"] = pd.to_datetime(df["Date"].apply(str))
df["% Attending"] = 100*df["Present"]/df["Enrolled"]
```


Variations on the Theme: School Attendance



C

```
df = pd.read_csv('dailyAttendance.csv') #Read file to a dataframe
df["Date"] = pd.to_datetime(df["Date"].apply(str))
df["% Attending"] = 100*df["Present"]/df["Enrolled"]
df.plot(x='Date',y="% Attending")
```

Design a Challenge

- Find an interesting data set for a challenge.



Design a Challenge



- Find an interesting data set for a challenge.
- Suggested places to look:

Design a Challenge



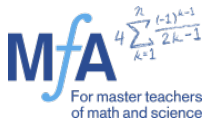
- Find an interesting data set for a challenge.
- Suggested places to look:
 - ▶ NYC OpenData.

Design a Challenge



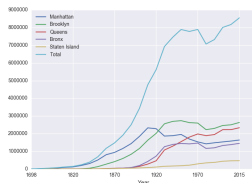
- Find an interesting data set for a challenge.
- Suggested places to look:
 - ▶ NYC OpenData.
 - ▶ Weather Underground (for historical weather data).

Design a Challenge



- Find an interesting data set for a challenge.
- Suggested places to look:
 - ▶ NYC OpenData.
 - ▶ Weather Underground (for historical weather data).
 - ▶ Kaggle Open Datasets: data, code, and competitions for data science.

Outline

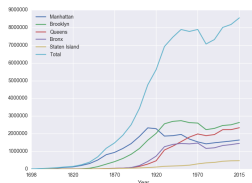


- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

Break



Outline



- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

Variations on the Theme: Binning Data: Parking Tickets



- Open Data has archived recent NYC parking tickets.

Variations on the Theme: Binning Data: Parking Tickets



- Open Data has archived recent NYC parking tickets.
 - ▶ We will use a small version (1000 lines).

Variations on the Theme: Binning Data: Parking Tickets



- Open Data has archived recent NYC parking tickets.
 - ▶ We will use a small version (1000 lines).
 - ▶ You are welcome to use any neighborhood in the city.

Variations on the Theme: Binning Data: Parking Tickets



- Open Data has archived recent NYC parking tickets.
 - ▶ We will use a small version (1000 lines).
 - ▶ You are welcome to use any neighborhood in the city.
 - ▶ Suggest restricting to a single year, since can be quite large.

Variations on the Theme: Binning Data: Parking Tickets



- Open Data has archived recent NYC parking tickets.
 - ▶ We will use a small version (1000 lines).
 - ▶ You are welcome to use any neighborhood in the city.
 - ▶ Suggest restricting to a single year, since can be quite large.
- A simple, but very powerful, technique is **binning data**: grouping data into the number of occurrences for each categories.

Variations on the Theme: Binning Data: Parking Tickets



- Open Data has archived recent NYC parking tickets.
 - ▶ We will use a small version (1000 lines).
 - ▶ You are welcome to use any neighborhood in the city.
 - ▶ Suggest restricting to a single year, since can be quite large.
- A simple, but very powerful, technique is **binning data**: grouping data into the number of occurrences for each categories.
- Can often show patterns that individual data points do not.

Variations on the Theme: Binning Data: Parking Tickets



- Open Data has archived recent NYC parking tickets.
 - ▶ We will use a small version (1000 lines).
 - ▶ You are welcome to use any neighborhood in the city.
 - ▶ Suggest restricting to a single year, since can be quite large.
- A simple, but very powerful, technique is **binning data**: grouping data into the number of occurrences for each categories.
- Can often show patterns that individual data points do not.
- We will bin parking tickets by attributes: license plate number, car color, etc.

Parking Ticket Data Format

Table Preview

View Data

Create Visualization

Sum...	Plate...	Regis...	Plate...	Issue...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	202
14471524...	JCV6523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	202
14471525...	GMK6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	202
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	202
14471529...	HXH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	202
14471533...	HXM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	202
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	202
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	202
14471533...	GDH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	202
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	202
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	202
14471538...	GYM7645	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	202

< Previous Next >

Showing Rows 1-14 out of 4,984,034

Parking Ticket Data Format

Table Preview [View Data](#) [Create Visualization](#)

Seat...	Plate...	Regd...	Plate...	Issue...	Viol...	Vehicle...	Vehicle...	Issue...	Street...	Street...	Street...
14471323...	4T3981	NY	PAS	04/08/2019	21	SPN	BAND	P	27790	36290	36290
14471324...	1C45213	NY	PAS	04/08/2019	28	SPN	TOYOT	P	36290	27790	124 13
14471325...	03A8896	NY	PAS	04/16/2019	14	SLBM	BAND	P	36270	11710	27790
14471325...	1GJ5441	NY	PAS	04/04/2019	19	SPN	AUD	P	36270	11710	27790
14471327...	02M8068	NY	COM	07/06/2019	48			P	37190	36290	36290
14471328...	1K94342	NY	PAS	04/14/2019	38	SLBM	NISSA	P	36270	11710	27790
14471333...	1KMS470	NY	PAS	04/14/2019	48	SLBM	TOYOT	P	36290	11710	27790
14471333...	04H6546	NY	PAS	04/14/2019	46	SLBM	HONDA	P	36270	11710	27790
14471333...	1H87769	NY	PAS	04/08/2019	38	SLBM	TOYOT	P	36290	11710	27790
14471333...	02H1784	ME	PAS	07/06/2019	48	SPN	DOODGE	P	37190	40404	40404
14471338...	043331	NY	PAS	07/07/2019	46	SPN	HCLRA	P	36270	11710	27790
14471337...	1F61039	NY	PAS	04/14/2019	38	SPN	HONDA	P	36270	11710	27790
14471337...	1H32034	NY	PAS	04/16/2019	48		ACURA	P	36270	11710	27790
14471338...	01N7545	NY	PAS	04/15/2019	19	SLBM	NISSA	P	36270	11710	27790

< Previous **Next** > Showing Rows 1-14 out of 4,064,034

Parking Ticket Data Format

Table Preview [View Data](#) [Create Visualization](#)

Seat...	Plate...	Regd...	Plate...	Issued...	Vehicle...	Vehicle...	Vehicle...	Issued...	Street...	Street...	Street...	Seat...
14471023...	4T3981	NY	PAS	04/08/2019	21	SPN	BAND	P	27790	36290	36290	201
14471024...	LD5213	NY	PAS	04/08/2019	28	SPN	TOYOT	P	36290	27790	124 12	201
14471025...	Q88896	NY	PAS	04/16/2019	14	SJRM	BAND	P	36270	11710	27790	201
14471025...	LD5161	NY	PAS	04/04/2019	19	SPN	AUD	P	36270	11710	27790	201
14471027...	Q288068	NY	COM	07/06/2019	48			P	37190	36210	36230	201
14471028...	V094322	NY	PAS	04/14/2019	38	SJRM	NISSA	P	36270	11710	27790	201
14471033...	V080470	NY	PAS	04/14/2019	40	SJRM	TOYOT	P	36290	11710	27790	201
14471033...	Q985646	NY	PAS	04/14/2019	46	SJRM	HONDA	P	36270	11710	27790	201
14471033...	V087769	NY	PAS	04/08/2019	40	SJRM	TOYOT	P	36290	11710	27790	201
14471033...	Q291784	ME	PAS	07/06/2019	48	SPN	DOODGE	P	37190	40604	40604	
14471038...	EX4321	NY	PAS	07/07/2019	46	SPN	HCLRA	P	36270	11710	27790	201
14471037...	V08000	NY	PAS	04/16/2019	36	SPN	HONDA	P	36270	11710	27790	201
14471037...	V032004	NY	PAS	04/16/2019	46		ACURA	P	36270	11710	27790	201
14471038...	Q197545	NY	PAS	04/15/2019	19	SJRM	NISSA	P	36270	11710	27790	201

< Previous [Next](#) >

Showing Rows 1-14 out of 4,064,034

- Instead of zipcode, classified by the issuing police precinct.

Parking Ticket Data Format

Table Preview

View Data

Create Visualization

Item...	Plat...	Regi...	Plac...	Issu...	Volu...	WHIC...	WHIC...	Issu...	Stor...	Stor...	Stor...	View
14471523...	IT2801	NY	PAS	06/05/2019	23	SUN	BMAF	P	27390	36230	36230	10/13
14471524...	EV0523	NY	PAS	06/05/2019	23	SUN	TOTCV	P	36230	27390	19113	10/13
14471525...	040804	NY	PAS	06/04/2019	18	SUN	BMAF	P	16270	11730	27390	10/13
14471525...	020404	NY	PAS	06/04/2019	19	SUN	ALCE	P	16270	11730	27390	10/13
14471527...	020808	NY	COM	07/05/2019	48	SUN		P	31190	36230	36230	10/13
14471528...	090402	NY	PAS	06/04/2019	48	SUN	MBSA	P	16270	11730	27390	10/13
14471529...	090402	NY	PAS	06/04/2019	48	SUN	TOTCV	P	36230	11730	27390	10/13
14471531...	090406	NY	PAS	06/04/2019	48	SUN	HONCH	P	16270	11730	27390	10/13
14471533...	090409	NY	PAS	06/04/2019	48	SUN	TOTCV	P	36230	11730	27390	10/13
14471534...	090704	NY	PAS	07/06/2019	48	SUN	DOCE	P	31190	40640	40640	10/13
14471535...	040201	NY	PAS	07/01/2019	48	SUN	ACLA	P	16270	11730	27390	10/13
14471537...	090306	NY	PAS	06/03/2019	48	SUN	HONCH	P	16270	11730	27390	10/13
14471538...	030504	NY	PAS	06/05/2019	48	SUN	ACLA	P	16270	11730	27390	10/13
14471539...	090505	NY	PAS	06/05/2019	19	SUN	NSGA	P	16270	11730	27390	10/13

< Previous

Next >

Showing Rows 1-14 out of 4,564,004

- Instead of zipcode, classified by the issuing police precinct.
- To limit to a precinct, filter by "Violation Precinct".

Parking Ticket Data Format

Table Preview											
Item_1	Item_2	Item_3	Reg_1	Plate_1	Issued_1	Vol_1	WHIC_1	WHIC_2	Issued_2	Stow_1	Stow_2
14471523_	IT2801	NY	PAS	96/05/2013	23	SPN	BMAF	P	27390	36290	30300
14471524_	LVJ523	NY	PAS	96/05/2013	23	SPN	TQVCF	P	26290	27390	13113
14471525_	3048866	NY	PAS	96/04/2019	18	BUMH	BMAF	P	16270	11710	27390
14471525_	LDX144	NY	PAS	96/04/2019	18	SPN	ALCF	P	36270	11710	27390
14471527_	32048008	NY	COM	8/10/2019	48	SPN			31710	36210	30300
14471528_	KH91032	NY	PAS	96/04/2019	48	BUMH	MBSA	P	16270	11710	27390
14471533_	KH90347	NY	PAS	96/04/2019	48	SPN	TQVCF	P	26290	11710	27390
14471533_	99H5965	NY	PAS	96/04/2019	48	SPN	HONDC	P	26270	11710	27390
14471533_	H087369	NY	PAS	96/04/2019	48	BUMH	TQVCF	P	26290	11710	27390
14471533_	SDV7474	NY	PAS	96/04/2019	48	SPN	LODCEP	P	31710	36210	30300
14471535_	GA2319	NY	PAS	97/09/2019	48	SPN	ACLA	P	26270	11710	27390
14471536_	99H036	NY	PAS	96/04/2019	48	SPN	HONDC	P	26270	11710	27390
14471536_	H030004	NY	PAS	96/04/2019	48	ACLA	P		26270	11710	27390
14471538_	97H5465	NY	PAS	96/05/2019	19	BUMH	NBSA	P	26270	11710	27390

- Instead of zipcode, classified by the issuing police precinct.
- To limit to a precinct, filter by "Violation Precinct".
- The first line gives the entries in the order they occur in the rows.

Parking Ticket Data Format

Table Preview

View Data

Create Visualization

Ticket ID	Plate	Regd.	Plate	Issued	Viol.	Viol. Precinct	Vehicle	Viol.	Issued	Street	Street	Street	Year
14471023...	4T3981	NY	PAS	04/08/2019	25	SDA	BAND	P	27390	36230	36230	201	
14471024...	4D5213	NY	PAS	04/08/2019	28	SDA	TOYOT	P	36240	27390	124 12	201	
14471025...	0480864	NY	PAS	04/14/2019	14	SLBM	BAND	P	36270	11710	27390	201	
14471025...	4D5140	NY	PAS	04/04/2019	19	SDA	AUD	P	36270	11710	27390	201	
14471027...	0288068	NY	COM	07/06/2019	48			P	37190	36210	36230	201	
14471028...	4V84342	NY	PAS	04/14/2019	38	SLBM	NISSA	P	36270	11710	27390	201	
14471033...	4V85470	NY	PAS	04/14/2019	48	SLBM	TOYOT	P	36290	11710	27390	201	
14471033...	0484646	NY	PAS	04/14/2019	46	SLBM	HONDA	P	36270	11710	27390	201	
14471043...	4H87769	NY	PAS	04/08/2019	38	SLBM	TOYOT	P	36290	11710	27390	201	
14471053...	0291784	ME	PAS	07/06/2019	48	SDA	DOODGE	P	37190	40604	40604		
14471058...	043537	NY	PAS	07/07/2019	46	SDA	ACURA	P	36270	11710	27390	201	
14471057...	4V84338	NY	PAS	04/14/2019	38	SDA	HONDA	P	36270	11710	27390	201	
14471057...	4H32034	NY	PAS	04/16/2019	46		ACURA	P	36270	11710	27390	201	
14471058...	0197545	NY	PAS	04/15/2019	19	SLBM	NISSA	P	36270	11710	27390	201	

< Previous

Next >

Showing Rows 1-14 out of 4,064,034

- Instead of zipcode, classified by the issuing police precinct.
- To limit to a precinct, filter by "Violation Precinct".
- The first line gives the entries in the order they occur in the rows.
- Each entry begins with a unique identifier to look up the ticket.

Parking Ticket Data Format

Table Preview

[View Data](#) [Create Visualization](#)

Seq. #	Plate #	Regd. #	Plate #	Issued	Viol. #	Vehicle	Vehicle	Issued	Seq. #	Seq. #	Seq. #	Seq. #
14471023	473981	NY	PAS	06/09/2015	25	SPN	BAND	P	27390	36230	36230	201
14471024	470523	NY	PAS	06/09/2015	28	SPN	TOYOT	P	36230	27390	12113	201
14471025	008086	NY	PAS	06/16/2015	14	SUBN	BAND	P	36270	11710	27390	201
14471025	450540	NY	PAS	06/04/2015	13	SPN	AUD	P	36270	11710	27390	201
14471027	0388068	NY	COM	07/02/2015	48			P	37190	36210	36230	201
14471028	4094342	NY	PAS	06/14/2015	38	SUBN	NISSA	P	36270	11710	27390	201
14471033	4060470	NY	PAS	06/14/2015	40	SUBN	TOYOT	P	36290	11710	27390	201
14471033	0466646	NY	PAS	06/14/2015	46	SUBN	HONDA	P	36270	11710	27390	201
14471043	4087769	NY	PAS	06/09/2015	40	SUBN	TOYOT	P	36290	11710	27390	201
14471053	0291784	ME	PAS	07/06/2015	48	SPN	DOODGE	P	37190	40604	40604	
14471061	045521	NY	PAS	07/07/2015	46	SPN	ACURA	P	36270	11710	27390	201
14471071	404008	NY	PAS	06/16/2015	38	SPN	HONDA	P	36270	11710	27390	201
14471071	4030034	NY	PAS	06/16/2015	38	ACURA		P	36270	11710	27390	201
14471081	0197545	NY	PAS	06/15/2015	14	SUBN	NISSA	P	36270	11710	27390	201

< Previous Next >

Showing Rows 1-14 out of 4,064,034

- Instead of zipcode, classified by the issuing police precinct.
- To limit to a precinct, filter by "Violation Precinct".
- The first line gives the entries in the order they occur in the rows.
- Each entry begins with a unique identifier to look up the ticket.
- Sample line of CSV file:

1335632335,L040HZ,FL,PAS,06/09/2015,46,SUBN,NISSA,X,35430,14510,15710,0,0020,20,74,921167,E074,0000,1213

83 ST,,0,408,C,,BBBBBBB,ALL,ALL,RED,0,0,-,0,,,,,

Parking Ticket Data Format

Table Preview

[View Data](#) [Create Visualization](#)

Serial	Plate	Regd.	Plate	Serial	Viol.	Viol.	Viol.	Viol.	Viol.	Serial	Serial	Serial	Serial
14471023	KT3981	NY	PAS	06/09/2015	21	SPN	BAND	P		27390	36290	36290	201
14471024	LO4023	NY	PAS	06/09/2015	28	SPN	TOYOT	P		36290	27390	12110	201
14471025	QW8886	NY	PAS	06/16/2015	14	SUBN	BAND	P		36270	11710	27390	201
14471025	LO4041	NY	PAS	06/04/2015	13	SPN	AUD	P		36270	11710	27390	201
14471025	QW8886	NY	COM	07/06/2015	48			P		37190	36290	36290	201
14471026	W09432	NY	PAS	06/14/2015	38	SUBN	NISSA	P		36270	11710	27390	201
14471033	W09470	NY	PAS	06/14/2015	40	SUBN	TOYOT	P		36290	11710	27390	201
14471033	QW8886	NY	PAS	06/14/2015	46	SUBN	HONDA	P		36270	11710	27390	201
14471043	W09769	NY	PAS	06/09/2015	40	SUBN	TOYOT	P		36290	11710	27390	201
14471053	QW1084	NY	PAS	07/09/2015	48	SPN	DOODGE	P		37190	40604	40604	201
14471058	QW4331	NY	PAS	07/01/2015	46	SPN	ACURA	P		36270	11710	27390	201
14471059	W09430	NY	PAS	06/16/2015	48	SPN	HONDA	P		36270	11710	27390	201
14471059	W09430	NY	PAS	06/16/2015	48	ACURA		P		36270	11710	27390	201
14471059	QW1084	NY	PAS	06/15/2015	14	SUBN	NISSA	P		36270	11710	27390	201

< Previous Next >

Showing Rows 1-14 out of 4,064,034

- Instead of zipcode, classified by the issuing police precinct.
- To limit to a precinct, filter by "Violation Precinct".
- The first line gives the entries in the order they occur in the rows.
- Each entry begins with a unique identifier to look up the ticket.
- Sample line of CSV file:

```
1335632335,L040HZ,FL,PAS,06/09/2015,46,SUBN,NISSA,X,35430,14510,15710,0,0020,20,74,921167,E074,0000,1213
83 ST,,0,408,C,,BBBBBBB,ALL,ALL,RED,0,0,-,0,,,,,
```

- Issued on June 9, 2015 to a passenger car with Florida plates, L040HZ. The red Nissan SUV received it on W 83rd Street.

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMW6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	H0M3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HRB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GCH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JPW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous Next >

Showing Rows 1-14 out of 4,984,034

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMW6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	H0M3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HRB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GDH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GYM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous Next >

Showing Rows 1-14 out of 4,984,034

In groups, brainstorm about how to answer:

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMW6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	HGH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	HGM3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GCH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JPW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous Next >

Showing Rows 1-14 out of 4,984,034

In groups, brainstorm about how to answer:

- Which car got the most tickets?

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMM6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	HGH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	HGM3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GDM2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous Next >

Showing Rows 1-14 out of 4,984,034

In groups, brainstorm about how to answer:

- Which car got the most tickets?
- What color of car is most likely to get a ticket?

Binning Data: Parking Tickets

Table Preview [View Data](#) [Create Visualization](#)

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMM6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	HGH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	HGM3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GDM2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous Next >

Showing Rows 1-14 out of 4,984,034

In groups, brainstorm about how to answer:

- Which car got the most tickets?
- What color of car is most likely to get a ticket?
- What type of license gets the most tickets?

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20
14471525...	GWM6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20
14471529...	HGH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20
14471533...	HGM3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20
14471533...	GWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20
14471533...	GDM2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20
14471537...	JPW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20

< Previous Next > Showing Rows 1-14 out of 4,984,034

In groups, brainstorm about how to answer:

- Which car got the most tickets?
- What color of car is most likely to get a ticket?
- What type of license gets the most tickets?
- Are all states equally represented in license plates that get tickets?

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20
14471525...	GMM6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20
14471529...	HGH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20
14471533...	HGM3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20
14471533...	GWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20
14471533...	GDM2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20

< Previous Next >

Showing Rows 1-14 out of 4,984,034

In groups, brainstorm about how to answer:

- Which car got the most tickets?
- What color of car is most likely to get a ticket?
- What type of license gets the most tickets?
- Are all states equally represented in license plates that get tickets?
- Which location yields the most tickets?

Counting Tickets per Car

Table Preview [View Data](#) [Create Visualization](#)

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27990	36290	36350	20
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27990	13113	20
14471525...	GMR6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27990	20
14471525...	JGK1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27990	20
14471527...	GOM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27990	20
14471533...	HMM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27990	20
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	G0H2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCAS331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27990	20
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27990	20
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27990	20
14471538...	QYN6743	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27990	20

< Previous [Next](#) >

Showing Rows 1-14 out of 4,984,034

Counting Tickets per Car

Table Preview [View Data](#) [Create Visualization](#)

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27990	36290	36350	20
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27990	13113	20
14471525...	GMR6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27990	20
14471525...	JGK1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27990	20
14471527...	GOM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27990	20
14471533...	HMM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27990	20
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GDK2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCAS331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27990	20
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27990	20
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27990	20
14471538...	QYN7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27990	20

< Previous [Next](#) >

Showing Rows 1-14 out of 4,984,034

How can tell which car got the most tickets?

Counting Tickets per Car

Table Preview [View Data](#) [Create Visualization](#)

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27990	36290	36350	20
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27990	13113	20
14471525...	GMR6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27990	20
14471525...	JGK1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27990	20
14471527...	GOM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27990	20
14471533...	HMM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27990	20
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GDK1184	ME	PAS	07/06/2019	48	SDN	DOGE	P	31190	40404	40404	
14471536...	JCAS331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27990	20
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27990	20
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27990	20
14471538...	QYN6745	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27990	20

< Previous [Next](#) >

Showing Rows 1-14 out of 4,984,034

How can tell which car got the most tickets?

- Need to a unique way to identify different cars.

Counting Tickets per Car

Table Preview [View Data](#) [Create Visualization](#)

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27990	36290	36350	20
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27990	13113	20
14471525...	GMR6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27990	20
14471525...	JGK1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27990	20
14471527...	GOM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27990	20
14471533...	HMM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27990	20
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GDK1184	ME	PAS	07/06/2019	48	SDN	DOODG	P	31190	40404	40404	
14471536...	JCAS331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27990	20
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27990	20
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27990	20
14471538...	QYN6743	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27990	20

< Previous [Next](#) >

Showing Rows 1-14 out of 4,984,034

How can tell which car got the most tickets?

- Need to a unique way to identify different cars.

Luckily, cars almost always have license plates– unique by state.

Counting Tickets per Car

Table Preview [View Data](#) [Create Visualization](#)

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27990	36290	36330	20
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27990	13113	20
14471525...	GMR6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27990	20
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27990	20
14471527...	GOM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27990	20
14471533...	HMM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27990	20
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27990	20
14471533...	GDH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCAS331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27990	20
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27990	20
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27990	20
14471538...	QYN7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27990	20

< Previous Next >

Showing Rows 1-14 out of 4,984,034

How can tell which car got the most tickets?

- Need to a unique way to identify different cars.

Luckily, cars almost always have license plates– unique by state.

(For this simple exercise, assume each license plate ID is unique– not unreasonable since every state has a different schema for assigning numbers, but to be more accurate should keep track of license plate number and issuing state.)

Counting Tickets per Car

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27990	36290	36330	201
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27990	13113	201
14471525...	GMR6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27990	201
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27990	201
14471527...	GOM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	201
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27990	201
14471533...	HMM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27990	201
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27990	201
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27990	201
14471533...	GQH2184	ME	PAS	07/06/2019	48	SDN	DOOGI	P	31190	40404	40404	
14471536...	JCAS331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27990	201
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27990	201
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27990	201
14471538...	QYM7645	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27990	201

< Previous Next >

Showing Rows 1-14 out of 4,984,034

How can tell which car got the most tickets?

- Need to a unique way to identify different cars.
 Luckily, cars almost always have license plates– unique by state.
(For this simple exercise, assume each license plate ID is unique– not unreasonable since every state has a different schema for assigning numbers, but to be more accurate should keep track of license plate number and issuing state.)
- Want to “bin” tickets by license plates (“Plate ID”),

Counting Tickets per Car

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27990	36290	36330	201
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27990	13113	201
14471525...	GMMK954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27990	201
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27990	201
14471527...	GOM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	201
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27990	201
14471533...	HMM3470	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27990	201
14471533...	GWH9640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27990	201
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27990	201
14471533...	G0H2184	ME	PAS	07/06/2019	48	SDN	DOOGI	P	31190	40404	40404	
14471536...	JCAS331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27990	201
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27990	201
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27990	201
14471538...	GYN7645	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27990	201

< Previous Next > Showing Rows 1-14 out of 4,984,034

How can tell which car got the most tickets?

- Need to a unique way to identify different cars.
 Luckily, cars almost always have license plates– unique by state.
(For this simple exercise, assume each license plate ID is unique– not unreasonable since every state has a different schema for assigning numbers, but to be more accurate should keep track of license plate number and issuing state.)
- Want to “bin” tickets by license plates (“Plate ID”),
 and then count the size of bins.

Your Turn: Binning Data

- Sample program:

Your Turn: Binning Data

- Sample program:
`import pandas as pd`

Your Turn: Binning Data

- Sample program:

```
import pandas as pd  
tickets = pd.read_csv('tickets.csv')
```

Your Turn: Binning Data

- Sample program:

```
import pandas as pd
tickets = pd.read_csv('tickets.csv')
#Print out the data frame:
print(tickets)
```

Your Turn: Binning Data

- Sample program:

```
import pandas as pd
tickets = pd.read_csv('tickets.csv')
#Print out the data frame:
print(tickets)
#Print out licence plates:
print(tickets["Plate ID"])
```

Your Turn: Binning Data

- Sample program:

```
import pandas as pd
tickets = pd.read_csv('tickets.csv')
#Print out the data frame:
print(tickets)
#Print out licence plates:
print(tickets["Plate ID"])
#Print out plates & number of tickets each got:
print(tickets["Plate ID"].value_counts())
```

Your Turn: Binning Data

- Sample program:

```
import pandas as pd
tickets = pd.read_csv('tickets.csv')
#Print out the data frame:
print(tickets)
#Print out licence plates:
print(tickets["Plate ID"])
#Print out plates & number of tickets each got:
print(tickets["Plate ID"].value_counts())
#Print 10 worst & number of tickets:
print(tickets["Plate ID"].value_counts()[:10])
```

Your Turn: Binning Data

- Sample program:

```
import pandas as pd
tickets = pd.read_csv('tickets.csv')
#Print out the data frame:
print(tickets)
#Print out licence plates:
print(tickets["Plate ID"])
#Print out plates & number of tickets each got:
print(tickets["Plate ID"].value_counts())
#Print 10 worst & number of tickets:
print(tickets["Plate ID"].value_counts()[:10])
```

- For the sample data set, there were few cars that got more than a ticket a day...

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stree...	Stree...	Stree...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMW6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	HGH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	HGM3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HRB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GCH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JPW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous Next >

Showing Rows 1-14 out of 4,984,034

Binning Data: Parking Tickets

Table Preview

View Data

Create Visualization

Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stren...	Stren...	Stren...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMW6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	H0H5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	H0M3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GDH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JPW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GYM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous

Next >

Showing Rows 1-14 out of 4,984,034

In groups, write programs for:

Binning Data: Parking Tickets

Table Preview View Data Create Visualization

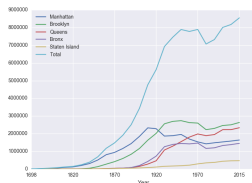
Sum...	Plate...	Regis...	Plate...	Issu...	Viola...	Vehic...	Vehic...	Issu...	Stren...	Stren...	Stren...	Veh
14471523...	JET2661	NY	PAS	06/28/2019	21	SDN	BMW	P	27390	36290	36350	20...
14471524...	JCV5523	NY	PAS	06/28/2019	20	SDN	TOYOT	P	36290	27390	13113	20...
14471525...	GMM6954	NY	PAS	06/16/2019	19	SUBN	BMW	P	36270	11710	27390	20...
14471525...	JGX1641	NY	PAS	06/24/2019	19	SDN	AUDI	P	36270	11710	27390	20...
14471527...	GDM8069	NY	COM	07/06/2019	48			P	31190	36310	36330	20...
14471529...	GKH5242	NY	PAS	06/14/2019	46	SUBN	NISSA	P	36270	11710	27390	20...
14471533...	HXM3479	NY	PAS	06/14/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	QWH19640	NY	PAS	06/14/2019	46	SUBN	HONDA	P	36270	11710	27390	20...
14471533...	HKB1769	NY	PAS	06/28/2019	40	SUBN	TOYOT	P	36290	11710	27390	20...
14471533...	GKH2184	ME	PAS	07/06/2019	48	SDN	DODGE	P	31190	40404	40404	
14471536...	JCA5331	NY	PAS	07/01/2019	46	SDN	ACURA	P	36270	11710	27390	20...
14471537...	JFW5006	99	PAS	06/16/2019	46	SDN	HONDA	P	36270	11710	27390	20...
14471537...	HGR2634	NY	PAS	06/16/2019	46		ACURA	P	36270	11710	27390	20...
14471538...	GVM7643	NY	PAS	06/15/2019	19	SUBN	NISSA	P	36270	11710	27390	20...

< Previous Next > Showing Rows 1-14 out of 4,984,034

In groups, write programs for:

- Which car got the most tickets?
- What color of car is most likely to get a ticket?
- What type of license gets the most tickets?
- Are all states equally represented in license plates that get tickets?
- Which location yields the most tickets?

Outline



- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

Variations on the Theme: OpenData Film Permits



Home Data About ▾ Learn

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page>

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELDERT STREET b...	Brooklyn
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELDERT STREET b...	Brooklyn
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens

Example: OpenData Film Permits

NYC OpenData Home Data About ▾ Learn ▾ Alerts Contact Us Blog

Film Permits 📄 📱 📧

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page>

[More Views](#) [Filter](#) [Visualize](#) [Export](#) [Discuss](#) [Embed](#) [About](#)

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou	Com	Police	Categ	SubC	Count	ZipCo
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

- What's the most popular street for filming?

Example: OpenData Film Permits

NYC OpenData Home Data About ▾ Learn ▾ Alerts Contact Us Blog |

Film Permits 🔗 f 🔍 📄 📊 📅

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page> More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou	Com	Police	Categ	SubC	Count	ZipCo
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

- What's the most popular street for filming?
- What's the most popular borough?

Example: OpenData Film Permits



Home Data About ▾ Learn ▾ Alerts Contact Us Blog |

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page>

[More Views](#) [Filter](#) [Visualize](#) [Export](#) [Discuss](#) [Embed](#) [About](#)

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg...	ParkingHeld	Borou...	Com...	Police...	Categ...	SubC...	Count...	ZipCo...
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

- What's the most popular street for filming?
- What's the most popular borough?
- How many TV episodes were filmed?

Example: OpenData Film Permits

NYC OpenData Home Data About Learn Alerts Contact Us Blog

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopen/permits/when-permit-required.page>

EventID	EventType	StartDateT...	EndDateTime	EventDate	EventAg...	ParkingInfr...	Borne...	Cent...	Police...	Categ...	SubC...	Count...	ZipCo...
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:35...	Mayor's Offi...	STARKE AVENUE b...	Queens	2	108	Television	Epicodic S...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/06/2018 09:11...	Mayor's Offi...	EAGLE STREET b...	Brooklyn	1	84	Television	Epicodic S...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/06/2018 05:44...	Mayor's Offi...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	3/8 Photo...	Not Applica...	United Sta...	11215, 11...
454920	Shooting Permit	12/06/2018 13:00...	12/06/2018 11:55...	12/06/2018 03:28...	Mayor's Offi...	13 AVENUE betw...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10052, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/06/2018 03:05...	Mayor's Offi...	ELDERST STREET b...	Brooklyn	4, 9	104, 76, 83	Television	Epicodic S...	United Sta...	11200, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 09:00...	12/06/2018 02:45...	Mayor's Offi...	ELDERST STREET b...	Brooklyn	4	83	Television	Epicodic S...	United Sta...	11227
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/06/2018 02:17...	Mayor's Offi...	35 STREET betw...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.

Example: OpenData Film Permits

NYC OpenData

Home Data About Learn Alerts Contact Us Blog Sign In

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopendata/permits/when-permit-required.page>

Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateT...	EndDateTime	EnteredOn	EventAg...	ParkingInf...	Borne...	Cent...	Police...	Categ...	SubC...	Count...	ZipCo...
45503	Shooting Permit	12/05/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:35...	Mayor's Offi...	STARKE AVENUE b...	Queens	2	108	Television	Episodic S...	United Sta...	11101
45497	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/06/2018 09:11...	Mayor's Offi...	EAGLE STREET bet...	Brooklyn	1	84	Television	Episodic S...	United Sta...	11222
45491	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/06/2018 05:44...	Mayor's Offi...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	3/8 Photo...	Not Applica...	United Sta...	11215, 11...
45490	Shooting Permit	12/06/2018 13:00...	12/06/2018 11:00...	12/06/2018 03:28...	Mayor's Offi...	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/06/2018 03:05...	Mayor's Offi...	ELDERST STREET b...	Brooklyn	4, 9	104, 76, 83	Television	Episodic S...	United Sta...	11200, 11...
45489	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/06/2018 02:45...	Mayor's Offi...	ELDERST STREET b...	Brooklyn	4	83	Television	Episodic S...	United Sta...	11227
45485	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/06/2018 02:17...	Mayor's Offi...	35 STREET betwe...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

```
#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits
```

```
#Import pandas for reading and analyzing CSV data:
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
```


Example: OpenData Film Permits

NYC OpenData

Home Data About Learn Alerts Contact Us Blog Sign In

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopendata/permits/when-permit-required.page>

Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateT...	EndDateTime	EnteredOn	EventAg...	ParkingInf...	Borne...	Cent...	Police...	Categ...	SubC...	Count...	ZipCo...
45503	Shooting Permit	12/05/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:35...	Mayor's Offi...	STARKE AVENUE B...	Queens	2	108	Television	Episodic S...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/06/2018 09:11...	Mayor's Offi...	EAGLE STREET bet...	Brooklyn	1	84	Television	Episodic S...	United Sta...	11222
45491	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/06/2018 05:44...	Mayor's Offi...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	S&B Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00...	12/06/2018 11:00...	12/06/2018 03:28...	Mayor's Offi...	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/06/2018 03:05...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4, 6	104, 76, 83	Television	Episodic S...	United Sta...	11200, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/06/2018 02:45...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic S...	United Sta...	11227
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/06/2018 02:17...	Mayor's Offi...	35 STREET betwe...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

```
#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits
```

```
#Import pandas for reading and analyzing CSV data:
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
print(tickets)              #Print out the dataframe
```

Example: OpenData Film Permits

NYC OpenData

Home Data About Learn Alerts Contact Us Blog Sign In

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopendata/permits/when-permit-required.page>

Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDate	EndDate	EventDate	EventName	ParkingHeld	Borough	Cent.	Police	Catg.	SubCat.	County	ZipCo.
45503	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/05/2018 12:35	Mayor's Office	STARKE AVENUE B...	Queens	2	108	Television	Episodic S...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/04/2018 09:11	Mayor's Office	EAGLE STREET B...	Brooklyn	1	84	Television	Episodic S...	United Sta...	11222
45481	Shooting Permit	12/06/2018 07:00	12/06/2018 07:00	12/04/2018 09:44	Mayor's Office	SOUTH OXFORD	Brooklyn	2	76, 88	S&B Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00	12/06/2018 11:00	12/04/2018 03:28	Mayor's Office	13 AVENUE betw...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00	12/06/2018 11:00	12/04/2018 03:05	Mayor's Office	ELBERT STREET B...	Brooklyn	4, 6	104, 76, 83	Television	Episodic S...	United Sta...	11200, 11...
454809	Shooting Permit	12/05/2018 08:00	12/05/2018 09:00	12/04/2018 02:45	Mayor's Office	ELBERT STREET B...	Brooklyn	4	83	Television	Episodic S...	United Sta...	11227
454865	Shooting Permit	12/06/2018 07:00	12/06/2018 10:00	12/04/2018 02:17	Mayor's Office	35 STREET betw...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

```
#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits
```

```
#Import pandas for reading and analyzing CSV data:
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
print(tickets) #Print out the dataframe
print(tickets["ParkingHeld"]) #Print out streets (multiple times)
```

Example: OpenData Film Permits

NYC OpenData

Home Data About Learn Alerts Contact Us Blog Sign In

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopendata/permits/when-permit-required.page>

Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateT...	EndDateTime	EnterDateT...	EventAg...	ParkingHeld	Borne...	Cent...	Police...	Camp...	SubC...	Count...	ZipCo...
45503	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:35...	Mayor's Offi...	STARKE AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/04/2018 09:11...	Mayor's Offi...	EAGLE STREET b...	Brooklyn	1	84	Television	Episodic s...	United Sta...	11222
45481	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offi...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	3/8 Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00...	12/06/2018 11:55...	12/04/2018 03:28...	Mayor's Offi...	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4, 6	104, 76, 83	Television	Episodic s...	United Sta...	11200, 11...
454809	Shooting Permit	12/05/2018 08:00...	12/05/2018 09:00...	12/04/2018 02:45...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11227
454865	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offi...	35 STREET betwe...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

```
#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits
```

```
#Import pandas for reading and analyzing CSV data:
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
print(tickets) #Print out the dataframe
print(tickets["ParkingHeld"]) #Print out streets (multiple times)
print(tickets["ParkingHeld"].value_counts()) #Print out streets & number of times used
```

Example: OpenData Film Permits

NYC OpenData

Home Data About Learn Alerts Contact Us Blog Search Sign In

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopendata/permits/when-permit-required.page>

Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDate	EndDate	EventDate	EventName	ParkingHeld	Borough	Cent.	Police	Catg.	SubCat.	County	ZipCode
45063	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/05/2018 12:35	Mayor's Office	STARKE AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/04/2018 09:11	Mayor's Office	EAGLE STREET b...	Brooklyn	1	84	Television	Episodic s...	United Sta...	11222
45481	Shooting Permit	12/06/2018 07:00	12/06/2018 07:00	12/04/2018 09:44	Mayor's Office	SOUTH OXFORD ...	Brooklyn	2	76, 88	SUB Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00	12/06/2018 11:00	12/04/2018 03:28	Mayor's Office	13 AVENUE betw...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
45414	Shooting Permit	12/06/2018 08:00	12/06/2018 11:00	12/04/2018 03:05	Mayor's Office	ELBERT STREET b...	Brooklyn	4, 6	104, 76, 83	Television	Episodic s...	United Sta...	11200, 11...
45489	Shooting Permit	12/05/2018 08:00	12/05/2018 09:00	12/04/2018 02:45	Mayor's Office	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11227
45485	Shooting Permit	12/06/2018 07:00	12/06/2018 10:00	12/04/2018 02:17	Mayor's Office	35 STREET betw...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits

#Import pandas for reading and analyzing CSV data:

```
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
print(tickets) #Print out the dataframe
print(tickets["ParkingHeld"]) #Print out streets (multiple times)
print(tickets["ParkingHeld"].value_counts()) #Print out streets & number of times used
print(tickets["ParkingHeld"].value_counts()[:10]) #Print 10 most popular
```

In Groups: OpenData Film Permits

Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page>



Find in this Dataset

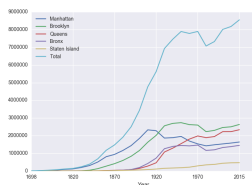
More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou	Com	Police	Categ	SubC	Count	ZipCo
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

Can approach the other questions in the same way:

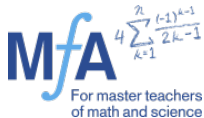
- What's the most popular street for filming?
- What's the most popular borough?
- How many TV episodes were filmed?

Outline



- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- Wrap Up

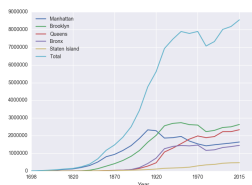
Design a Challenge



With your group, brainstorm about a design challenge that:

- An interesting publicly available data set,
- To analyze with the pandas commands we've discussed.

Outline



- Recap
- Design Challenge: NYC Population
- Variations on the Theme
- Design a Challenge
- Break
- Design Challenge: Parking Tickets
- Variations on the Theme
- Design a Challenge
- **Wrap Up**

Wrap Up

- Introduced pandas for analyzing structured data.



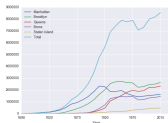
Wrap Up

- Introduced pandas for analyzing structured data.
 - ▶ Plotting, simple stats functions, and slicing.



Wrap Up

- Introduced pandas for analyzing structured data.
 - ▶ Plotting, simple stats functions, and slicing.
 - ▶ Didn't cover: accessing rows, joining/merging tables, applying functions, ...



Wrap Up

- Introduced pandas for analyzing structured data.
 - ▶ Plotting, simple stats functions, and slicing.
 - ▶ Didn't cover: accessing rows, joining/merging tables, applying functions, ...
- Used publicly available data:

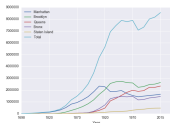


Wrap Up



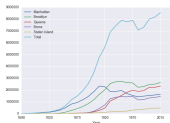
- Introduced pandas for analyzing structured data.
 - ▶ Plotting, simple stats functions, and slicing.
 - ▶ Didn't cover: accessing rows, joining/merging tables, applying functions, ...
- Used publicly available data:
 - ▶ Great source: NYC Open Data.

Wrap Up



- Introduced pandas for analyzing structured data.
 - ▶ Plotting, simple stats functions, and slicing.
 - ▶ Didn't cover: accessing rows, joining/merging tables, applying functions, ...
- Used publicly available data:
 - ▶ Great source: NYC Open Data.
 - ▶ Examined population data, school attendance, parking tickets, film permits.

Wrap Up



- Introduced pandas for analyzing structured data.
 - ▶ Plotting, simple stats functions, and slicing.
 - ▶ Didn't cover: accessing rows, joining/merging tables, applying functions, ...
- Used publicly available data:
 - ▶ Great source: NYC Open Data.
 - ▶ Examined population data, school attendance, parking tickets, film permits.
- If time: share challenges you designed...

Wrap Up



- Introduced pandas for analyzing structured data.
 - ▶ Plotting, simple stats functions, and slicing.
 - ▶ Didn't cover: accessing rows, joining/merging tables, applying functions, ...
- Used publicly available data:
 - ▶ Great source: NYC Open Data.
 - ▶ Examined population data, school attendance, parking tickets, film permits.
- If time: share challenges you designed...
- See you in three weeks!