rental_analysis

May 6, 2022

1 Toronto Dwellings Analysis

In this assignment, you will perform fundamental analysis for the Toronto dwellings market to allow potential real estate investors to choose rental investment properties.

[1]:
```
# imports
import panel as pn
pn.extension('plotly')
import plotly.express as px
import pandas as pd
import hvplot.pandas
import matplotlib.pyplot as plt
import os
import random
from pathlib import Path
from dotenv import load_dotenv
```

[2]:
```
# Read the Mapbox API key
load_dotenv()

map_box_api = os.getenv("map_box_api")
# Set the Mapbox API
px.set_mapbox_access_token(map_box_api)
```

[3]:
```
type("mapbox")
```

[3]:
```
str
```

1.1 Load Data

[4]:
```
# Read the census data into a Pandas DataFrame
file_path = Path("Data/toronto_neighbourhoods_census_data.csv")
to_data = pd.read_csv(file_path, index_col="year")
to_data.head()
```

[4]:
```
                     neighbourhood  single_detached_house  \
year
2001               Agincourt North                   3715
```

```
2001  Agincourt South-Malvern West                    3250
2001                      Alderwood                   3175
2001                          Annex                   1060
2001              Banbury-Don Mills                   3615

      apartment_five_storeys_plus  movable_dwelling  semi_detached_house  \
year
2001                         1480                 0                 1055
2001                         1835                 0                  545
2001                          315                 0                  470
2001                         6090                 5                 1980
2001                         4465                 0                  240

      row_house  duplex  apartment_five_storeys_less  other_house  \
year
2001       1295     195                          185            5
2001        455     105                          425            0
2001         50     185                          370            0
2001        605     275                         3710          165
2001        380      15                         1360            0

      average_house_value  shelter_costs_owned  shelter_costs_rented
year
2001               200388                  810                   870
2001               203047                  806                   892
2001               259998                  817                   924
2001               453850                 1027                  1378
2001               371864                 1007                  1163
```

1.2 Dwelling Types Per Year

In this section, you will calculate the number of dwelling types per year. Visualize the results using bar charts and the Pandas plot function.

Hint: Use the Pandas `groupby` function.

Optional challenge: Plot each bar chart in a different color.

[5]:
```
# Calculate the sum number of dwelling types units per year (hint: use groupby)
dwelling_per_year = to_data.groupby("year").sum().
 ↪drop(columns=["average_house_value", "shelter_costs_owned",␣
 ↪"shelter_costs_rented" ])

dwelling_per_year
```

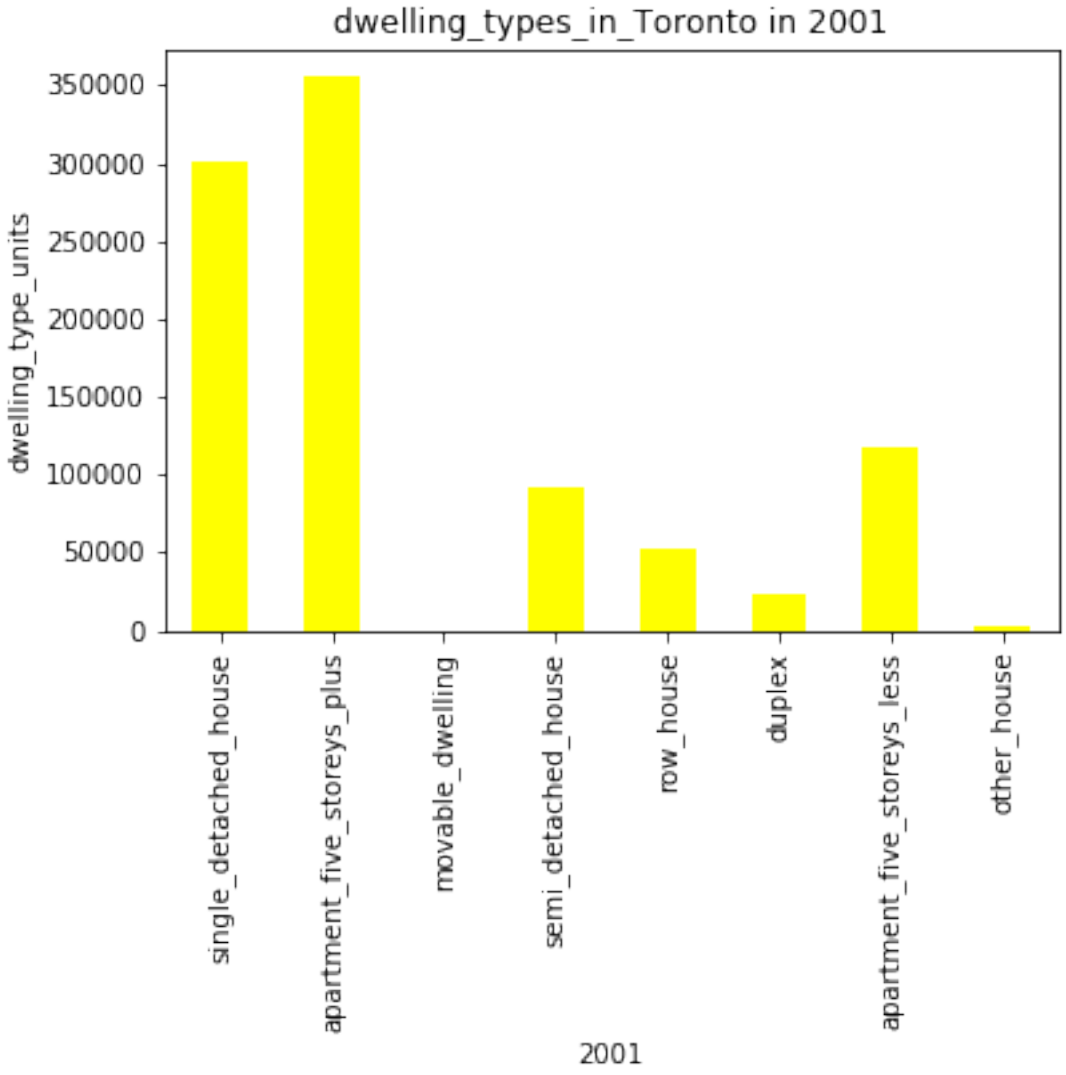
[5]:
```
      single_detached_house  apartment_five_storeys_plus  movable_dwelling  \
year
2001                 300930                       355015               75
2006                 266860                       379400              165
2011                 274940                       429220              100
2016                 269680                       493270               95

      semi_detached_house  row_house  duplex  apartment_five_storeys_less  \
year
2001                90995      52355   23785                       116900
2006                69430      54690   44095                       162850
2011                72480      60355   44750                       163895
2016                71200      61565   48585                       165575

      other_house
year
2001         3040
2006         1335
2011         2165
2016         2845
```

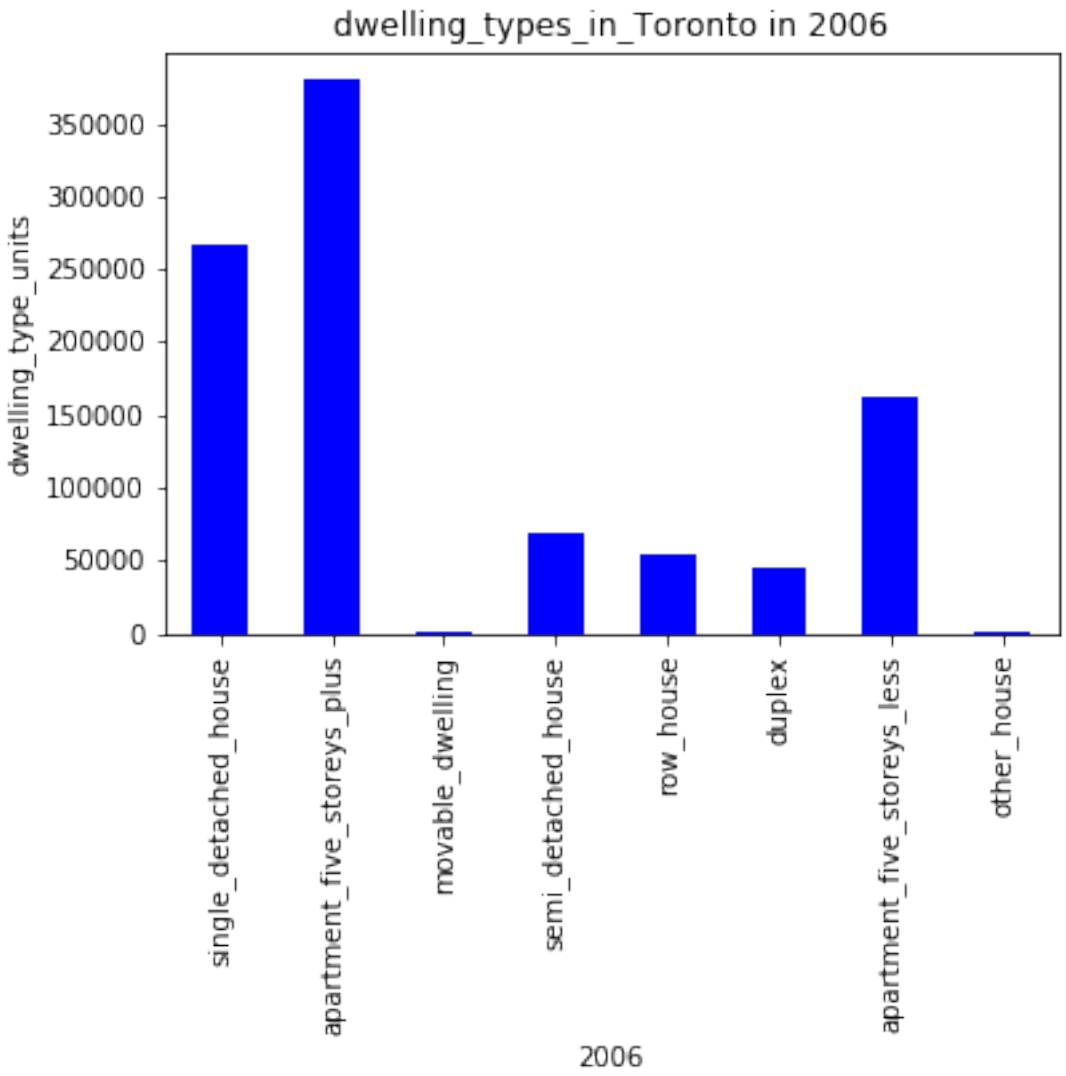
[6]:
```
# Save the dataframe as a csv file
dwelling_per_year.to_csv("Data/dwelling_types_per_year.csv")
```

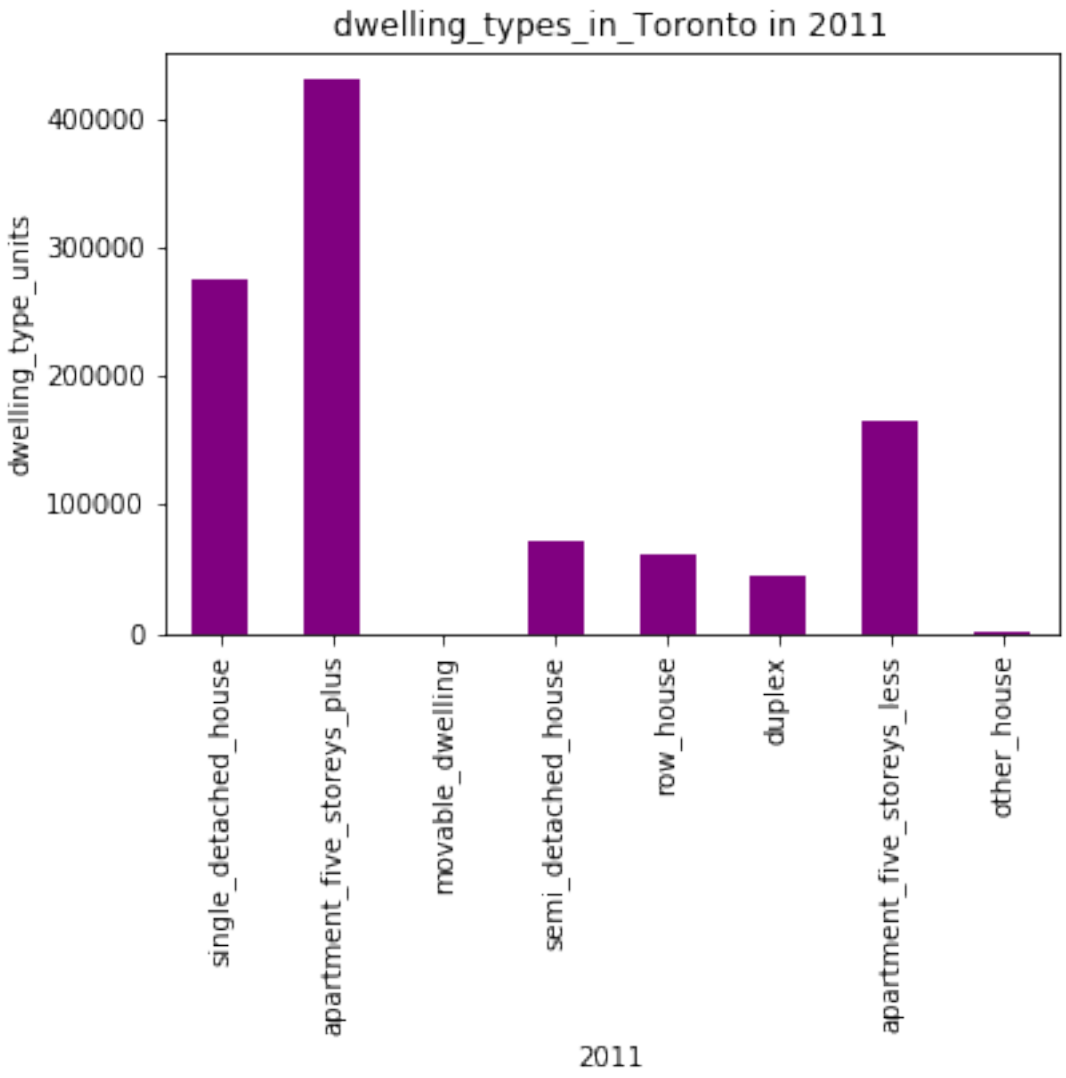
[7]:
```
# Helper create_bar_chart function
def create_bar_chart(data, title, xlabel, ylabel, color):
    """
    Create a barplot based in the data argument.
    Input:
    data = DataFrame to use for plotting the data
    title = Chart Title
    xlabel = Label for X Axis
    ylabel = Label for Y Axis
    color = Colour of the bar chart

    """
    data.plot(kind="bar", xlabel=xlabel, ylabel=ylabel, color=color,␣
 ↪title=title)

# Show the plot after plotting it, to avoid overwrite the previously plotted␣
 ↪bar chart.
    plt.show()
```

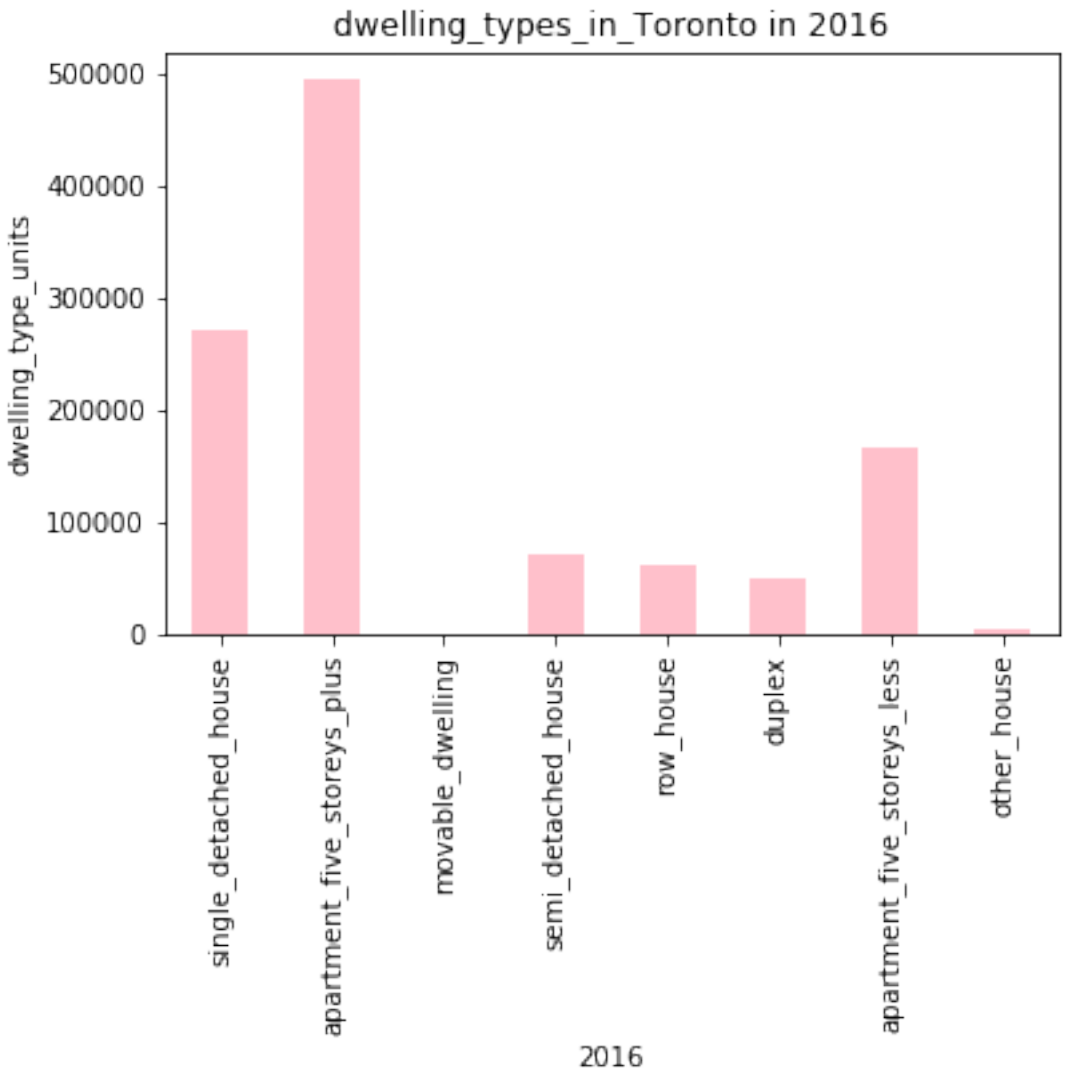
[31]:
```
# Create a bar chart per year to show the number of dwelling types
colors = ["orange","yellow", "blue","purple","green","pink"]
```

```
#For loop is used to do charts for each year using a random color from the␣
 ↪colors list.

for index in dwelling_per_year.index:
    title = "dwelling_types_in_Toronto in " + str(index)
    ylabel = "dwelling_type_units"
    create_bar_chart(dwelling_per_year.loc[index], title=title, xlabel=index,␣
 ↪ylabel=ylabel, color = random.choice(colors))
```




dwelling_types_in_Toronto in 2006
dwelling_type_units
350000
300000
250000
200000
150000
100000
50000
0
single_detached_house
apartment_five_storeys_plus
movable_dwelling
semi_detached_house
row_house
duplex
apartment_five_storeys_less
other_house
2006


dwelling_types_in_Toronto in 2011
dwelling_type_units
400000
300000
200000
100000
0
single_detached_house
apartment_five_storeys_plus
movable_dwelling
semi_detached_house
row_house
duplex
apartment_five_storeys_less
other_house
2011



1.3 Average Monthly Shelter Costs in Toronto Per Year

In this section, you will calculate the average monthly shelter costs for owned and rented dwellings and the average house value for each year. Plot the results as a line chart.

Optional challenge: Plot each line chart in a different color.

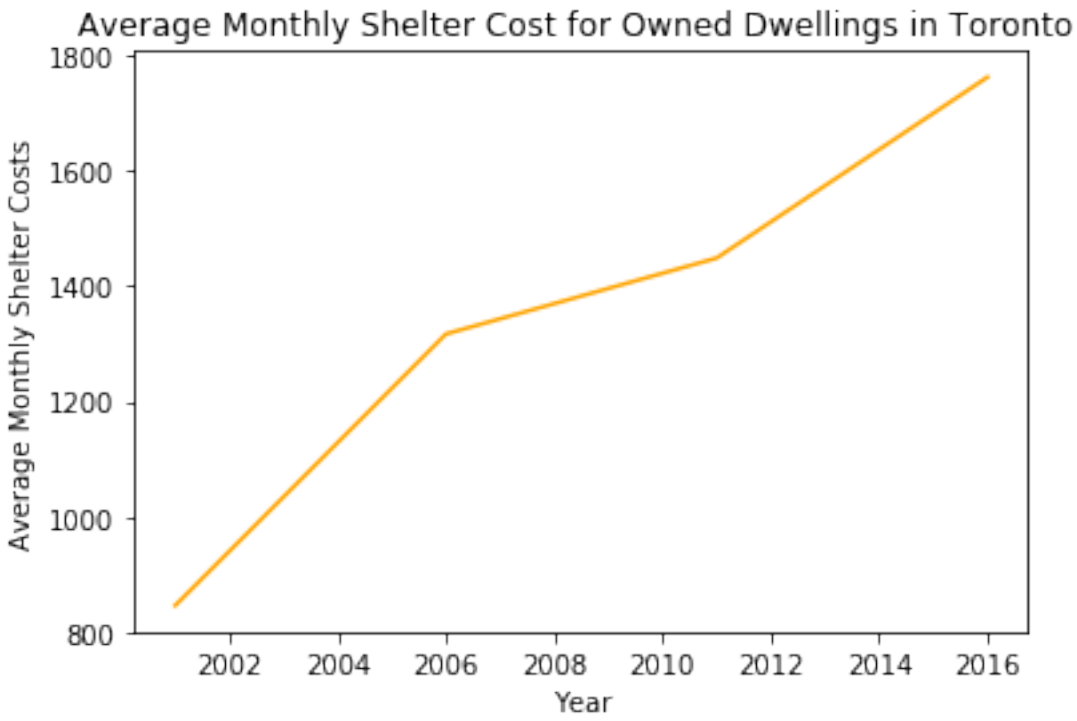
[9]:
```
# Calculate the average monthly shelter costs for owned and rented dwellings
monthly_shelter_cost_per_year =␣
  ↪to_data[["shelter_costs_owned","shelter_costs_rented"]].groupby("year").
  ↪mean()
monthly_shelter_cost_per_year
```

[9]:

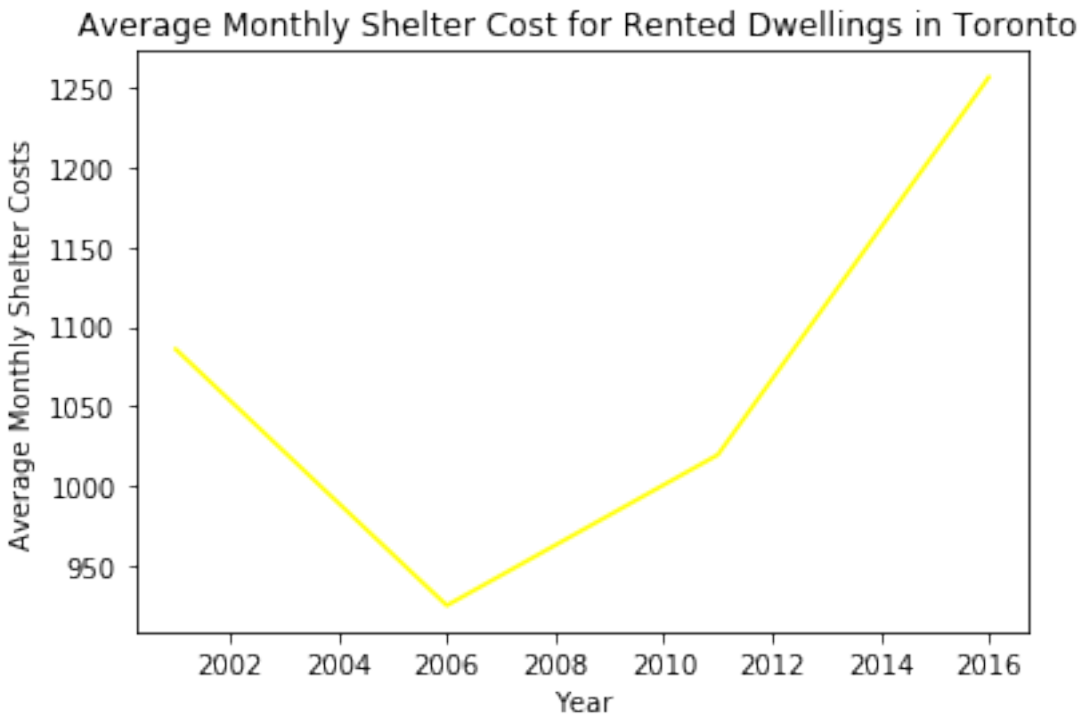
year	shelter_costs_owned	shelter_costs_rented
2001	846.878571	1085.935714
2006	1316.800000	925.414286
2011	1448.214286	1019.792857
2016	1761.314286	1256.321429

[10]:
```
# Helper create_line_chart function
def create_line_chart(data, title, xlabel, ylabel, color):
    """
    Create a line chart based in the data argument.
    Input:
    data = DataFrame to use for plotting the data
    title = Chart Title
    xlabel = Label for X Axis
    ylabel = Label for Y Axis
    color = Colour of the line chart
    """
    data.plot(kind="line", xlabel=xlabel, ylabel=ylabel, color=color,␣
 ↪title=title)
# Show the plot after plotting it, to avoid overwrite the previously plotted␣
 ↪bar chart.
plt.show()
```

[11]:
```
# Create two line charts, one to plot the monthly shelter costs for owned␣
 ↪dwelleing and other for rented dwellings per year

# Line chart for owned dwellings
create_line_chart(data=monthly_shelter_cost_per_year["shelter_costs_owned"],␣
 ↪title="Average Monthly Shelter Cost for Owned Dwellings in Toronto ",
                  xlabel="Year", ylabel="Average Monthly Shelter Costs",␣
 ↪color="orange")
```



[12]:
```
# Line chart for rented dwellings
create_line_chart(data=monthly_shelter_cost_per_year["shelter_costs_rented"],␣
 ↪title="Average Monthly Shelter Cost for Rented Dwellings in Toronto ",
                  xlabel="Year", ylabel="Average Monthly Shelter Costs",␣
 ↪color="yellow")
```



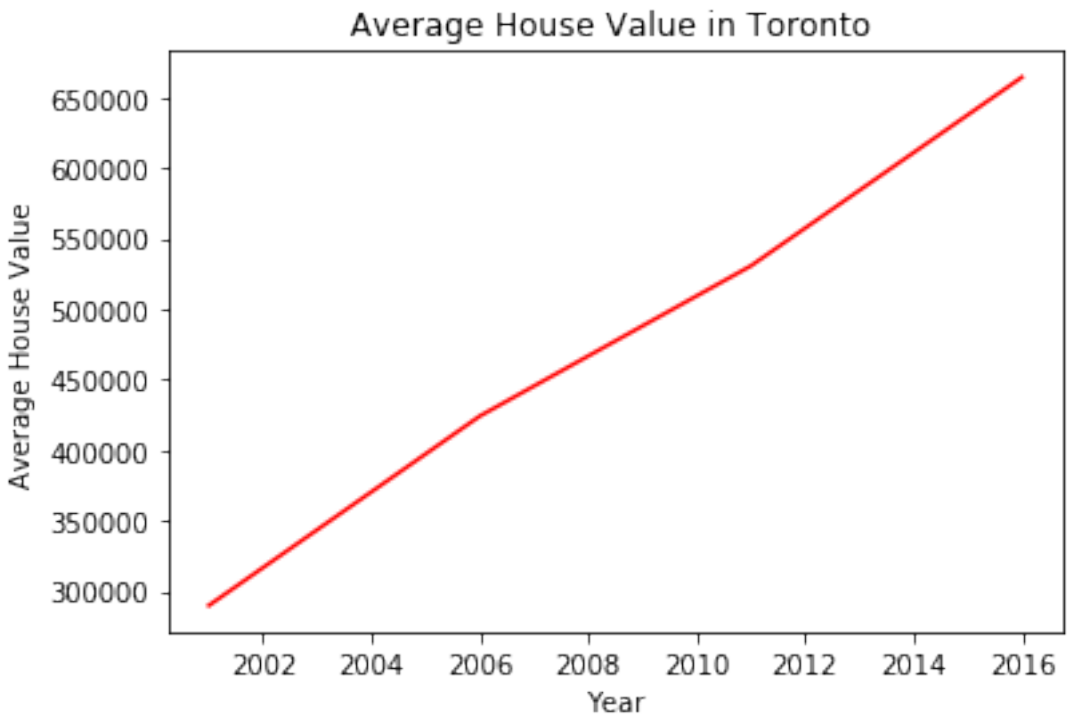
1.4 Average House Value per Year

In this section, you want to determine the average house value per year. An investor may want to understand better the sales price of the rental property over time. For example, a customer will want to know if they should expect an increase or decrease in the property value over time so they can determine how long to hold the rental property. You will visualize the `average_house_value` per year as a bar chart.

[13]:
```
# Calculate the average house value per year
average_house_value = to_data["average_house_value"].groupby("year").mean()
average_house_value
```

[13]:
```
year
2001    289882.885714
2006    424059.664286
2011    530424.721429
2016    664068.328571
Name: average_house_value, dtype: float64
```

[14]:
```
# Plot the average house value per year as a line chart
create_line_chart(data=average_house_value, title="Average House Value in␣
 ↪Toronto ",
                  xlabel="Year", ylabel="Average House Value", color="red")
```



1.5 Average House Value by Neighbourhood

In this section, you will use `hvplot` to create an interactive visualization of the average house value with a dropdown selector for the neighbourhood.

Hint: It will be easier to create a new DataFrame from grouping the data and calculating the mean house values for each year and neighbourhood.

[15]:
```
# Create a new DataFrame with the mean house values by neighbourhood per year
avg_house_value_by_neighbourhood =␣
↪to_data[["neighbourhood","average_house_value"]].reset_index()
avg_house_value_by_neighbourhood.head(10)
```

[15]:

	year	neighbourhood	average_house_value
0	2001	Agincourt North	200388
1	2001	Agincourt South-Malvern West	203047
2	2001	Alderwood	259998
3	2001	Annex	453850
4	2001	Banbury-Don Mills	371864
5	2001	Bathurst Manor	304749
6	2001	Bay Street Corridor	257404
7	2001	Bayview Village	327644
8	2001	Bayview Woods-Steeles	343535

```
9  2001          Bedford Park-Nortown                565304
```

[16]:
```
# Use hvplot to create an interactive line chart of the average house value per␣
↪neighbourhood
# The plot should have a dropdown selector for the neighbourhood
avg_house_value_by_neighbourhood.hvplot.line(x="year", y="average_house_value",␣
↪xlabel="Year", ylabel="Average House Value", groupby="neighbourhood")
```

[16]:
```
:DynamicMap   [neighbourhood]
   :Curve   [year]   (average_house_value)
```

1.6 Number of Dwelling Types per Year

In this section, you will use `hvplot` to create an interactive visualization of the average number of dwelling types per year with a dropdown selector for the neighbourhood.

[17]:
```
# Fetch the data of all dwelling types per year
dwelling_types_per_year = to_data.drop(columns=["average_house_value",␣
↪"shelter_costs_owned", "shelter_costs_rented" ])
dwelling_types_per_year.head(10)
```

[17]:

year	neighbourhood	single_detached_house	apartment_five_storeys_plus	movable_dwelling	semi_detached_house
2001	Agincourt North	3715	1480	0	1055
2001	Agincourt South-Malvern West	3250	1835	0	545
2001	Alderwood	3175	315	0	470
2001	Annex	1060	6090	5	1980
2001	Banbury-Don Mills	3615	4465	0	240
2001	Bathurst Manor	2405	1550	0	130
2001	Bay Street Corridor	10	7575	0	0
2001	Bayview Village	2170	630	0	170
2001	Bayview Woods-Steeles	1650	1715	0	925
2001	Bedford Park-Nortown	4985	2080	0	45

year	row_house	duplex	apartment_five_storeys_less	other_house
2001	1295	195	185	5
2001	455	105	425	0
2001	50	185	370	0
2001	605	275	3710	165
2001	380	15	1360	0
2001	130	375	745	0
2001	15	0	240	0
2001	765	15	640	0
2001	105	10	170	5
2001	40	210	1235	15

[18]:
```
# Use hvplot to create an interactive bar chart of the number of dwelling types␣
↪per neighbourhood
# The plot should have a dropdown selector for the neighbourhood
dwelling_types_per_year.hvplot.bar(groupby="neighbourhood",rot=90,␣
↪ylabel="Dwelling Type Units", xlabel="Year", height=500)
```

[18]:
```
:DynamicMap   [neighbourhood]
  :Bars   [year,Variable]   (value)
```

1.7 The Top 10 Most Expensive Neighbourhoods

In this section, you will need to calculate the house value for each neighbourhood and then sort the values to obtain the top 10 most expensive neighbourhoods on average. Plot the results as a bar chart.

[19]:
```
# Getting the data from the top 10 expensive neighbourhoods
ten_most_expensive_neighbourhoods = to_data.groupby("neighbourhood").mean().
↪sort_values(by="average_house_value", ascending=False).reset_index()
ten_most_expensive_neighbourhoods.head(10)
```

[19]:

	neighbourhood	single_detached_house	\
0	Bridle Path-Sunnybrook-York Mills	2260.00	
1	Forest Hill South	1742.50	
2	Lawrence Park South	3472.50	
3	Rosedale-Moore Park	2498.75	
4	St.Andrew-Windfields	3225.00	
5	Casa Loma	916.25	
6	Bedford Park-Nortown	4865.00	
7	Forest Hill North	1488.75	
8	Kingsway South	2326.25	
9	Yonge-St.Clair	565.00	

	apartment_five_storeys_plus	movable_dwelling	semi_detached_house	\

```
0                      331.25              0.00                36.25
1                     2031.25              1.25                61.25
2                      773.75              0.00               126.25
3                     4641.25              0.00               486.25
4                     1670.00              0.00               185.00
5                     2310.00              0.00               288.75
6                     1981.25              0.00                43.75
7                     3392.50              0.00                12.50
8                      576.25              0.00                66.25
9                     3948.75              0.00               425.00

   row_house  duplex  apartment_five_storeys_less  other_house  \
0      90.00    25.0                        40.00         0.00
1      45.00    75.0                      1027.50         3.75
2      38.75   225.0                       966.25        16.25
3     245.00   327.5                      1618.75         2.50
4     552.50    97.5                       586.25         5.00
5     201.25   162.5                      1192.50         2.50
6      57.50   287.5                      1275.00        88.75
7      16.25    82.5                       402.50         1.25
8      48.75    20.0                       336.25         2.50
9     212.50   172.5                      1308.75         6.25

   average_house_value  shelter_costs_owned  shelter_costs_rented
0           1526485.75              2360.75               2321.75
1           1195992.50              1781.00               1313.75
2           1094027.75              1954.00               1372.75
3           1093640.00              1909.75               1537.25
4            999107.00              1880.25               1384.50
5            981064.25              1873.75               1547.75
6            930415.25              1786.75               1255.00
7            851680.50              1722.75               1245.50
8            843234.25              1736.75               1622.00
9            813220.25              1680.75               1369.00
```

[20]:
```
# Plotting the data from the top 10 expensive neighbourhoods
ten_most_expensive_neighbourhoods.head(10).hvplot.bar(rot=90, ylabel="Average␣
↪House Value", xlabel="Neighbourhood", y="average_house_value",␣
↪x="neighbourhood",height=500)
```

[20]: :Bars [neighbourhood] (average_house_value)

1.8 Neighbourhood Map

In this section, you will read in neighbourhoods location data and build an interactive map with the average house value per neighbourhood. Use a `scatter_mapbox` from Plotly express to create

the visualization. Remember, you will need your Mapbox API key for this.

1.8.1 Load Location Data

[21]:
```
# Load neighbourhoods coordinates data
file_path = Path("Data/toronto_neighbourhoods_coordinates.csv")
df_neighbourhood_locations = pd.read_csv(file_path)
df_neighbourhood_locations.head()
```

[21]:

	neighbourhood	lat	lon
0	Agincourt North	43.805441	-79.266712
1	Agincourt South-Malvern West	43.788658	-79.265612
2	Alderwood	43.604937	-79.541611
3	Annex	43.671585	-79.404001
4	Banbury-Don Mills	43.737657	-79.349718

1.8.2 Data Preparation

You will need to join the location data with the mean values per neighbourhood.

1. Calculate the mean values for each neighbourhood.
2. Join the average values with the neighbourhood locations.

[22]:
```
# Calculate the mean values for each neighborhood
mean_data_neighbourhoods = to_data.groupby("neighbourhood").mean().reset_index()
mean_data_neighbourhoods.head()
```

[22]:

	neighbourhood	single_detached_house	apartment_five_storeys_plus	movable_dwelling	semi_detached_house	row_house	duplex	apartment_five_storeys_less	other_house
0	Agincourt North	3435.00	1947.50	2.50	863.75	1406.25	512.50	547.50	10.00
1	Agincourt South-Malvern West	2897.50	2180.00	1.25	375.00	456.25	523.75	628.75	32.50
2	Alderwood	2903.75	302.50	1.25	503.75	76.25	302.50	502.50	1.25
3	Annex	751.25	7235.00	1.25	1375.00	613.75	355.00	4605.00	83.75
4	Banbury-Don Mills	3572.50	5388.75	1.25	273.75	626.25	32.50	1340.00	0.00

```
   average_house_value  shelter_costs_owned  shelter_costs_rented
0             329811.5              1109.00                983.50
1             334189.0              1131.25                985.00
2             427922.5              1166.75               1003.25
3             746977.0              1692.75               1315.25
4             612039.0              1463.50               1242.75
```

[23]:
```
# Join the average values with the neighbourhood locations
mean_data_neighbourhoods.set_index(keys="neighbourhood",inplace=True)
df_neighbourhood_locations.set_index(keys="neighbourhood",inplace=True)
neighbourhood_with_location = pd.concat([mean_data_neighbourhoods,␣
 ↪df_neighbourhood_locations ], join="inner", axis="columns")
neighbourhood_with_location
```

[23]:
```
                              single_detached_house  \
neighbourhood
Agincourt North                              3435.00
Agincourt South-Malvern West                 2897.50
Alderwood                                    2903.75
Annex                                         751.25
Banbury-Don Mills                            3572.50
…                                              …
Wychwood                                     1056.25
Yonge-Eglinton                               1468.75
Yonge-St.Clair                                565.00
York University Heights                      1355.00
Yorkdale-Glen Park                           2286.25

                              apartment_five_storeys_plus  movable_dwelling  \
neighbourhood
Agincourt North                                   1947.50              2.50
Agincourt South-Malvern West                      2180.00              1.25
Alderwood                                          302.50              1.25
Annex                                             7235.00              1.25
Banbury-Don Mills                                 5388.75              1.25
…                                                    …                 …
Wychwood                                          1236.25              0.00
Yonge-Eglinton                                    1638.75              0.00
Yonge-St.Clair                                    3948.75              0.00
York University Heights                           5165.00              1.25
Yorkdale-Glen Park                                1347.50              0.00

                              semi_detached_house  row_house  duplex  \
neighbourhood
Agincourt North                            863.75    1406.25  512.50
Agincourt South-Malvern West               375.00     456.25  523.75
Alderwood                                  503.75      76.25  302.50
```

```
Annex                                1375.00     613.75  355.00
Banbury-Don Mills                     273.75     626.25   32.50
…                                        …          …      …
Wychwood                              992.50     298.75  325.00
Yonge-Eglinton                        470.00      33.75  328.75
Yonge-St.Clair                        425.00     212.50  172.50
York University Heights              1316.25     662.50  188.75
Yorkdale-Glen Park                     73.75     450.00  377.50

                          apartment_five_storeys_less  other_house  \
neighbourhood
Agincourt North                                547.50        10.00
Agincourt South-Malvern West                   628.75        32.50
Alderwood                                      502.50         1.25
Annex                                         4605.00        83.75
Banbury-Don Mills                             1340.00         0.00
…                                                  …            …
Wychwood                                      1878.75        17.50
Yonge-Eglinton                                1385.00         6.25
Yonge-St.Clair                                1308.75         6.25
York University Heights                       1085.00        33.75
Yorkdale-Glen Park                             722.50         7.50

                          average_house_value  shelter_costs_owned  \
neighbourhood
Agincourt North                      329811.50              1109.00
Agincourt South-Malvern West         334189.00              1131.25
Alderwood                            427922.50              1166.75
Annex                                746977.00              1692.75
Banbury-Don Mills                    612039.00              1463.50
…                                          …                    …
Wychwood                             565976.50              1390.75
Yonge-Eglinton                       809745.75              1799.50
Yonge-St.Clair                       813220.25              1680.75
York University Heights              305899.50              1116.75
Yorkdale-Glen Park                   430861.25              1122.50

                          shelter_costs_rented        lat        lon
neighbourhood
Agincourt North                         983.50  43.805441 -79.266712
Agincourt South-Malvern West            985.00  43.788658 -79.265612
Alderwood                              1003.25  43.604937 -79.541611
Annex                                  1315.25  43.671585 -79.404001
Banbury-Don Mills                      1242.75  43.737657 -79.349718
…                                          …         …         …
Wychwood                               1017.25  43.676919 -79.425515
Yonge-Eglinton                         1347.75  43.704689 -79.403590
```

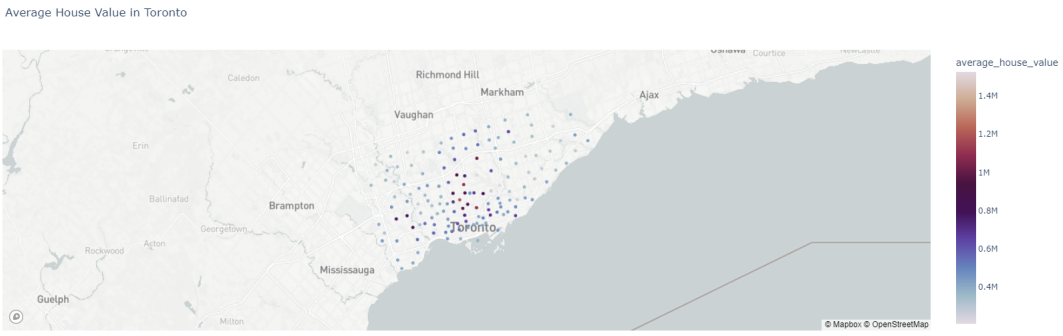
```
Yonge-St.Clair                          1369.00  43.687859 -79.397871
York University Heights                  937.50  43.765736 -79.488883
Yorkdale-Glen Park                       942.50  43.714672 -79.457108

[140 rows x 13 columns]
```

[ ]:

1.8.3 Mapbox Visualization

Plot the average values per neighbourhood using a Plotly express `scatter_mapbox` visualization.

[24]:
```
# Create a scatter mapbox to analyze neighbourhood info
average_house_value_map= px.scatter_mapbox(

            neighbourhood_with_location,
            lat="lat",
            lon="lon",
            color="average_house_value",
            color_continuous_scale=px.colors.cyclical.Twilight,
            title="Average House Value in Toronto",
            zoom=9,
            width=700,
            height=600,



    )



average_house_value_map.show()
```



1.9 Cost Analysis - Optional Challenge

In this section, you will use Plotly express to a couple of plots that investors can interactively filter and explore various factors related to the house value of the Toronto's neighbourhoods.

1.9.1 Create a bar chart row facet to plot the average house values for all Toronto's neighbourhoods per year

[25]:
```
mean_data_neighbourhoods.reset_index(inplace=True)
to_data
```

[25]:

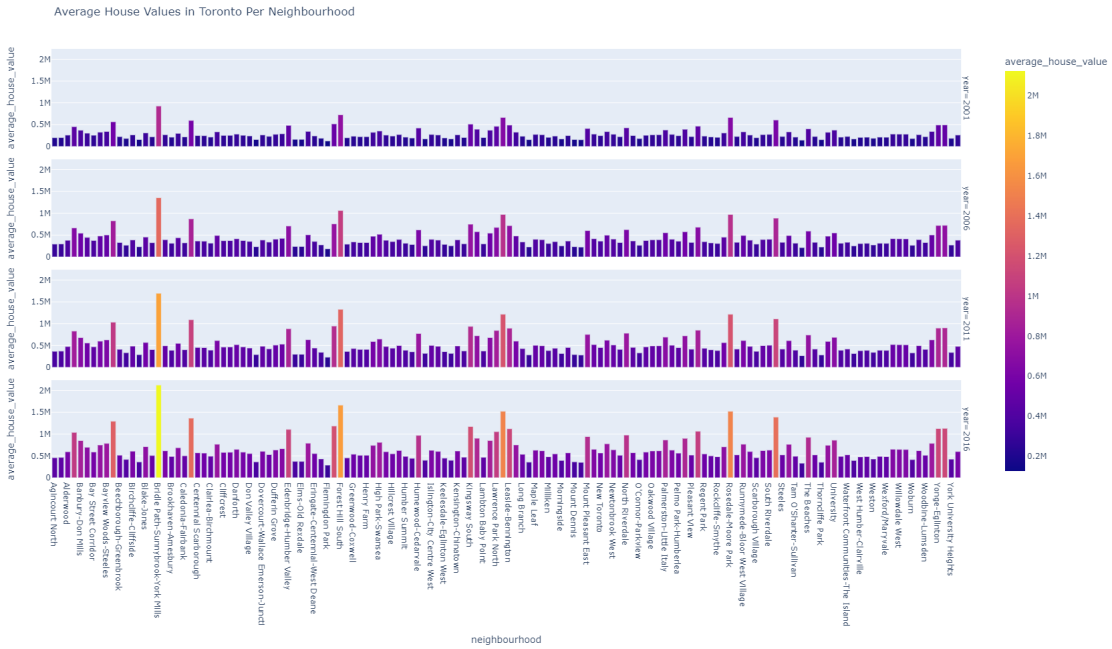
year	neighbourhood	single_detached_house	apartment_five_storeys_plus	movable_dwelling	semi_detached_house	row_house	duplex	apartment_five_storeys_less	other_house
2001	Agincourt North	3715	1480	0	1055	1295	195	185	5
2001	Agincourt South-Malvern West	3250	1835	0	545	455	105	425	0
2001	Alderwood	3175	315	0	470	50	185	370	0
2001	Annex	1060	6090	5	1980	605	275	3710	165
2001	Banbury-Don Mills	3615	4465	0	240	380	15	1360	0
…	…	…	…	…	…	…	…	…	…
2016	Wychwood	920	1295	0	880	290	395	2080	35
2016	Yonge-Eglinton	1400	1995	0	465				
2016	Yonge-St.Clair	520	4315	0	450				
2016	York University Heights	1235	5505	0	1360				
2016	Yorkdale-Glen Park	2165	1185	0	80				

```
2016          60      310                          1445              0
2016         220      130                          1370              0
2016         775      280                           995              0
2016         600      465                           830              5
```

year	average_house_value	shelter_costs_owned	shelter_costs_rented
2001	200388	810	870
2001	203047	806	892
2001	259998	817	924
2001	453850	1027	1378
2001	371864	1007	1163
…	…	…	…
2016	787760	1864	1146
2016	1127052	2398	1535
2016	1131888	2192	1619
2016	425769	1444	1122
2016	599698	1451	1128

[560 rows x 12 columns]

[26]:
```
px.bar(to_data, x="neighbourhood",␣
↪y="average_house_value",color="average_house_value", facet_row=to_data.
↪index,height=1000, title="Average House Values in Toronto Per Neighbourhood")
```



1.9.2 Create a sunburst chart to conduct a costs analysis of most expensive neighbourhoods in Toronto per year

[27]:
```
# Fetch the data from all expensive neighbourhoods per year.
ten_most_expensive_neighbourhoods
```

[27]:

	neighbourhood	single_detached_house	apartment_five_storeys_plus	movable_dwelling	semi_detached_house	row_house	duplex	apartment_five_storeys_less	other_house	average_house_value	shelter_costs_owned	shelter_costs_rented
0	Bridle Path-Sunnybrook-York Mills	2260.00	331.25	0.00	36.25	90.00	25.00	40.00	0.00	1526485.75	2360.75	2321.75
1	Forest Hill South	1742.50	2031.25	1.25	61.25	45.00	75.00	1027.50	3.75			
2	Lawrence Park South	3472.50	773.75	0.00	126.25	38.75	225.00	966.25	16.25			
3	Rosedale-Moore Park	2498.75	4641.25	0.00	486.25	245.00	327.50	1618.75	2.50			
4	St.Andrew-Windfields	3225.00	1670.00	0.00	185.00	552.50	97.50	586.25	5.00			
..	…	…	…	…	…	…	…	…	…			
135	Malvern	3693.75	2982.50	0.00	1317.50	3410.00	878.75	552.50	55.00			
136	Thorncliffe Park	3.75	6318.75	0.00	0.00	141.25	0.00	187.50	5.00			
137	Mount Olive-Silverstone-Jamestown	1730.00	5916.25	1.25	176.25	1033.75	603.75	127.50	1.25			
138	Taylor-Massey	622.50	4795.00	0.00	203.75	216.25	150.00	218.75	15.00			
139	Flemingdon Park	5.00	6368.75	0.00	182.50	630.00	3.75	591.25	0.00			

```
1              1195992.50              1781.00              1313.75
2              1094027.75              1954.00              1372.75
3              1093640.00              1909.75              1537.25
4               999107.00              1880.25              1384.50
..                    …                    …                    …
135             256880.25              1228.00               998.75
136             255264.75              1304.25              1088.50
137             253182.25              1159.50               955.25
138             239414.00              1129.25               919.25
139             207799.00              1199.75               973.00

[140 rows x 12 columns]
```

[28]:
```
# Create the sunburst chart
px.sunburst(
    ten_most_expensive_neighbourhoods,
    path=[ten_most_expensive_neighbourhoods.index, 'neighbourhood'],␣
 ↪values='average_house_value', color='average_house_value',␣
 ↪color_continuous_scale='blues',
    height=500

)
```

[ ]:
```

```