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Assignment 2

Perform the Below Tasks to complete the assignment:-

Tasks:-
1. Download the dataset: Dataset
2. Load the dataset.
3. Perform the Below Visualizations.
    - Univariate Analysis
    - Bi - Variate Analysis
    - Multivariate Analysis
4. Perform descriptive statistics on the dataset.
5. Handle the Missing values.

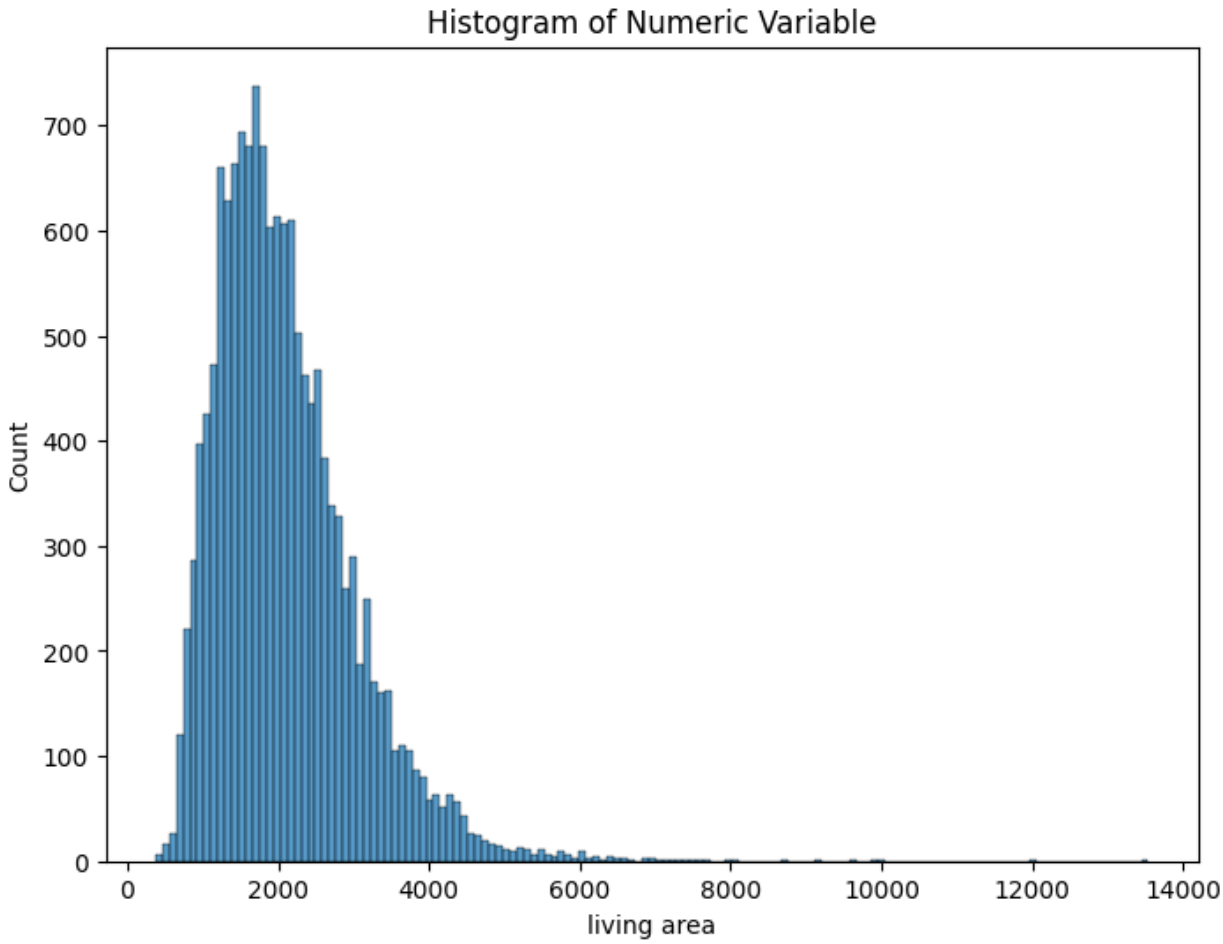
```
import pandas as pd

# Load the dataset
df = pd.read_csv('/content/House Price India.csv')

df.head()
```

```
           id   Date  number of bedrooms  number of bathrooms  living
area  \
0  6762810145  42491                   5                 2.50
3650
1  6762810635  42491                   4                 2.50
2920
2  6762810998  42491                   5                 2.75
2910
3  6762812605  42491                   4                 2.50
3310
4  6762812919  42491                   3                 2.00
2710

   lot area  number of floors  waterfront present  number of views  \
0      9050               2.0                   0                4
1      4000               1.5                   0                0
2      9480               1.5                   0                0
3     42998               2.0                   0                0
4      4500               1.5                   0                0
```

```
   condition of the house  ...  Built Year  Renovation Year  Postal
Code  \
0                       5  ...        1921                0
122003
1                       5  ...        1909                0
122004
2                       3  ...        1939                0
122004
3                       3  ...        2001                0
122005
4                       4  ...        1929                0
122006

   Lattitude  Longitude  living_area_renov  lot_area_renov  \
0    52.8645   -114.557               2880            5400
1    52.8878   -114.470               2470            4000
2    52.8852   -114.468               2940            6600
3    52.9532   -114.321               3350           42847
4    52.9047   -114.485               2060            4500

   Number of schools nearby  Distance from the airport    Price
0                         2                         58  2380000
1                         2                         51  1400000
2                         1                         53  1200000
3                         3                         76   838000
4                         1                         51   805000

[5 rows x 23 columns]
```

Univariate Analysis

```
import matplotlib.pyplot as plt
import seaborn as sns

# Example: Histogram for a numeric variable
plt.figure(figsize=(8, 6))
sns.histplot(data=df, x='living area')
plt.title('Histogram of Numeric Variable')
plt.show()
```

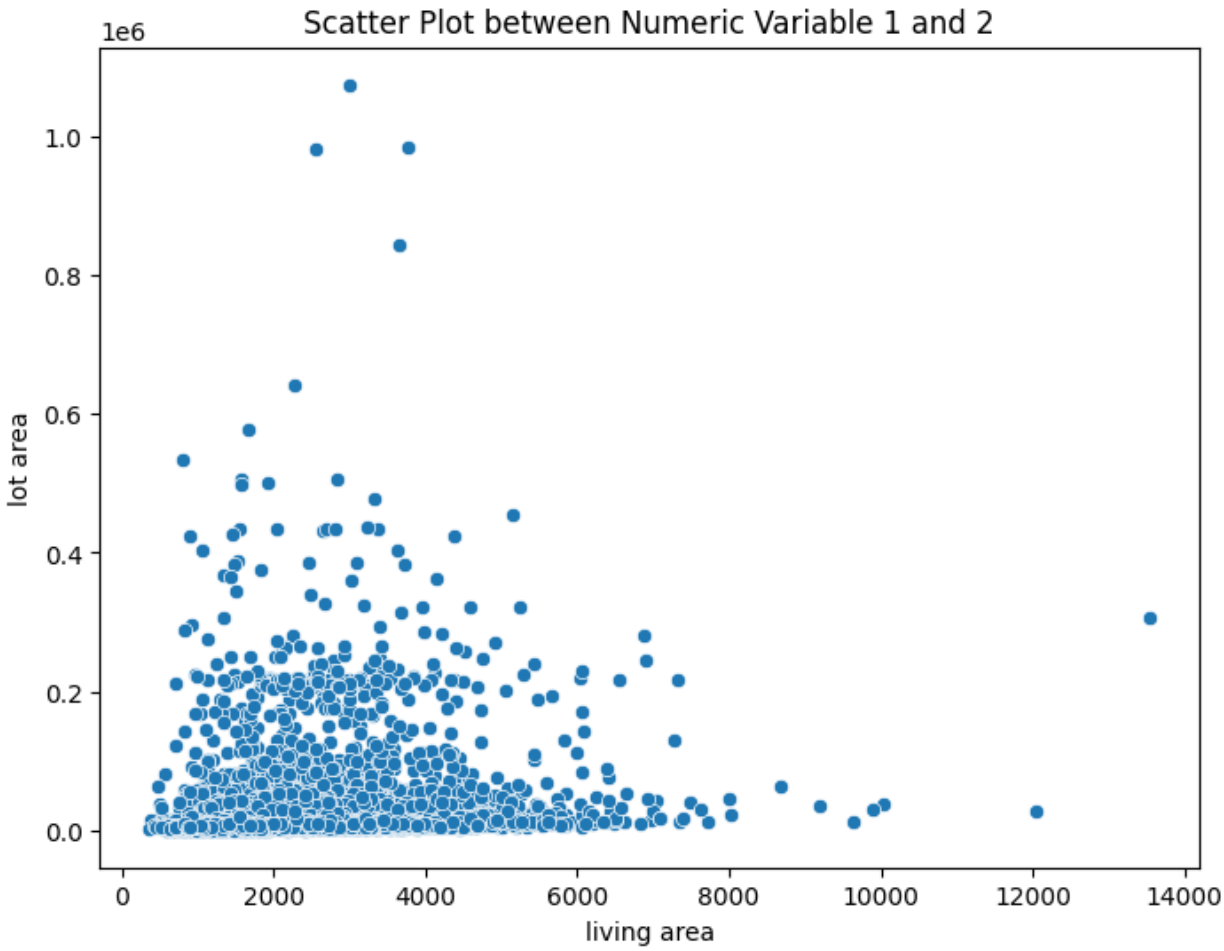


Hello Mam!

I was exploring new features in Google Colab and came across the histogram feature. As a result, I decided to use it for conducting univariate analysis.

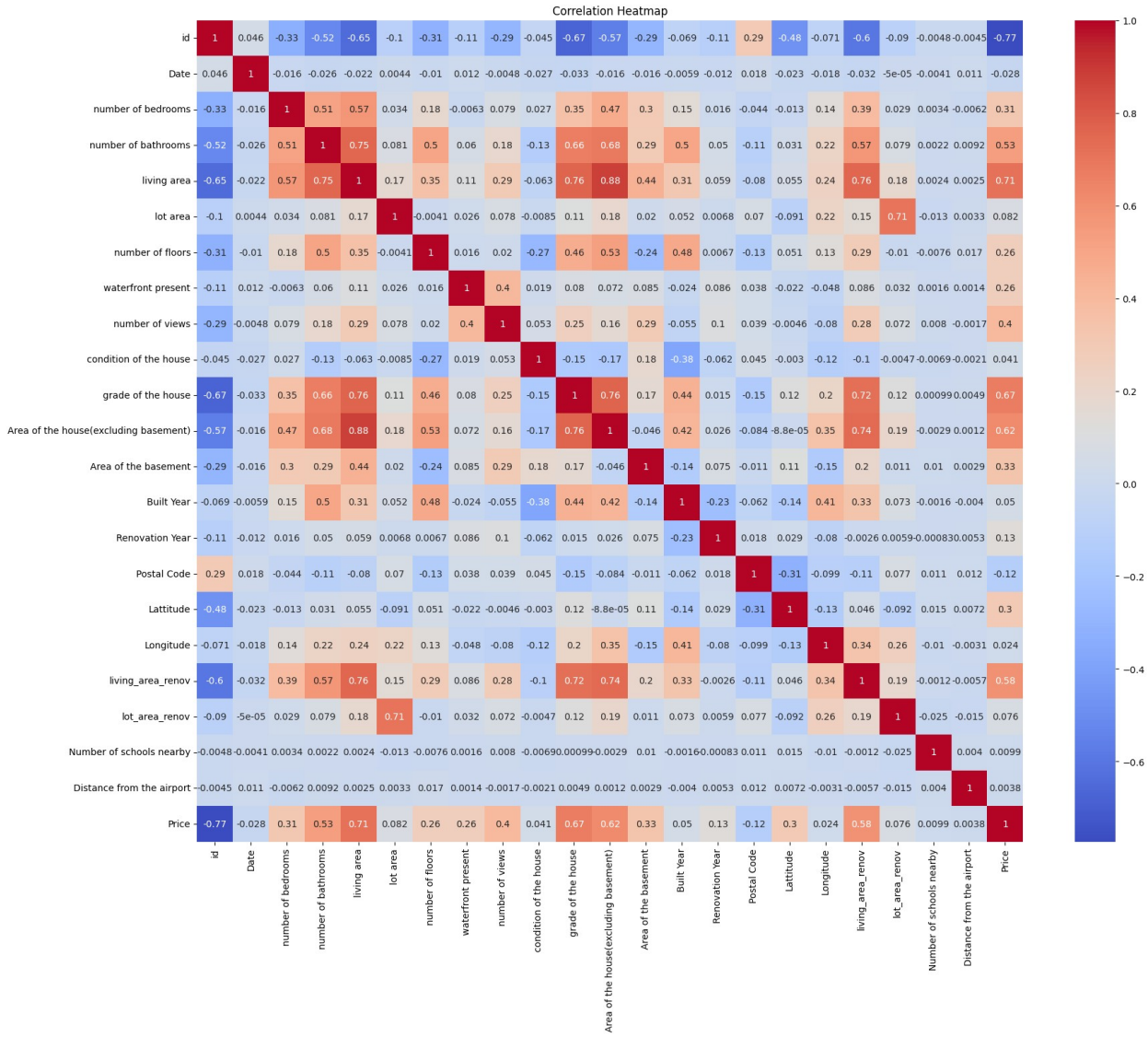
Bivariate Analysis

```
# Example: Scatter plot between two numeric variables
plt.figure(figsize=(8, 6))
sns.scatterplot(data=df, x='living area', y='lot area')
plt.title('Scatter Plot between Numeric Variable 1 and 2')
plt.show()
```



Multivariate Analysis

```
# Example: Correlation heatmap
corr_matrix = df.corr()
plt.figure(figsize=(20,16))
sns.heatmap(corr_matrix, annot=True, cmap='coolwarm')
plt.title('Correlation Heatmap')
plt.show()
```



Descriptive Statistics

```
# Example: Descriptive statistics for numeric variables
descriptive_stats = df.describe()
descriptive_stats
```

```
                 id          Date  number of bedrooms  number of
bathrooms  \
count  1.462000e+04  14620.000000        14620.000000
14620.000000
mean   6.762821e+09  42604.538646            3.379343
2.129583
std    6.237575e+03     67.347991            0.938719
0.769934
min    6.762810e+09  42491.000000            1.000000
0.500000
```

```
25%    6.762815e+09  42546.000000            3.000000
1.750000
50%    6.762821e+09  42600.000000            3.000000
2.250000
75%    6.762826e+09  42662.000000            4.000000
2.500000
max    6.762832e+09  42734.000000           33.000000
8.000000

        living area      lot area  number of floors  waterfront
present  \
count  14620.000000  1.462000e+04      14620.000000
14620.000000
mean    2098.262996  1.509328e+04          1.502360
0.007661
std      928.275721  3.791962e+04          0.540239
0.087193
min      370.000000  5.200000e+02          1.000000
0.000000
25%     1440.000000  5.010750e+03          1.000000
0.000000
50%     1930.000000  7.620000e+03          1.500000
0.000000
75%     2570.000000  1.080000e+04          2.000000
0.000000
max    13540.000000  1.074218e+06          3.500000
1.000000

       number of views  condition of the house  ...    Built Year  \
count     14620.000000            14620.000000  ...  14620.000000
mean          0.233105                3.430506  ...   1970.926402
std           0.766259                0.664151  ...     29.493625
min           0.000000                1.000000  ...   1900.000000
25%           0.000000                3.000000  ...   1951.000000
50%           0.000000                3.000000  ...   1975.000000
75%           0.000000                4.000000  ...   1997.000000
max           4.000000                5.000000  ...   2015.000000

       Renovation Year    Postal Code     Lattitude     Longitude  \
count     14620.000000   14620.000000  14620.000000  14620.000000
mean         90.924008  122033.062244     52.792848   -114.404007
std         416.216661      19.082418      0.137522      0.141326
min           0.000000  122003.000000     52.385900   -114.709000
25%           0.000000  122017.000000     52.707600   -114.519000
50%           0.000000  122032.000000     52.806400   -114.421000
75%           0.000000  122048.000000     52.908900   -114.315000
max        2015.000000  122072.000000     53.007600   -113.505000

       living_area_renov  lot_area_renov  Number of schools nearby  \
count       14620.000000    14620.000000              14620.000000
```

```
mean          1996.702257    12753.500068                    2.012244
std            691.093366    26058.414467                    0.817284
min            460.000000      651.000000                    1.000000
25%           1490.000000     5097.750000                    1.000000
50%           1850.000000     7620.000000                    2.000000
75%           2380.000000    10125.000000                    3.000000
max           6110.000000   560617.000000                    3.000000

       Distance from the airport         Price
count               14620.000000  1.462000e+04
mean                   64.950958  5.389322e+05
std                     8.936008  3.675324e+05
min                    50.000000  7.800000e+04
25%                    57.000000  3.200000e+05
50%                    65.000000  4.500000e+05
75%                    73.000000  6.450000e+05
max                    80.000000  7.700000e+06

[8 rows x 23 columns]

<google.colab._quickchart_helpers.SectionTitle at 0x79cdd6db8190>

import numpy as np
from google.colab import autoviz

def value_plot(df, y, figscale=1):
  from matplotlib import pyplot as plt
  df[y].plot(kind='line', figsize=(8 * figscale, 4 * figscale),
title=y)
  plt.gca().spines[['top', 'right']].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(descriptive_stats, *['id'], **{})
chart

import numpy as np
from google.colab import autoviz

def value_plot(df, y, figscale=1):
  from matplotlib import pyplot as plt
  df[y].plot(kind='line', figsize=(8 * figscale, 4 * figscale),
title=y)
  plt.gca().spines[['top', 'right']].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(descriptive_stats, *['Date'], **{})
chart
```

```
import numpy as np
from google.colab import autoviz

def value_plot(df, y, figscale=1):
  from matplotlib import pyplot as plt
  df[y].plot(kind='line', figsize=(8 * figscale, 4 * figscale),
title=y)
  plt.gca().spines[['top', 'right']].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(descriptive_stats, *['number of bedrooms'], **{})
chart
```

```
import numpy as np
from google.colab import autoviz

def value_plot(df, y, figscale=1):
  from matplotlib import pyplot as plt
  df[y].plot(kind='line', figsize=(8 * figscale, 4 * figscale),
title=y)
  plt.gca().spines[['top', 'right']].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(descriptive_stats, *['number of bathrooms'], **{})
chart
```

```
<google.colab._quickchart_helpers.SectionTitle at 0x79cdd670be80>
```

```
import numpy as np
from google.colab import autoviz

def histogram(df, colname, num_bins=20, figscale=1):
  from matplotlib import pyplot as plt
  df[colname].plot(kind='hist', bins=num_bins, title=colname,
figsize=(8*figscale, 4*figscale))
  plt.gca().spines[['top', 'right',]].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = histogram(descriptive_stats, *['id'], **{})
chart
```

```
import numpy as np
from google.colab import autoviz

def histogram(df, colname, num_bins=20, figscale=1):
  from matplotlib import pyplot as plt
  df[colname].plot(kind='hist', bins=num_bins, title=colname,
figsize=(8*figscale, 4*figscale))
```

```
  plt.gca().spines[['top', 'right',]].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = histogram(descriptive_stats, *['Date'], **{})
chart
```

```
import numpy as np
from google.colab import autoviz

def histogram(df, colname, num_bins=20, figscale=1):
  from matplotlib import pyplot as plt
  df[colname].plot(kind='hist', bins=num_bins, title=colname,
figsize=(8*figscale, 4*figscale))
  plt.gca().spines[['top', 'right',]].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = histogram(descriptive_stats, *['number of bedrooms'], **{})
chart
```

```
import numpy as np
from google.colab import autoviz

def histogram(df, colname, num_bins=20, figscale=1):
  from matplotlib import pyplot as plt
  df[colname].plot(kind='hist', bins=num_bins, title=colname,
figsize=(8*figscale, 4*figscale))
  plt.gca().spines[['top', 'right',]].set_visible(False)
  plt.tight_layout()
  return autoviz.MplChart.from_current_mpl_state()

chart = histogram(descriptive_stats, *['number of bathrooms'], **{})
chart
```

```
<google.colab._quickchart_helpers.SectionTitle at 0x79cdd8fa6ec0>
```

```
import numpy as np
from google.colab import autoviz

def scatter_plots(df, colname_pairs, figscale=1, alpha=.8):
  from matplotlib import pyplot as plt
  plt.figure(figsize=(len(colname_pairs) * 6 * figscale, 6 *
figscale))
  for plot_i, (x_colname, y_colname) in enumerate(colname_pairs,
start=1):
    ax = plt.subplot(1, len(colname_pairs), plot_i)
    df.plot(kind='scatter', x=x_colname, y=y_colname, s=(32 *
figscale), alpha=alpha, ax=ax)
    ax.spines[['top', 'right',]].set_visible(False)
  plt.tight_layout()
```

```
  return autoviz.MplChart.from_current_mpl_state()

chart = scatter_plots(descriptive_stats, *[['id', 'Date'], ['Date',
'number of bedrooms'], ['number of bedrooms', 'number of bathrooms'],
['number of bathrooms', 'living area']]], **{})
chart
```

```
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```

```
import numpy as np
from google.colab import autoviz

def time_series_multiline(df, timelike_colname, value_colname,
series_colname, figscale=1, mpl_palette_name='Dark2'):
  from matplotlib import pyplot as plt
  import seaborn as sns
  figsize = (10 * figscale, 5.2 * figscale)
  palette = list(sns.palettes.mpl_palette(mpl_palette_name))
  def _plot_series(series, series_name, series_index=0):
    if value_colname == 'count()':
      counted = (series[timelike_colname]
                 .value_counts()
                 .reset_index(name='counts')
                 .rename({'index': timelike_colname}, axis=1)
                 .sort_values(timelike_colname, ascending=True))
      xs = counted[timelike_colname]
      ys = counted['counts']
    else:
      xs = series[timelike_colname]
      ys = series[value_colname]
    plt.plot(xs, ys, label=series_name, color=palette[series_index %
len(palette)])

  fig, ax = plt.subplots(figsize=figsize, layout='constrained')
  df = df.sort_values(timelike_colname, ascending=True)
  if series_colname:
    for i, (series_name, series) in
enumerate(df.groupby(series_colname)):
      _plot_series(series, series_name, i)
    fig.legend(title=series_colname, bbox_to_anchor=(1, 1), loc='upper
left')
  else:
    _plot_series(df, '')
  sns.despine(fig=fig, ax=ax)
  plt.xlabel(timelike_colname)
  plt.ylabel(value_colname)
  return autoviz.MplChart.from_current_mpl_state()

chart = time_series_multiline(descriptive_stats, *['Date', 'id',
```

```
None], **{})
chart

import numpy as np
from google.colab import autoviz

def time_series_multiline(df, timelike_colname, value_colname,
series_colname, figscale=1, mpl_palette_name='Dark2'):
  from matplotlib import pyplot as plt
  import seaborn as sns
  figsize = (10 * figscale, 5.2 * figscale)
  palette = list(sns.palettes.mpl_palette(mpl_palette_name))
  def _plot_series(series, series_name, series_index=0):
    if value_colname == 'count()':
      counted = (series[timelike_colname]
                 .value_counts()
                 .reset_index(name='counts')
                 .rename({'index': timelike_colname}, axis=1)
                 .sort_values(timelike_colname, ascending=True))
      xs = counted[timelike_colname]
      ys = counted['counts']
    else:
      xs = series[timelike_colname]
      ys = series[value_colname]
    plt.plot(xs, ys, label=series_name, color=palette[series_index %
len(palette)])

  fig, ax = plt.subplots(figsize=figsize, layout='constrained')
  df = df.sort_values(timelike_colname, ascending=True)
  if series_colname:
    for i, (series_name, series) in
enumerate(df.groupby(series_colname)):
      _plot_series(series, series_name, i)
    fig.legend(title=series_colname, bbox_to_anchor=(1, 1), loc='upper
left')
  else:
    _plot_series(df, '')
  sns.despine(fig=fig, ax=ax)
  plt.xlabel(timelike_colname)
  plt.ylabel(value_colname)
  return autoviz.MplChart.from_current_mpl_state()

chart = time_series_multiline(descriptive_stats, *['Date', 'number of
bedrooms', None], **{})
chart

import numpy as np
from google.colab import autoviz

def time_series_multiline(df, timelike_colname, value_colname,
```

```
series_colname, figscale=1, mpl_palette_name='Dark2'):
  from matplotlib import pyplot as plt
  import seaborn as sns
  figsize = (10 * figscale, 5.2 * figscale)
  palette = list(sns.palettes.mpl_palette(mpl_palette_name))
  def _plot_series(series, series_name, series_index=0):
    if value_colname == 'count()':
      counted = (series[timelike_colname]
                 .value_counts()
                 .reset_index(name='counts')
                 .rename({'index': timelike_colname}, axis=1)
                 .sort_values(timelike_colname, ascending=True))
      xs = counted[timelike_colname]
      ys = counted['counts']
    else:
      xs = series[timelike_colname]
      ys = series[value_colname]
    plt.plot(xs, ys, label=series_name, color=palette[series_index %
len(palette)])

  fig, ax = plt.subplots(figsize=figsize, layout='constrained')
  df = df.sort_values(timelike_colname, ascending=True)
  if series_colname:
    for i, (series_name, series) in
enumerate(df.groupby(series_colname)):
      _plot_series(series, series_name, i)
    fig.legend(title=series_colname, bbox_to_anchor=(1, 1), loc='upper
left')
  else:
    _plot_series(df, '')
  sns.despine(fig=fig, ax=ax)
  plt.xlabel(timelike_colname)
  plt.ylabel(value_colname)
  return autoviz.MplChart.from_current_mpl_state()

chart = time_series_multiline(descriptive_stats, *['Date', 'number of
bathrooms', None], **{})
chart
```

```
import numpy as np
from google.colab import autoviz

def time_series_multiline(df, timelike_colname, value_colname,
series_colname, figscale=1, mpl_palette_name='Dark2'):
  from matplotlib import pyplot as plt
  import seaborn as sns
  figsize = (10 * figscale, 5.2 * figscale)
  palette = list(sns.palettes.mpl_palette(mpl_palette_name))
  def _plot_series(series, series_name, series_index=0):
    if value_colname == 'count()':
```

```
      counted = (series[timelike_colname]
                 .value_counts()
                 .reset_index(name='counts')
                 .rename({'index': timelike_colname}, axis=1)
                 .sort_values(timelike_colname, ascending=True))
      xs = counted[timelike_colname]
      ys = counted['counts']
    else:
      xs = series[timelike_colname]
      ys = series[value_colname]
    plt.plot(xs, ys, label=series_name, color=palette[series_index %
len(palette)])

  fig, ax = plt.subplots(figsize=figsize, layout='constrained')
  df = df.sort_values(timelike_colname, ascending=True)
  if series_colname:
    for i, (series_name, series) in
enumerate(df.groupby(series_colname)):
      _plot_series(series, series_name, i)
    fig.legend(title=series_colname, bbox_to_anchor=(1, 1), loc='upper
left')
  else:
    _plot_series(df, '')
  sns.despine(fig=fig, ax=ax)
  plt.xlabel(timelike_colname)
  plt.ylabel(value_colname)
  return autoviz.MplChart.from_current_mpl_state()

chart = time_series_multiline(descriptive_stats, *['Date', 'living
area', None], **{})
chart
```

Handle Missing Values

```
# Example: Handling missing values
df.fillna(df.mean(), inplace=True)
df.fillna
```

```
<bound method DataFrame.fillna of                id   Date  number of
bedrooms  number of bathrooms  \
0      6762810145  42491                   5                 2.50
1      6762810635  42491                   4                 2.50
2      6762810998  42491                   5                 2.75
3      6762812605  42491                   4                 2.50
4      6762812919  42491                   3                 2.00
...           ...    ...                 ...                  ...
14615  6762830250  42734                   2                 1.50
14616  6762830339  42734                   3                 2.00
14617  6762830618  42734                   2                 1.00
```

```
14618  6762830709  42734                   4                  1.00
14619  6762831463  42734                   3                  1.00

       living area  lot area  number of floors  waterfront present  \
0             3650      9050               2.0                   0
1             2920      4000               1.5                   0
2             2910      9480               1.5                   0
3             3310     42998               2.0                   0
4             2710      4500               1.5                   0
...            ...       ...               ...                 ...
14615         1556     20000               1.0                   0
14616         1680      7000               1.5                   0
14617         1070      6120               1.0                   0
14618         1030      6621               1.0                   0
14619          900      4770               1.0                   0

       number of views  condition of the house  ...  Built Year  \
0                    4                       5  ...        1921
1                    0                       5  ...        1909
2                    0                       3  ...        1939
3                    0                       3  ...        2001
4                    0                       4  ...        1929
...                ...                     ...  ...         ...
14615                0                       4  ...        1957
14616                0                       4  ...        1968
14617                0                       3  ...        1962
14618                0                       4  ...        1955
14619                0                       3  ...        1969

       Renovation Year  Postal Code  Lattitude  Longitude
living_area_renov  \
0                    0       122003    52.8645   -114.557
2880
1                    0       122004    52.8878   -114.470
2470
2                    0       122004    52.8852   -114.468
2940
3                    0       122005    52.9532   -114.321
3350
4                    0       122006    52.9047   -114.485
2060
...                ...          ...        ...        ...
...
14615                0       122066    52.6191   -114.472
2250
14616                0       122072    52.5075   -114.393
1540
14617                0       122056    52.7289   -114.507
1130
14618                0       122042    52.7157   -114.411
```

```
1420
14619             2009       122018    52.5338   -114.552
900

       lot_area_renov  Number of schools nearby  Distance from the
airport  \
0                5400                         2
58
1                4000                         2
51
2                6600                         1
53
3               42847                         3
76
4                4500                         1
51
...               ...                       ...
...
14615           17286                         3
76
14616            7480                         3
59
14617            6120                         2
64
14618            6631                         3
54
14619            3480                         2
55

         Price
0      2380000
1      1400000
2      1200000
3       838000
4       805000
...        ...
14615   221700
14616   219200
14617   209000
14618   205000
14619   146000

[14620 rows x 23 columns]>
```