

# Chapter7

March 2, 2022

## 1 Chapter 7 - Collaborative Analytics with Plotly

### 1.1 Segment 1 - Creating basic charts

#### 1.1.1 Setting up to use Plotly within Jupyter

```
[8]: ! pip install Plotly
```

```
Requirement already satisfied: Plotly in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (5.6.0)  
Requirement already satisfied: six in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from Plotly)  
(1.16.0)  
Requirement already satisfied: tenacity>=6.2.0 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from Plotly)  
(8.0.1)
```

```
[12]: ! pip install cufflinks  
!pip install chart_studio
```

```
Requirement already satisfied: cufflinks in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (0.17.3)  
Requirement already satisfied: pandas>=0.19.2 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from cufflinks)  
(1.4.1)  
Requirement already satisfied: numpy>=1.9.2 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from cufflinks)  
(1.22.2)  
Requirement already satisfied: six>=1.9.0 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from cufflinks)  
(1.16.0)  
Requirement already satisfied: colorlover>=0.2.1 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from cufflinks)  
(0.3.0)  
Requirement already satisfied: plotly>=4.1.1 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from cufflinks)  
(5.6.0)  
Requirement already satisfied: ipywidgets>=7.0.0 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from cufflinks)
```

(7.6.5)  
Requirement already satisfied: setuptools>=34.4.1 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from cufflinks)  
(58.0.4)  
Requirement already satisfied: ipython>=5.3.0 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from cufflinks)  
(8.1.0)  
Requirement already satisfied: colorama in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (0.4.4)  
Requirement already satisfied: backcall in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (0.2.0)  
Requirement already satisfied: pickleshare in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (0.7.5)  
Requirement already satisfied: pygments>=2.4.0 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (2.11.2)  
Requirement already satisfied: stack-data in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (0.2.0)  
Requirement already satisfied: matplotlib-inline in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (0.1.3)  
Requirement already satisfied: jedi>=0.16 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (0.18.1)  
Requirement already satisfied: prompt-toolkit!=3.0.0,!<3.0.1,<3.1.0,>=2.0.0 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (3.0.28)  
Requirement already satisfied: traitlets>=5 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (5.1.1)  
Requirement already satisfied: decorator in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipython>=5.3.0->cufflinks) (5.1.1)  
Requirement already satisfied: ipython-genutils~0.2.0 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipywidgets>=7.0.0->cufflinks) (0.2.0)  
Requirement already satisfied: nbformat>=4.2.0 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipywidgets>=7.0.0->cufflinks) (5.1.3)  
Requirement already satisfied: ipykernel>=4.5.1 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from  
ipywidgets>=7.0.0->cufflinks) (6.9.1)  
Requirement already satisfied: jupyterlab-widgets>=1.0.0 in  
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from

```

ipywidgets>=7.0.0->cufflinks) (1.0.2)
Requirement already satisfied: widgetsnbextension~=3.5.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
ipywidgets>=7.0.0->cufflinks) (3.5.2)
Requirement already satisfied: nest-asyncio in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (1.5.4)
Requirement already satisfied: tornado<7.0,>=4.2 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (6.1)
Requirement already satisfied: debugpy<2.0,>=1.0.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (1.5.1)
Requirement already satisfied: jupyter-client<8.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (7.1.2)
Requirement already satisfied: parso<0.9.0,>=0.8.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
jedi>=0.16->ipython>=5.3.0->cufflinks) (0.8.3)
Requirement already satisfied: entrypoints in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from jupyter-
client<8.0->ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (0.4)
Requirement already satisfied: jupyter-core>=4.6.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from jupyter-
client<8.0->ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (4.9.2)
Requirement already satisfied: pyzmq>=13 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from jupyter-
client<8.0->ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (22.3.0)
Requirement already satisfied: python-dateutil>=2.1 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from jupyter-
client<8.0->ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks) (2.8.2)
Requirement already satisfied: pywin32>=1.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from jupyter-
core>=4.6.0->jupyter-client<8.0->ipykernel>=4.5.1->ipywidgets>=7.0.0->cufflinks)
(303)
Requirement already satisfied: jsonschema!=2.5.0,>=2.4 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
nbformat>=4.2.0->ipywidgets>=7.0.0->cufflinks) (4.4.0)
Requirement already satisfied: pyparsing!=0.17.0,!0.17.1,!0.17.2,>=0.14.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
jsonschema!=2.5.0,>=2.4->nbformat>=4.2.0->ipywidgets>=7.0.0->cufflinks) (0.18.1)
Requirement already satisfied: attrs>=17.4.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
jsonschema!=2.5.0,>=2.4->nbformat>=4.2.0->ipywidgets>=7.0.0->cufflinks) (21.4.0)
Requirement already satisfied: importlib-resources>=1.4.0 in
e:\anaconda\envs\applicationdesignnbdm1034\lib\site-packages (from
jsonschema!=2.5.0,>=2.4->nbformat>=4.2.0->ipywidgets>=7.0.0->cufflinks) (5.4.0)
Requirement already satisfied: zipp>=3.1.0 in

```

e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from importlib-resources>=1.4.0->jsonschema!=2.5.0,>=2.4->nbformat>=4.2.0->ipywidgets>=7.0.0->cufflinks) (3.7.0)

Requirement already satisfied: pytz>=2020.1 in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from pandas>=0.19.2->cufflinks) (2021.3)

Requirement already satisfied: tenacity>=6.2.0 in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from plotly>=4.1.1->cufflinks) (8.0.1)

Requirement already satisfied: wcwidth in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from prompt-toolkit!=3.0.0,!<3.0.1,<3.1.0,>=2.0.0->ipython>=5.3.0->cufflinks) (0.2.5)

Requirement already satisfied: notebook>=4.4.1 in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (6.4.8)

Requirement already satisfied: terminado>=0.8.3 in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (0.13.1)

Requirement already satisfied: argon2-cffi in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (21.3.0)

Requirement already satisfied: prometheus-client in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (0.13.1)

Requirement already satisfied: nbconvert in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (6.4.2)

Requirement already satisfied: Send2Trash>=1.8.0 in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (1.8.0)

Requirement already satisfied: jinja2 in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (3.0.3)

Requirement already satisfied: pywinpty>=1.1.0 in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from terminado>=0.8.3->notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (2.0.3)

Requirement already satisfied: argon2-cffi-bindings in e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from argon2-cffi->notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (21.2.0)

Requirement already satisfied: cffi>=1.0.1 in

```

e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from argon2-cffi-bi
ndings->argon2-cffi->notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0
.0->cufflinks) (1.15.0)
Requirement already satisfied: pycparser in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from
cffi>=1.0.1->argon2-cffi-bindings->argon2-cffi->notebook>=4.4.1->widgetsnbextens
ion~=3.5.0->ipywidgets>=7.0.0->cufflinks) (2.21)
Requirement already satisfied: MarkupSafe>=2.0 in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from jinja2->notebo
ok>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (2.1.0)
Requirement already satisfied: defusedxml in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from nbconvert->not
ebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (0.7.1)
Requirement already satisfied: bleach in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from nbconvert->not
ebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (4.1.0)
Requirement already satisfied: nbclient<0.6.0,>=0.5.0 in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from nbconvert->not
ebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (0.5.11)
Requirement already satisfied: jupyterlab-pygments in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from nbconvert->not
ebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (0.1.2)
Requirement already satisfied: mistune<2,>=0.8.1 in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from nbconvert->not
ebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (0.8.4)
Requirement already satisfied: pandocfilters>=1.4.1 in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from nbconvert->not
ebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (1.5.0)
Requirement already satisfied: testpath in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from nbconvert->not
ebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks) (0.6.0)
Requirement already satisfied: packaging in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from bleach->nbconv
ert->notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks)
(21.3)
Requirement already satisfied: webencodings in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from bleach->nbconv
ert->notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->cufflinks)
(0.5.1)
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from packaging->ble
ach->nbconvert->notebook>=4.4.1->widgetsnbextension~=3.5.0->ipywidgets>=7.0.0->c
ufflinks) (3.0.7)
Requirement already satisfied: asttokens in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from stack-
data->ipython>=5.3.0->cufflinks) (2.0.5)
Requirement already satisfied: executing in
e:\anaconda\envs\applicationdesignbndm1034\lib\site-packages (from stack-

```

```

data->ipython>=5.3.0->cufflinks) (0.8.3)
Requirement already satisfied: pure-eval in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from stack-
data->ipython>=5.3.0->cufflinks) (0.2.2)
Requirement already satisfied: chart_studio in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (1.1.0)
Requirement already satisfied: plotly in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from chart_studio)
(5.6.0)
Requirement already satisfied: retrying>=1.3.3 in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from chart_studio)
(1.3.3)
Requirement already satisfied: requests in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from chart_studio)
(2.27.1)
Requirement already satisfied: six in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from chart_studio)
(1.16.0)
Requirement already satisfied: tenacity>=6.2.0 in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from
plotly->chart_studio) (8.0.1)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from
requests->chart_studio) (1.26.8)
Requirement already satisfied: charset-normalizer~=2.0.0 in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from
requests->chart_studio) (2.0.12)
Requirement already satisfied: certifi>=2017.4.17 in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from
requests->chart_studio) (2021.10.8)
Requirement already satisfied: idna<4,>=2.5 in
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from
requests->chart_studio) (3.3)

```

```

[15]: import numpy as np
import pandas as pd

import cufflinks as cf

# import plotly.plotly as py
import chart_studio.plotly as py
# import plotly.tools as tls
import chart_studio.tools as tls
import plotly.graph_objs as go

```

```

[16]: tls.set_credentials_file(username='aadarsha', api_key='0qf5rfEp17pSmDg2fekH')

```

### 1.1.2 Creating line charts

#### A very basic line chart

```
[17]: a = np.linspace(start=0, stop=36, num=36)

np.random.seed(25)

b = np.random.uniform(low=0.0, high=1.0, size=36)

trace = go.Scatter(x=a, y=b)

data = [trace]

py.ipplot(data, filename='basic-line-chart')
```

```
[17]: <IPython.lib.display.IFrame at 0x205ccf32220>
```

#### A line chart from a pandas dataframe

```
[18]: address = './Data/mtcars.csv'

cars = pd.read_csv(address)
cars.columns = ['car_names', 'mpg', 'cyl', 'disp', 'hp', 'drat', 'wt', 'qsec', '
↳ 'vs', 'am', 'gear', 'carb']

df = cars[['cyl', 'wt', 'mpg']]

layout = dict(title='Chart from Pandas DataFrame', xaxis= dict(title='x-axis'),
↳ yaxis= dict(title='y-axis'))

df.iplot(filename='cf-simple-line-chart', layout=layout)
```

```
[18]: <IPython.lib.display.IFrame at 0x205ccf32ac0>
```

### 1.1.3 Creating bar charts

```
[19]: data = [go.Bar(x=[1,2,3,4,5,6,7,8,9,10], y=[1,2,3,4,0.5,4,3,2,1])]
print(data)

[Bar({
  'x': [1, 2, 3, 4, 5, 6, 7, 8, 9, 10], 'y': [1, 2, 3, 4, 0.5, 4, 3, 2, 1]
})]
```

```
[22]: layout = dict(title='Simple Bar Chart',
    xaxis= dict(title='x-axis'), yaxis=dict(title='y-axis'))
py.ipplot(data, filename='basic-bar-chart', layout=layout)
```

```
[22]: <IPython.lib.display.IFrame at 0x205ccf050d0>
```

### 1.1.4 Creating pie charts

```
[23]: fig = {'data': [{'labels': ['bicycle', 'motorbike', 'car', 'van', 'stroller'],  
                        'values': [1, 2, 3, 4, 0.5], 'type': 'pie'}],  
            'layout': {'title': 'Simple Pie Chart'}}  
py.iplot(fig)
```

```
[23]: <IPython.lib.display.IFrame at 0x205cc2708b0>
```

## 1.2 Segment 2 - Creating statistical charts

### Setting up to use Plotly within Jupyter

```
[28]: !pip install sklearn  
import sklearn  
from sklearn.preprocessing import StandardScaler
```

```
Requirement already satisfied: sklearn in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (0.0)  
Requirement already satisfied: scikit-learn in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from sklearn)  
(1.0.2)  
Requirement already satisfied: joblib>=0.11 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from scikit-  
learn->sklearn) (1.1.0)  
Requirement already satisfied: numpy>=1.14.6 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from scikit-  
learn->sklearn) (1.22.2)  
Requirement already satisfied: threadpoolctl>=2.0.0 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from scikit-  
learn->sklearn) (3.1.0)  
Requirement already satisfied: scipy>=1.1.0 in  
e:\anaconda\envs\applicationdesignbdm1034\lib\site-packages (from scikit-  
learn->sklearn) (1.8.0)
```

### 1.2.1 Creating histograms

#### Make a histogram from a pandas Series object

```
[29]: mpg = cars.mpg  
  
mpg.iplot(kind='histogram', filename='simple-histogram-chart')
```

```
[29]: <IPython.lib.display.IFrame at 0x205dd1c7be0>
```

```
[30]: cars_subset = cars[['mpg', 'disp', 'hp']]  
  
cars_data_std = StandardScaler().fit_transform(cars_subset)  
  
cars_select = pd.DataFrame(cars_data_std)  
cars_select.columns = ['mpg', 'disp', 'hp']
```



```
cars_select.iplot(kind='histogram', filename= 'multiple-histogram-chart')
```

[30]: <IPython.lib.display.IFrame at 0x205dd27a1c0>

```
[31]: cars_select.iplot(kind='histogram', subplots=True, filename=
      ↪ 'subplot-histograms')
```

[31]: <IPython.lib.display.IFrame at 0x205cce73eb0>

```
[32]: cars_select.iplot(kind='histogram', subplots=True, shape=(3,1), filename=
      ↪ 'subplot-histograms')
```

[32]: <IPython.lib.display.IFrame at 0x205dd19ee20>

```
[33]: cars_select.iplot(kind='histogram', subplots=True, shape=(1,3), filename=
      ↪ 'subplot-histograms')
```

[33]: <IPython.lib.display.IFrame at 0x205dd8e4460>

### 1.2.2 Creating box plots

```
[35]: cars_select.iplot(kind='box', filename= 'box-plots')
```

[35]: <IPython.lib.display.IFrame at 0x205dd94fbb0>

### 1.2.3 Creating scatter plots

```
[37]: fig = {'data': [{'x': cars_select.mpg, 'y': cars_select.disp, 'mode': 'markers',
      ↪ 'name': 'mpg'},
      {'x': cars_select.hp, 'y': cars_select.disp, 'mode': 'markers',
      ↪ 'name': 'hp'}],
      'layout': {'xaxis': {'title': ''}, 'yaxis': {'title': 'Standardized
      ↪ Displacement'}}}
py.iplot(fig, filename= 'grouped-scatter-plot')
```

[37]: <IPython.lib.display.IFrame at 0x205dd26b640>

[ ]: