The Oscars

EECS-731

Assignment # 7

The Oscars - (*Jimmy Wrangler - Revisited*)

For this assignment, I will re-explore the *311 service request data for Kansas City* that I had explored in the very first assignment of this course. This time, I will use the **Bokeh** visualization library to create a more engaging narrative in exploratory data analysis.

Data Exploration ¶

Lets us first load the python modules that will be needed in this task:

```
# Render out plots inline
%matplotlib inline

import pandas as pd
import matplotlib.pyplot as plt

from bokeh.io import show, output_notebook
from bokeh.palettes import Spectral6
from bokeh.plotting import figure
import math

# Render bokeh plot in the notebook
output_notebook ()

# Make the graphs a bit prettier, and bigger
pd.set_option('display.mpl_style', 'default')
```

```
BokehJS successfully loaded.
```

Load The Dataset

```
df_kc = pd.read_csv ("../data/kc_311_a_a.csv", parse_dates = True, index_col = ['CREATION DATE'])
sdf_kc = df_kc.sort_index ()
sdf_kc.sample (1)
```

	CASE ID	SOURCE	DEPARTMENT	WORK GROUP	REQUEST TYPE	CATEGORY	TYPE	DETAIL	CREATION TIME	CREATION MONTH	...	ZIP CODE	NEIGHBO
CREATION DATE													
2018-07-05	2018088142	PHONE	Public Works	Public Works-Capital Projects-Traffic Signals	Lights / Signals-Traffic Signal-Signal out	Lights / Signals	Traffic Signal	Signal Out	02:47 PM	7	...	64128.0	Palestine E

1 rows × 29 columns

Remove Unnecessary Columns

```
cdf_kc = sdf_kc.drop (['CASE ID', 'SOURCE', 'STREET ADDRESS', 'WORK GROUP', 'REQUEST TYPE', 'TYPE', 'DETAIL', 'COUNCIL
DISTRICT', 'POLICE DISTRICT', 'PARCEL ID NO', 'CASE URL', 'EXCEEDED EST TIMEFRAME', 'CREATION MONTH', 'CREATION YEAR',
'CLOSED MONTH', 'CLOSED YEAR', 'ZIP CODE', 'ADDRESS WITH GEOCODE', '30-60-90 Days Open Window'], axis = 1)
cdf_kc.sample (3)
```

	DEPARTMENT	CATEGORY	CREATION TIME	STATUS	CLOSED DATE	DAYS TO CLOSE	NEIGHBORHOOD	COUNTY	LATITUDE	LONGITUDE
CREATION DATE										
2018-04-19	NHS	Property / Buildings / Construction	10:33 AM	RESOL	04/25/2018	6.0	Fairwood And Robandee	Jackson	38.958737	-94.489207
2018-04-23	NHS	Trash / Recycling	11:40 AM	RESOL	04/25/2018	2.0	Noble And Gregory Ridge	Jackson	38.995581	-94.546188
2018-06-20	NHS	Trash / Recycling	08:20 AM	RESOL	06/20/2018	0.0	St Catherines Gardens	Jackson	38.934364	-94.550276

Drop NaN Values

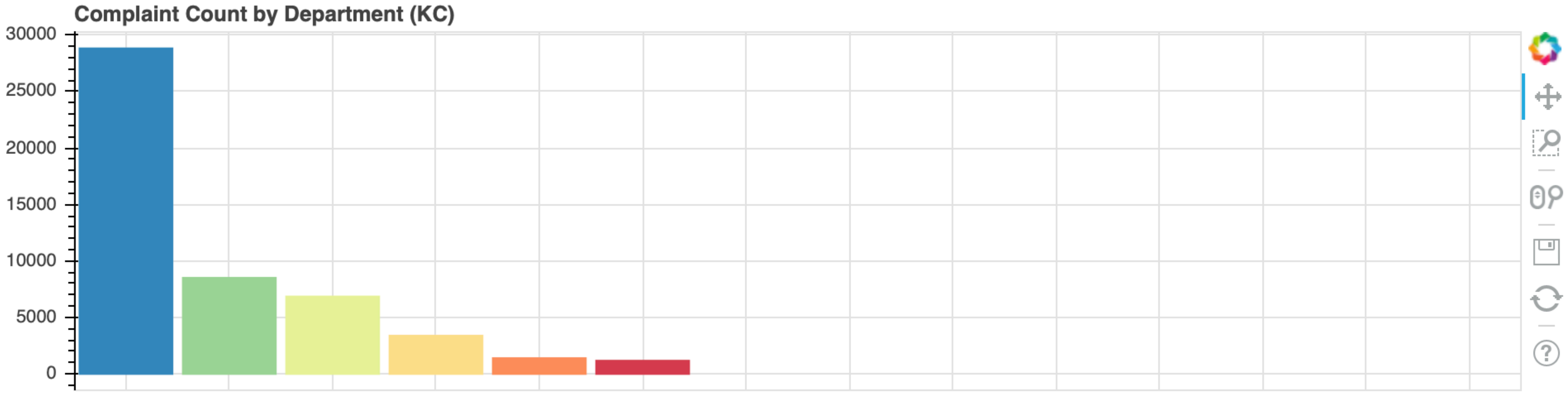
```
print '%40s: %s' % ('Dataframe Before Dropping NaN values', cdf_kc.shape)
vdf_kc = cdf_kc.dropna ()
print '%40s: %s' % ('Dataframe After Dropping NaN values', vdf_kc.shape)
```

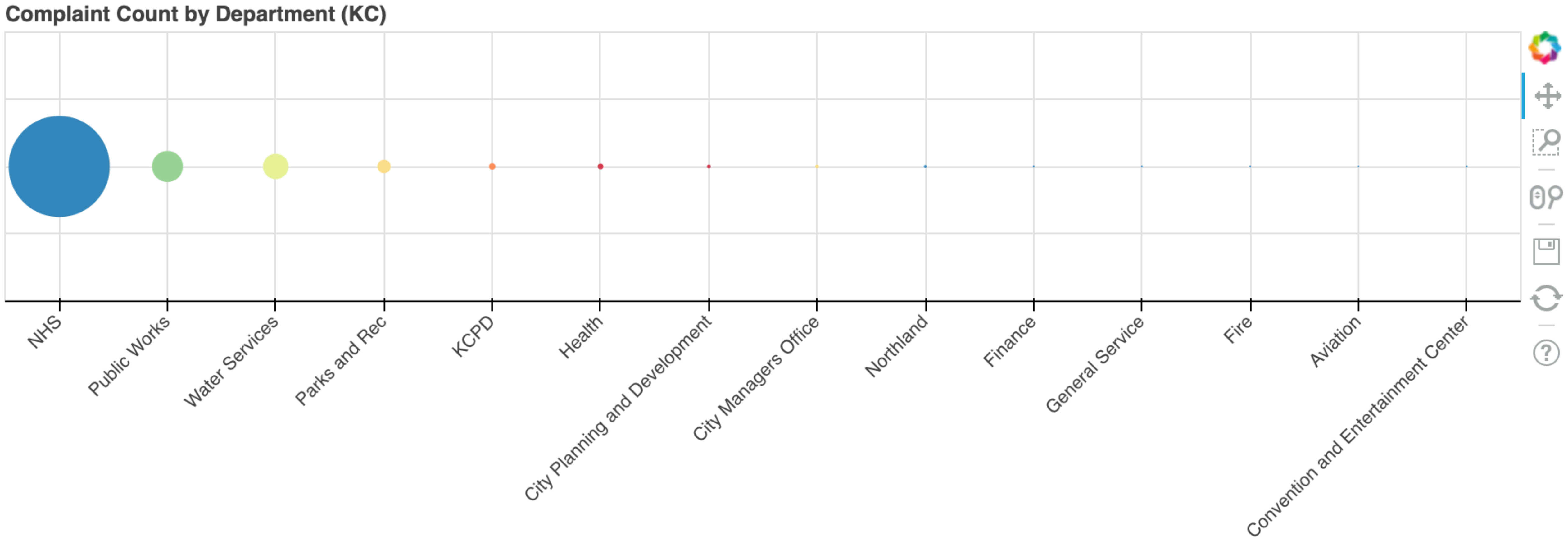
```
    Dataframe Before Dropping NaN values: (62048, 10)
     Dataframe After Dropping NaN values: (51774, 10)
```

Data Exploration with Bokeh

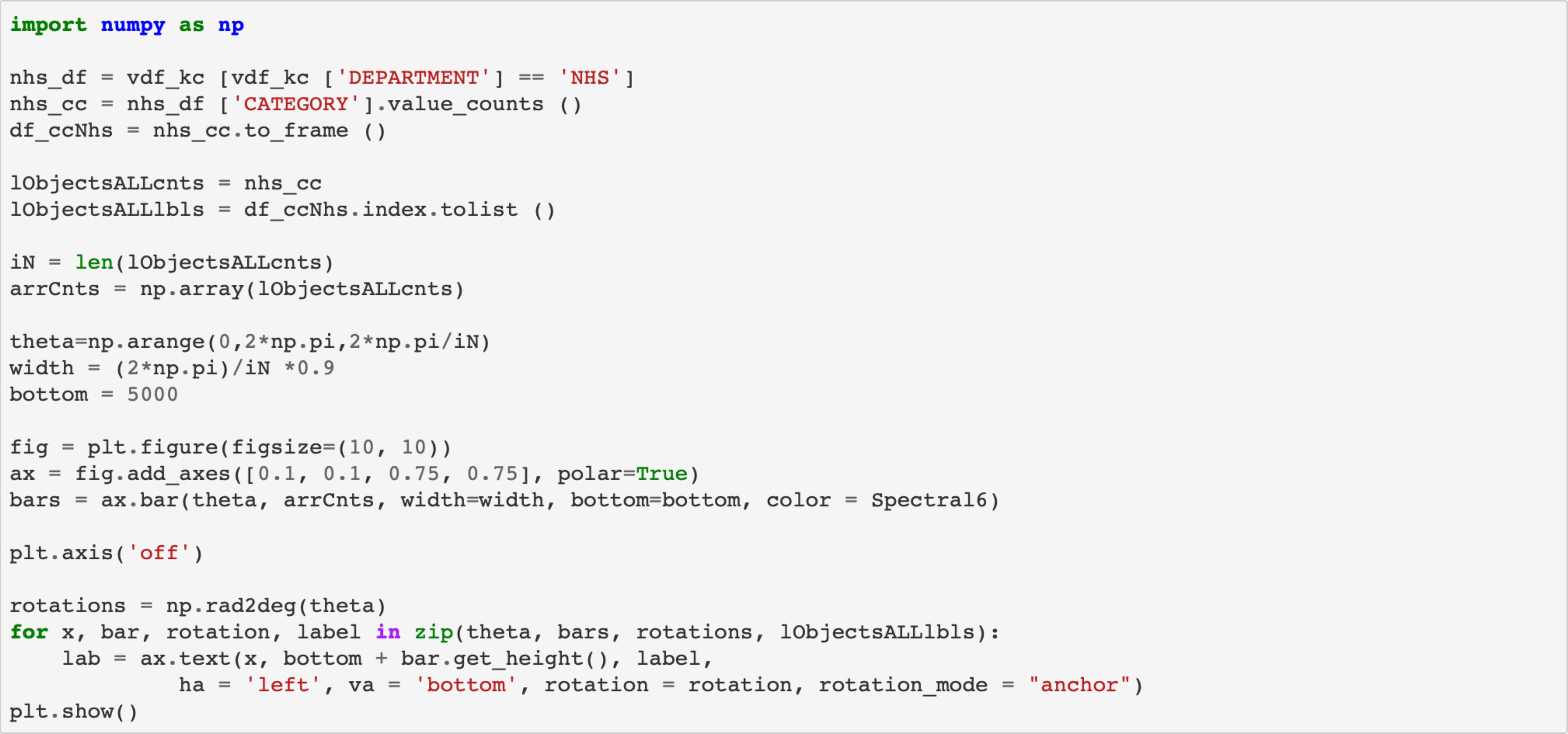
Let me create a visualization for the all the complaint types:

```
complaint_counts = vdf_kc ['DEPARTMENT'].value_counts ()
df_cc = complaint_counts.to_frame ()
p = figure (x_range = df_cc.index.tolist (), plot_height = 250, plot_width = 950, title="Complaint Count by Department (KC)")
p.vbar (x = df_cc.index, top = df_cc ['DEPARTMENT'], width=0.9, color = Spectral6)
p.xaxis.visible = False
show (p)

maxVal = max (df_cc ['DEPARTMENT'])
radii = [(x * 60.0)/maxVal for x in df_cc ['DEPARTMENT']]
p = figure (x_range = df_cc.index.tolist (), plot_height = 350, plot_width = 950, title="Complaint Count by Department (KC)")
p.circle (x = df_cc.index, y = [5] * len (df_cc.index), size = radii, color = Spectral6)
p.xaxis.major_label_orientation = math.pi/4
p.yaxis.visible = False
show (p)
```

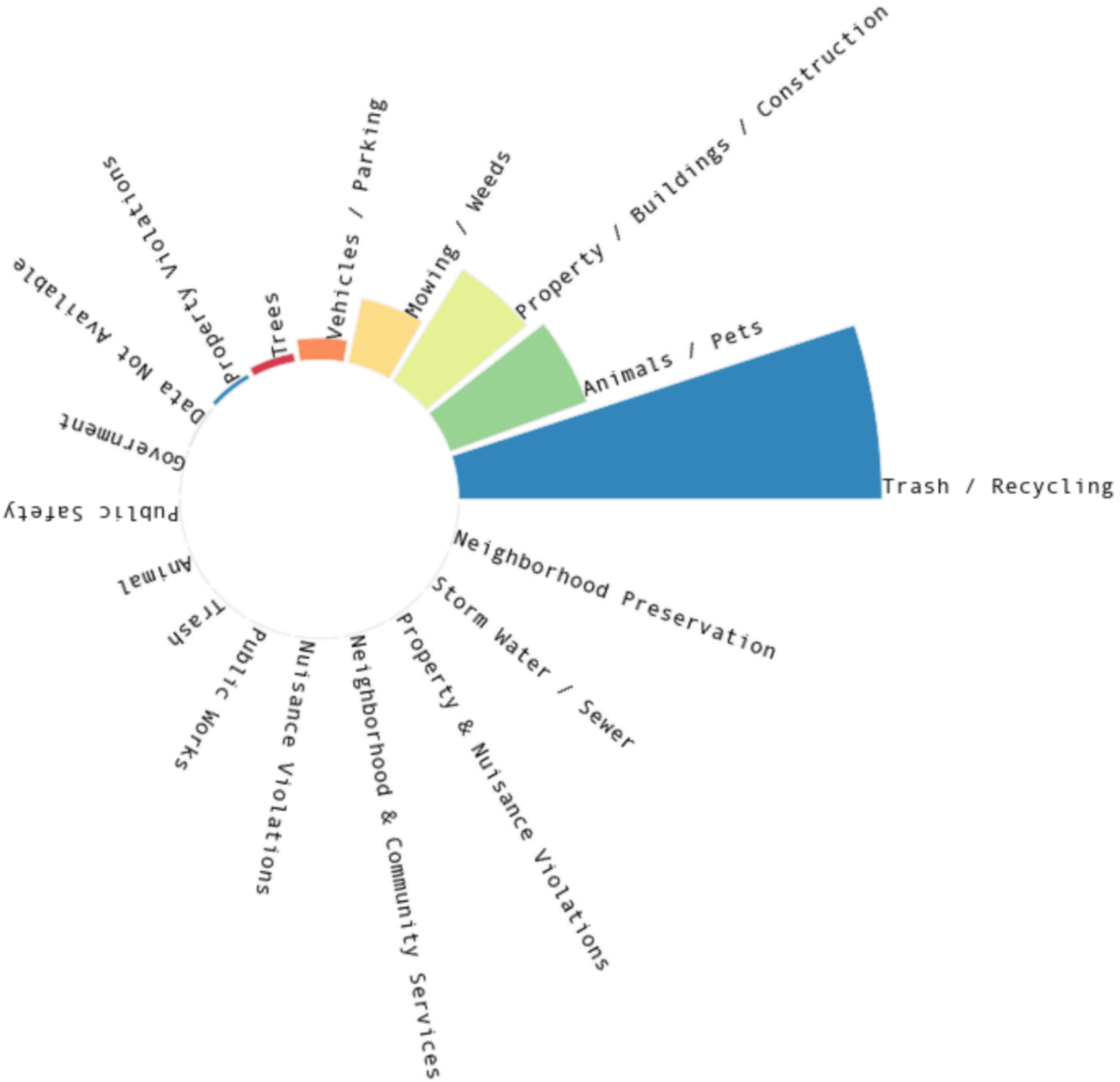




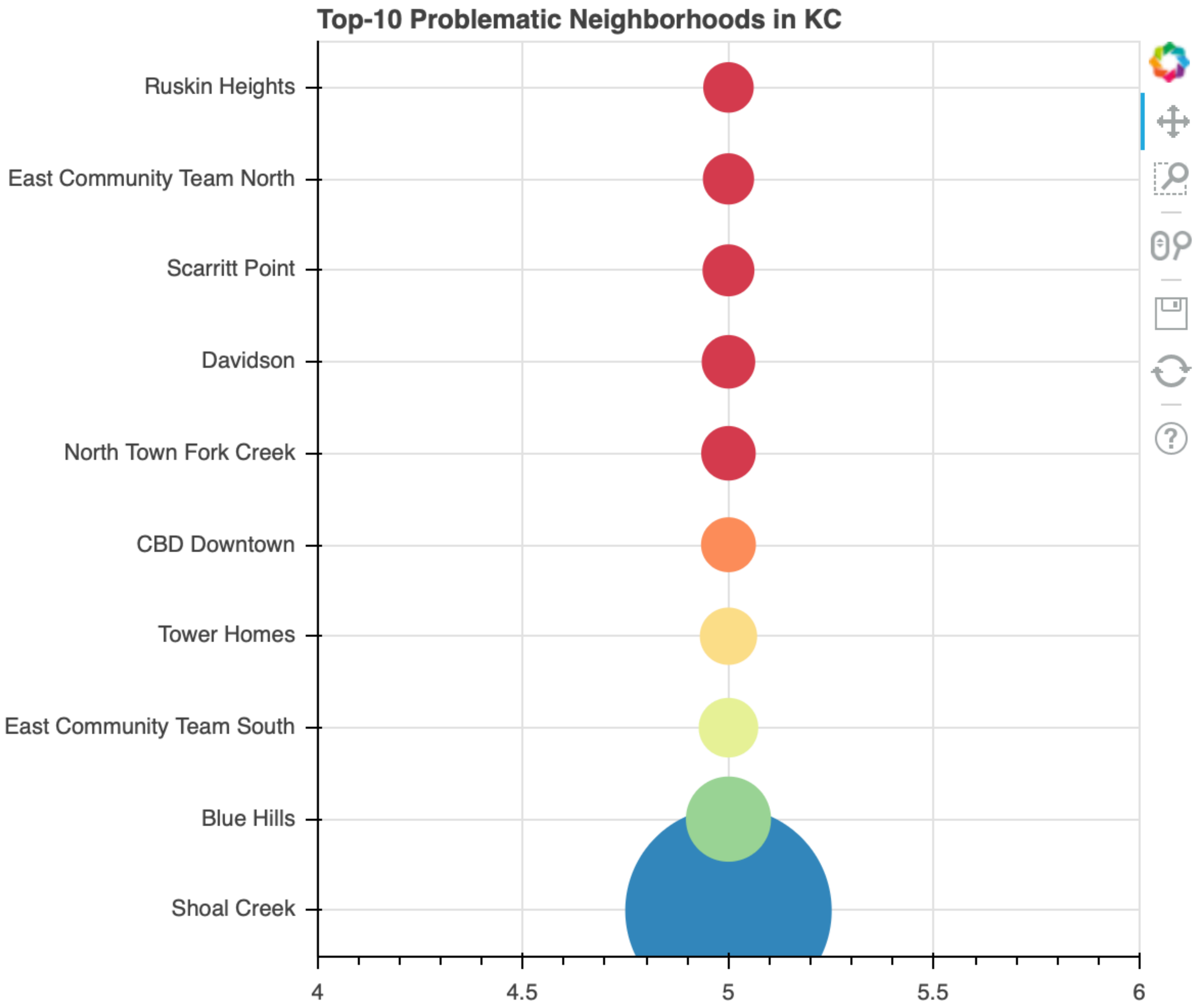
From the visualization above, it seems that National Highway Service (NHS) in Kansas City receives disproportionaly large number of complaints. Let us look what kind of complaints are received by NHS.



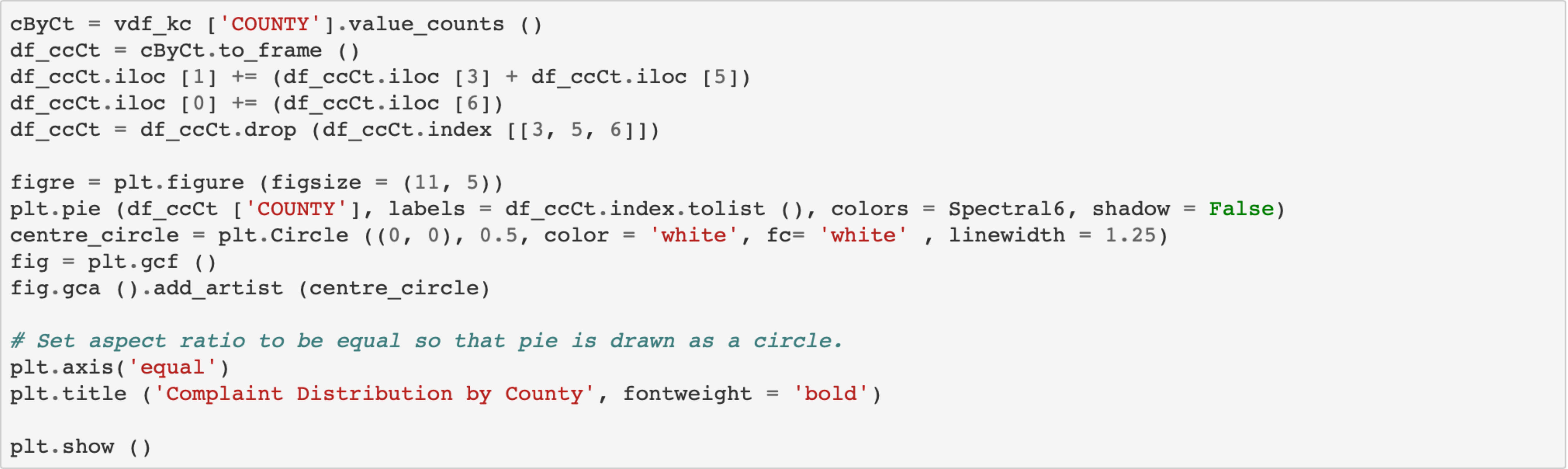
```
import numpy as np

nhs_df = vdf_kc [vdf_kc ['DEPARTMENT'] == 'NHS']
nhs_cc = nhs_df ['CATEGORY'].value_counts ()
df_ccNhs = nhs_cc.to_frame ()

lObjectsALLcnts = nhs_cc
lObjectsALLlbls = df_ccNhs.index.tolist ()

iN = len(lObjectsALLcnts)
arrCnts = np.array(lObjectsALLcnts)

theta=np.arange(0,2*np.pi,2*np.pi/iN)
width = (2*np.pi)/iN *0.9
bottom = 5000

fig = plt.figure(figsize=(10, 10))
ax = fig.add_axes([0.1, 0.1, 0.75, 0.75], polar=True)
bars = ax.bar(theta, arrCnts, width=width, bottom=bottom, color = Spectral6)

plt.axis('off')

rotations = np.rad2deg(theta)
for x, bar, rotation, label in zip(theta, bars, rotations, lObjectsALLlbls):
    lab = ax.text(x, bottom + bar.get_height(), label,
             ha = 'left', va = 'bottom', rotation = rotation, rotation_mode = "anchor")
plt.show()
```


Trash / Recycling
Animals / Pets
Property / Buildings / Construction
Mowing / Weeds
Vehicles / Parking
Treees
Property Violations
Data Not Available
Goverenment
Public Safety
Animal
Trash
Public Works
Nuisance Violations
Neighborhood & Community Services
Property & Nuisance Violations
Storm Water / Sewer
Neighborhood Preservation

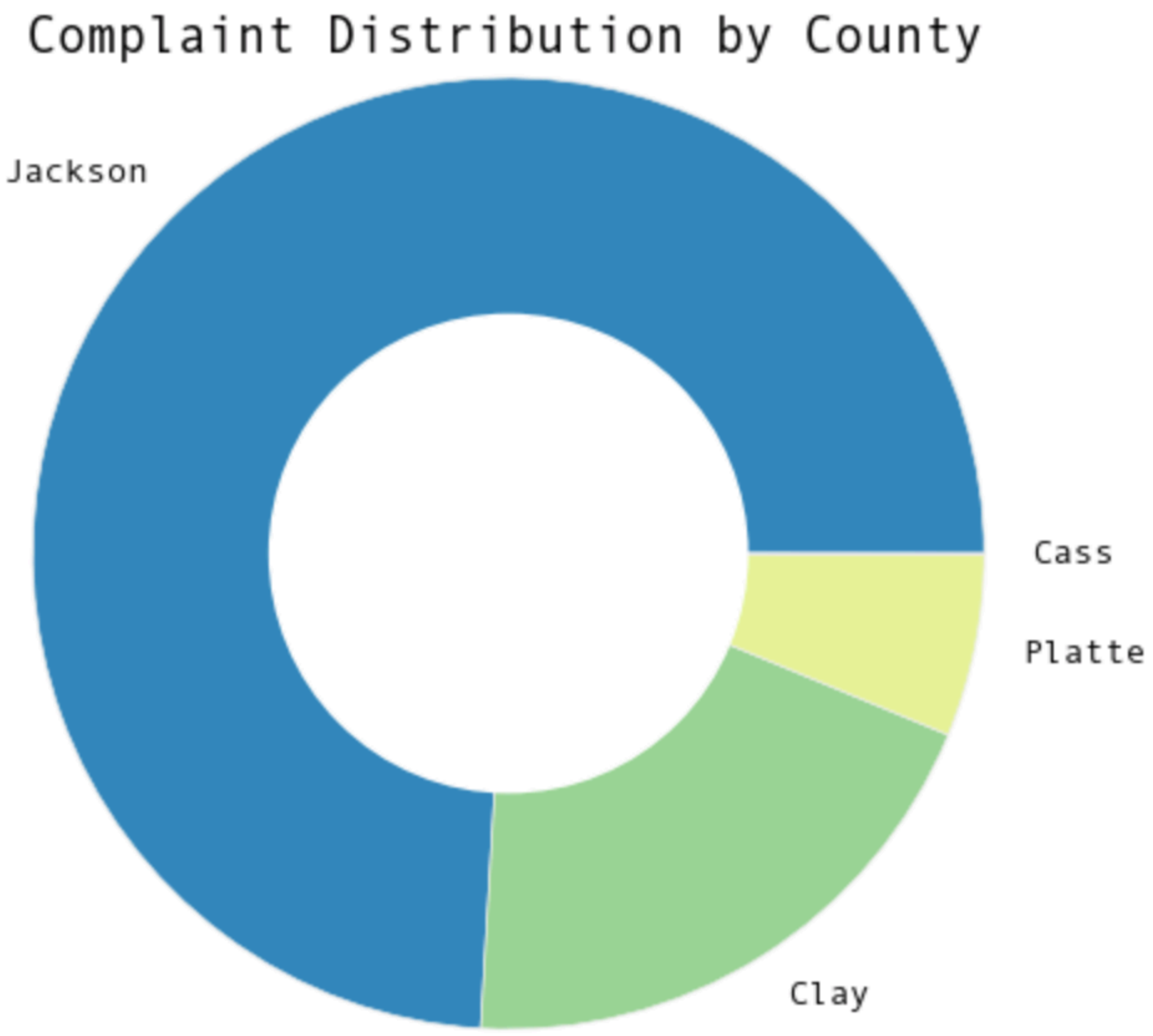
```
cByNbh = vdf_kc ['NEIGHBORHOOD'].value_counts ()
df_ccNbh = cByNbh.to_frame ()

maxVal = max (cByNbh [:10])
radii = [(x * 100.0)/maxVal for x in df_ccNbh ['NEIGHBORHOOD'][:10]]
p = figure (y_range = df_ccNbh.index.tolist ()[:10], plot_height = 500, title="Top-10 Problematic Neighborhoods in KC"
)
p.circle (x = [5] * 10, y = df_ccNbh.index [:10], size = radii, color = Spectral6)
show (p)
```



From this plot, it is evident that **Shoal Creek** is the most problematic neighborhood in KC w.r.t. the 311 service request data.



```
cByCt = vdf_kc ['COUNTY'].value_counts ()
df_ccCt = cByCt.to_frame ()
df_ccCt.iloc [1] += (df_ccCt.iloc [3] + df_ccCt.iloc [5])
df_ccCt.iloc [0] += (df_ccCt.iloc [6])
df_ccCt = df_ccCt.drop (df_ccCt.index [[3, 5, 6]])

figre = plt.figure (figsize = (11, 5))
plt.pie (df_ccCt ['COUNTY'], labels = df_ccCt.index.tolist (), colors = Spectral6, shadow = False)
centre_circle = plt.Circle ((0, 0), 0.5, color = 'white', fc= 'white' , linewidth = 1.25)
fig = plt.gcf ()
fig.gca ().add_artist (centre_circle)

# Set aspect ratio to be equal so that pie is drawn as a circle.
plt.axis('equal')
plt.title ('Complaint Distribution by County', fontweight = 'bold')

plt.show ()
```



Summary

In this assignment, I revisited the first assignment (Jimmy Wrangler - Data Explorer) in which I had explored the 311 service request data from Kansas City. This time around, I used the **Bokeh** visualization library to improve the structure of my data exploration and to add in creating compelling visualizations.