New York restaurant consumption analysis

New York restaurant location information, business status, customer flow, price and rating correlation analysis

Import raw data

In [1]:

```
import pandas as pd
import folium
```

In [2]:

```
data = pd.read_csv("/Users/moyang/Data-Visualization-on-Yelp-Data/Restaurant_df_
```

In [3]:

```
data.head()
```

Out[3]:

	categories	coordinates	display_phone	distance	id	
0	[{'alias': 'shanghainese', 'title': 'Shanghain...	{'latitude': 40.7146691442891, 'longitude': -7...	(212) 233-8888	1066.508550	joes-shanghai-new-york-2	media3.fl.yelpcdn.
1	[{'alias': 'chinese', 'title': 'Chinese'}, {'a...	{'latitude': 40.7142, 'longitude': -73.99787}	(212) 791-1817	1020.195988	tasty-hand-pulled-noodles-new-york	media1.fl.yelpcdr
2	[{'alias': 'chinese', 'title': 'Chinese'}, {'a...	{'latitude': 40.7422275387194, 'longitude': -7...	(212) 989-6699	4183.124416	buddakan-new-york	media4.fl.yelpcdn.
3	[{'alias': 'shanghainese', 'title': 'Shanghain...	{'latitude': 40.7598810063385, 'longitude': -7...	(718) 321-3838	14909.390990	nan-xiang-xiao-long-bao-flushing	media4.fl.yelpcdn.c
4	[{'alias': 'asianfusion', 'title': 'Asian Fusi...	{'latitude': 40.7190148, 'longitude': -73.9968...	(212) 334-3669	1524.985833	nyonya-new-york	media2.fl.yelpcdn.c

Extract latitude and longitude information and generate a new column

In [4]:

```
data['coordinates']
```

Out[4]:

```
0       {'latitude': 40.7146691442891, 'longitude': -7...
1           {'latitude': 40.7142, 'longitude': -73.99787}
2       {'latitude': 40.7422275387194, 'longitude': -7...
3       {'latitude': 40.7598810063385, 'longitude': -7...
4       {'latitude': 40.7190148, 'longitude': -73.9968...
                              ...                        
5496    {'latitude': 40.8603060990572, 'longitude': -7...
5497    {'latitude': 40.7156225, 'longitude': -74.0073...
5498    {'latitude': 40.6357082, 'longitude': -74.1349...
5499     {'latitude': 40.81591, 'longitude': -73.9168399}
5500       {'latitude': 40.74225, 'longitude': -73.87199}
Name: coordinates, Length: 5501, dtype: object
```

In [5]:

```
import re
latitude=[]
longitude=[]
for coordinate in data['coordinates']:
    num = re.findall(r"[-+]?\d*\.\d+|\d+", coordinate)
    latitude.append(num[0])
    longitude.append(num[1])
list_df = pd.DataFrame({'latitude': latitude,
                        'longitude':longitude})
list_df
```

Out[5]:

	latitude	longitude
0	40.7146691442891	-73.9977602206654
1	40.7142	-73.99787
2	40.7422275387194	-74.0047066478157
3	40.7598810063385	-73.8325853625656
4	40.7190148	-73.9968228
...	...	...
5496	40.8603060990572	-73.8908256590366
5497	40.7156225	-74.0073923
5498	40.6357082	-74.1349684
5499	40.81591	-73.9168399
5500	40.74225	-73.87199

5501 rows × 2 columns

Merge two tables horizontally

In [6]:

```
new_df = pd.concat([data, list_df], axis=1)
new_df
```

Out[6]:

	categories	coordinates	display_phone	distance	id	
0	[{'alias': 'shanghainese', 'title': 'Shanghain...	{'latitude': 40.7146691442891, 'longitude': -7...	(212) 233-8888	1066.508550	joes-shanghai-new-york-2	media3.fl.yelp
1	[{'alias': 'chinese', 'title': 'Chinese'}, {'a...	{'latitude': 40.7142, 'longitude': -73.99787}	(212) 791-1817	1020.195988	tasty-hand-pulled-noodles-new-york	media1.fl.yel
2	[{'alias': 'chinese', 'title': 'Chinese'}, {'a...	{'latitude': 40.7422275387194, 'longitude': -7...	(212) 989-6699	4183.124416	buddakan-new-york	media4.fl.yelp
3	[{'alias': 'shanghainese', 'title': 'Shanghain...	{'latitude': 40.7598810063385, 'longitude': -7...	(718) 321-3838	14909.390990	nan-xiang-xiao-long-bao-flushing	media4.fl.yelpc
4	[{'alias': 'asianfusion', 'title': 'Asian Fusi...	{'latitude': 40.7190148, 'longitude': -73.9968...	(212) 334-3669	1524.985833	nyonya-new-york	media2.fl.yelpc
...	...	...	...	...	...	
5496	[{'alias': 'mexican', 'title': 'Mexican'}, {'a...	{'latitude': 40.8603060990572, 'longitude': -7...	(718) 220-1276	19295.845240	chipotle-mexican-grill-bronx-2	media1.fl.yelp
5497	[{'alias': 'mexican', 'title': 'Mexican'}]	{'latitude': 40.7156225, 'longitude': -74.0073...	(212) 393-1026	1581.060316	taco-house-new-york-5	media2.fl.yelp
5498	[{'alias': 'mexican', 'title': 'Mexican'}]	{'latitude': 40.6357082, 'longitude': -74.1349...	(718) 273-2442	14173.570510	taqueria-la-roqueta-staten-island	media3.fl.yel
5499	[{'alias': 'mexican', 'title': 'Mexican'}, {'a...	{'latitude': 40.81591, 'longitude': -73.9168399}	(718) 665-3336	13913.817000	delicioso-restaurant-bronx	media2.fl.yelp
5500	[{'alias': 'mexican', 'title': 'Mexican'}]	{'latitude': 40.74225, 'longitude': -73.87199}	(718) 760-3778	11093.136080	toltecamila-taqueria-elmhurst	media1.fl.yelpc

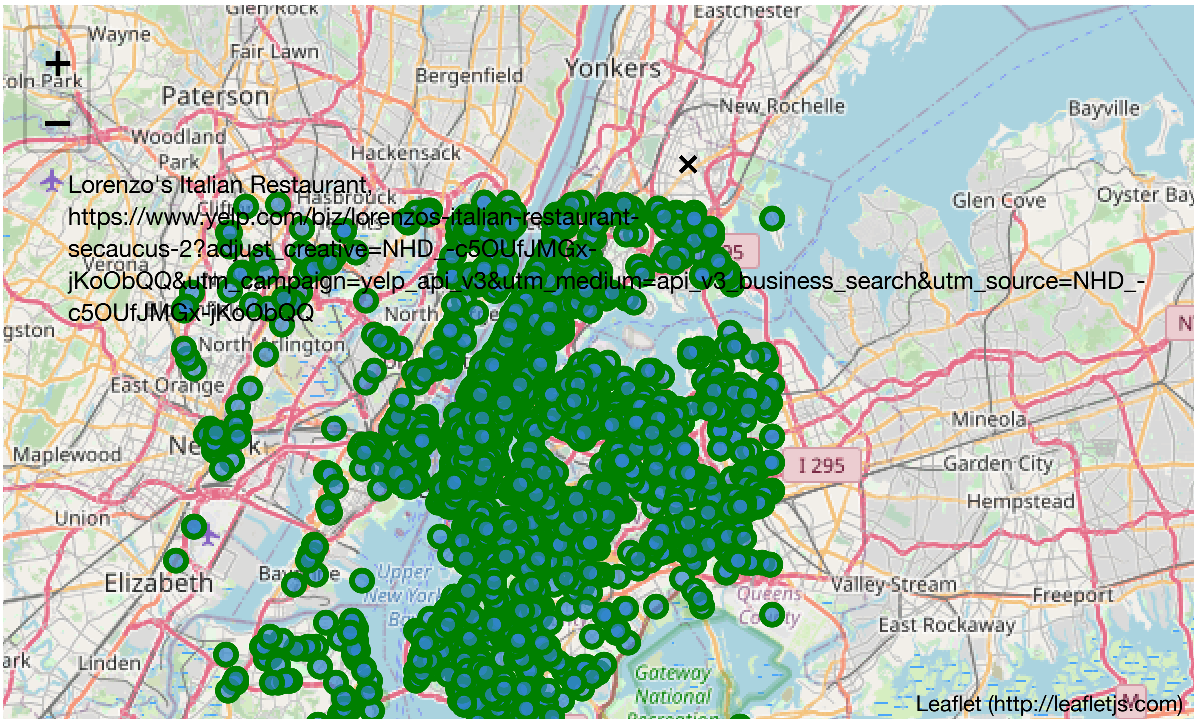
5501 rows × 18 columns

Show the restaurant’s name and URL on the map

In [7]:

```
map_yelp = folium.Map(location=[40.74220,-73.72100],zoom_start=10)
for lat,lng,name,url in zip(new_df['latitude'].astype(float),new_df['longitude']
    label = '{}, {}'.format(name, url)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
    [lat,lng],
    radius=5,
    popup=label,
    color='green',
    fill=True,
    fill_color='#3186cc',
    fill_opacity=0.7,
    parse_html=False).add_to(map_yelp)
map_yelp
```

Out[7]:

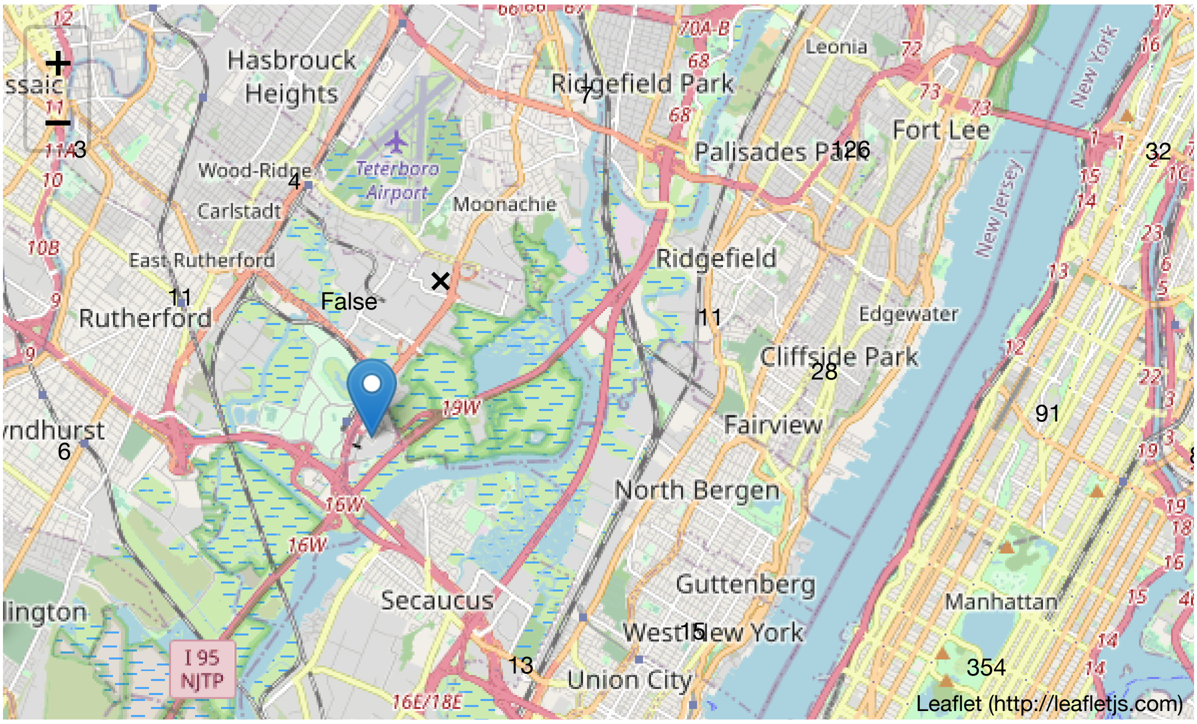

+
−
Lorenzo's Italian Restaurant, https://www.yelp.com/biz/lorenzos-italian-restaurant-secaucus-2?adjust_creative=NHD_-c5OUfJMGx-jKoObQQ&utm_campaign=yelp_api_v3&utm_medium=api_v3_business_search&utm_source=NHD_-c5OUfJMGx-jKoObQQ
×
Yonkers
Paterson
New Rochelle
Bergenfield
Hackensack
Glen Cove
Oyster Bay
Bayville
Mineola
Garden City
Hempstead
Valley Stream
Freeport
East Rockaway
Elizabeth
Linden
Union
Maplewood
East Orange
Leaflet (http://leafletjs.com)

Clustering on the map according to whether it is closed

In [8]:

```
from folium import plugins
# let's start again with a clean copy of the map of New York City
san_map = folium.Map(location = [40.74220,-73.72100], zoom_start = 10)
new_df['latitude'] = new_df['latitude'].astype(float)
new_df['longitude'] = new_df['longitude'].astype(float)
new_df['latitude'] = new_df['latitude'].astype(float)
new_df['is_closed'] = new_df['is_closed'].astype(str)
new_df1 = new_df.dropna(axis=0, subset=['latitude','longitude','is_closed'])

# instantiate a mark cluster object for the incidents in the dataframe
incidents = plugins.MarkerCluster().add_to(san_map)

# loop through the dataframe and add each data point to the mark cluster
for lat, lng, label, in zip(new_df1.latitude, new_df1.longitude, new_df1.is_clos
    folium.Marker(
        location=[lat, lng],
        icon=None,
        popup=label,
    ).add_to(incidents)

# add incidents to map
san_map.add_child(incidents)
```

Out[8]:

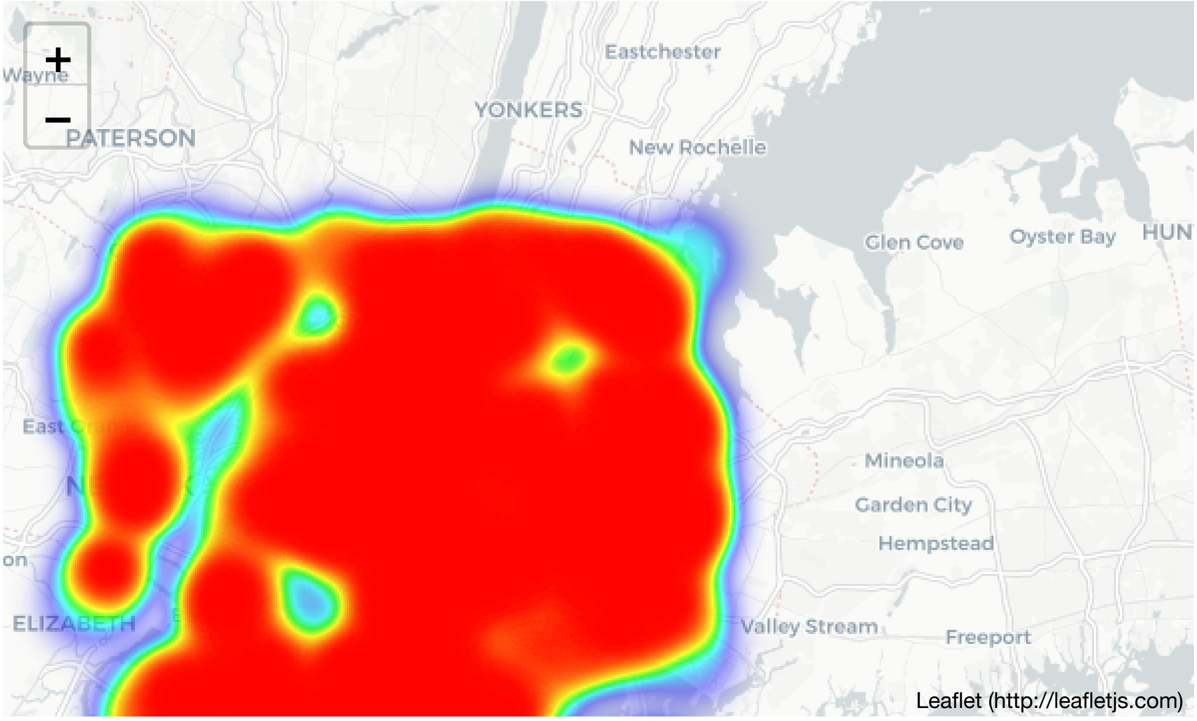


Draw a heat map on the map according to the number of reviews

In [9]:

```
from folium import plugins
from folium.plugins import HeatMap

new_df['latitude'] = new_df['latitude'].astype(float)
new_df['longitude'] = new_df['longitude'].astype(float)
new_df['review_count'] = new_df['review_count'].astype(float)

heat_df = new_df[['latitude', 'longitude', 'review_count']]
heat_df = heat_df.dropna(axis=0, subset=['latitude','longitude','review_count'])

heat_data = [[row['latitude'],row['longitude'],row['review_count']] for index, r

heatmap_city = folium.Map(location=[40.74220,-73.72100],zoom_start=10)

folium.TileLayer('cartodbpositron').add_to(heatmap_city) #cartodbpositron cartod
HeatMap(heat_data).add_to(heatmap_city)

# add the workplace marker
# folium.Marker(
#     [40.74220,-73.72100],
#     radius=5,
#     tooltip='Workplace',
#     icon=folium.Icon(icon='briefcase', color="green")
# ).add_to(heatmap_city)

# add the 5km radius
# folium.Circle([40.74220,-73.72100],
#                        radius=5000,
#                        color='red'
#                       ).add_to(heatmap_city)

heatmap_city
```

Out[9]:



Plot average rating and price by categories

In [18]:

```
import pygal as pg
from pygal.style import DarkStyle, NeonStyle, BlueStyle, DarkGreenStyle, LightCo
new_df['price'] = new_df['price'].str.len()
index = ['cat', 'price', 'rating']
clean_data = new_df[index]
avg_data = clean_data.groupby('cat').mean()
avg_data
```

Out[18]:

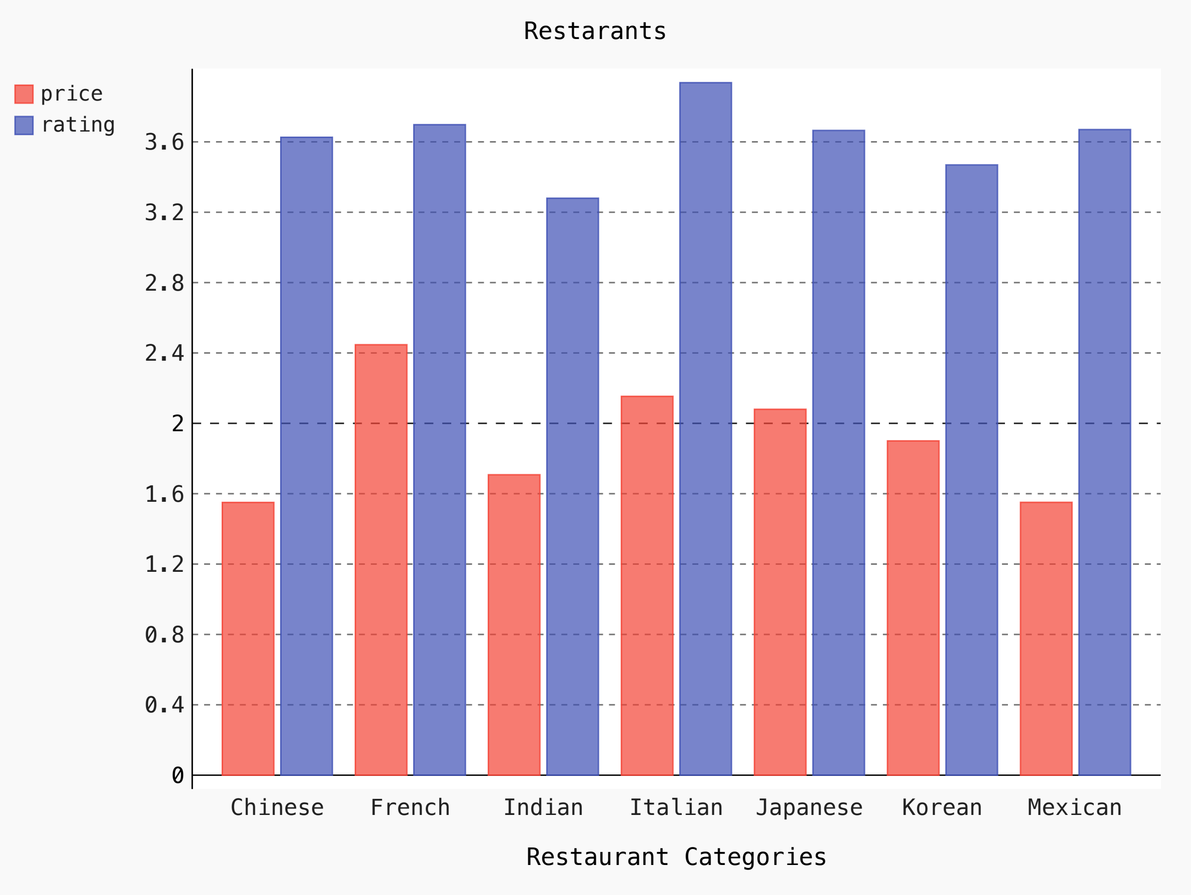
	price	rating
cat		
chinese	1.550321	3.626000
french	2.446875	3.697740
indpak	1.707724	3.279675
italian	2.153374	3.936500
japanese	2.079872	3.665000
korean	1.900232	3.468985
mexican	1.550931	3.670000

In [24]:

```
from pygal.style import Style
# Interactive Bar Chart
custom_style = Style(label_font_size = 15.0, major_label_font_size = 15)

ibar_chart = pg.Bar(x_title = 'Restaurant Categories',style = custom_style)
ibar_chart.title = 'Restarants'
ibar_chart.x_labels = ['Chinese', 'French', 'Indian', 'Italian', 'Japanese', 'Ko


for cols in avg_data.columns:
    ibar_chart.add(cols,avg_data[cols])

#galplot(ibar_chart)    ### display pygal in Jupyter notebook


ibar_chart.render_to_file('chart.svg')
```

In [25]:

```
from IPython.display import SVG, display
display(SVG(ibar_chart.render(disable_xml_declaration=True)))
#display({'image/svg+xml': ibar_chart.render()}, raw=True)
```

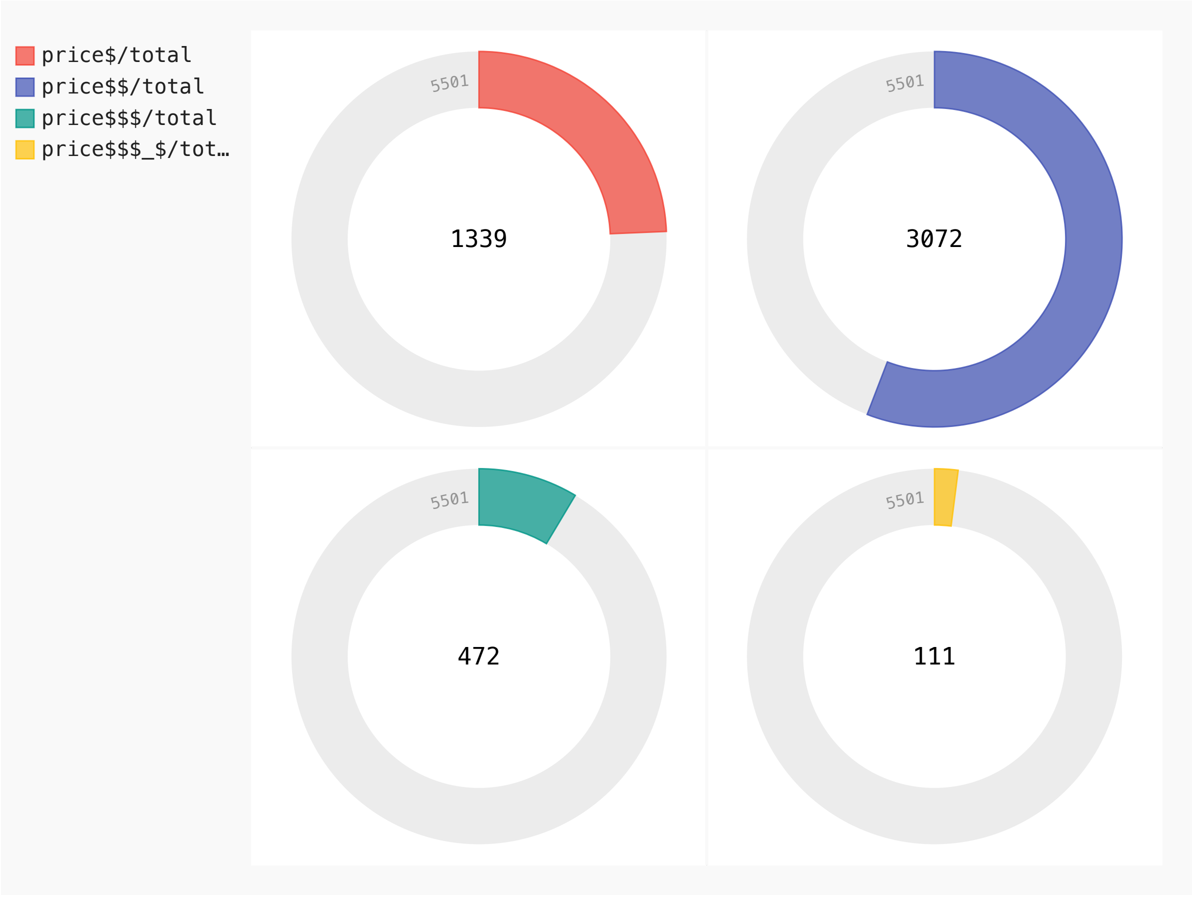


SolidGauge

In [26]:

```
clean_data.groupby(['rating']).size()
gauge = pg.SolidGauge(inner_radius=0.70)


gauge.add('price$/total', [{'value': 1339, 'max_value':5501}])
gauge.add('price$$/total', [{'value': 3072, 'max_value': 5501}])
gauge.add('price$$$/total', [{'value': 472, 'max_value': 5501}])
gauge.add('price$$$_$/total', [{'value': 111, 'max_value': 5501}])
```

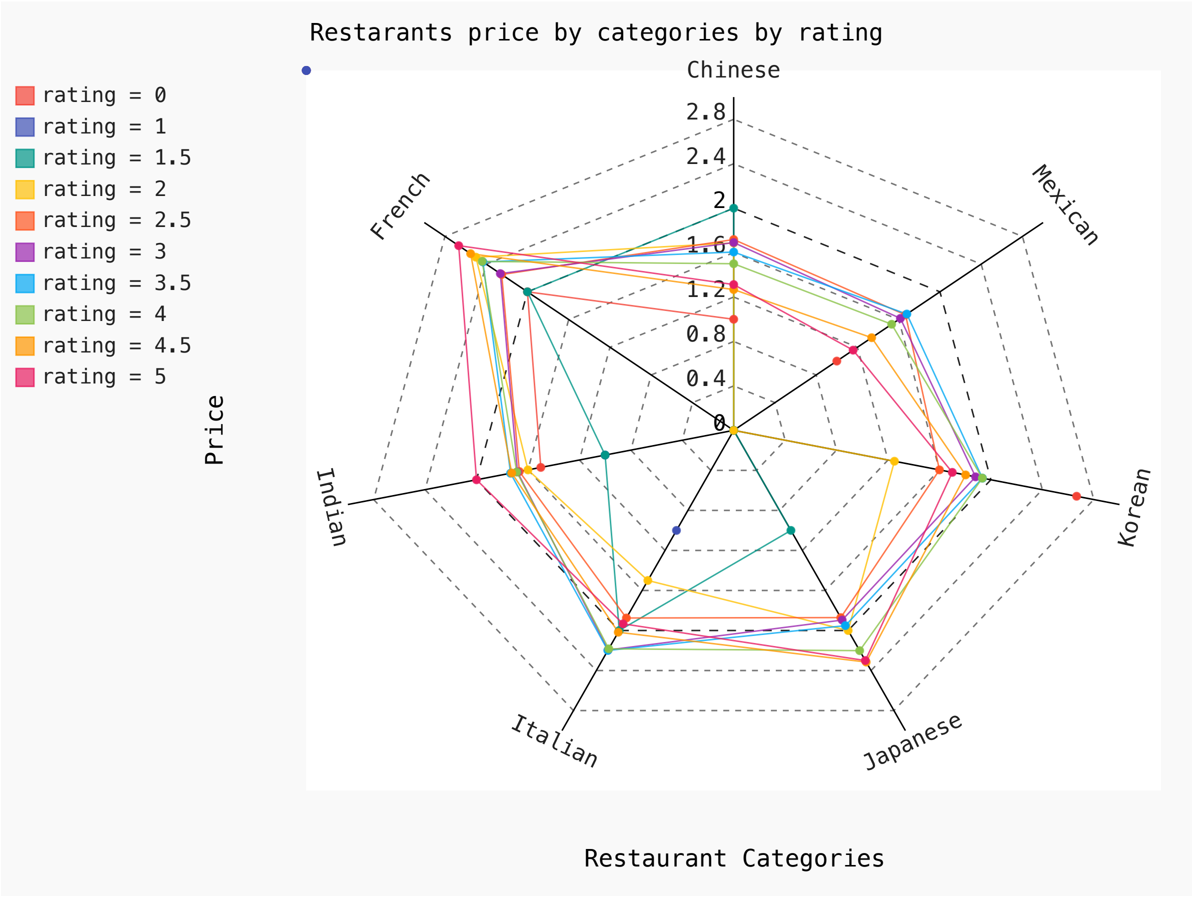
Out[26]:



Average Price by Categories by rating

In [27]:

```
new = clean_data.drop([2839,3615], axis = 0)


p_cr=new['price'].groupby([new['cat'],new['rating']]).mean()
p_cr = pd.DataFrame(p_cr)
p_cr = p_cr.reset_index(level = ['cat', 'rating'])
# p_cr[head]
custom_style = Style(label_font_size = 15.0, major_label_font_size = 15)

bar_chart = pg.Radar(x_title = 'Restaurant Categories', y_title = 'Price', style
bar_chart.title = 'Restarants price by categories by rating'
bar_chart.x_labels = ['Chinese', 'French', 'Indian', 'Italian', 'Japanese', 'Kor


bar_chart.add('rating = 0',list(p_cr[p_cr['rating'] == 0].price))
bar_chart.add('rating = 1',list(p_cr[p_cr['rating'] == 1].price))
bar_chart.add('rating = 1.5',list(p_cr[p_cr['rating'] == 1.5].price))
bar_chart.add('rating = 2',list(p_cr[p_cr['rating'] == 2].price))
bar_chart.add('rating = 2.5',list(p_cr[p_cr['rating'] == 2.5].price))
bar_chart.add('rating = 3',list(p_cr[p_cr['rating'] == 3].price))
bar_chart.add('rating = 3.5',list(p_cr[p_cr['rating'] == 3.5].price))
bar_chart.add('rating = 4',list(p_cr[p_cr['rating'] == 4].price))
bar_chart.add('rating = 4.5',list(p_cr[p_cr['rating'] == 4.5].price))
bar_chart.add('rating = 5',list(p_cr[p_cr['rating'] == 5].price))


#galplot(bar_chart)
display(SVG(bar_chart.render(disable_xml_declaration=True)))
```



In [ ]:

```

```