

```
In [11]: import pandas as pd
import numpy as np

import folium
from folium import plugins

from IPython.display import HTML
from IPython.display import IFrame
```

Folium

Now we are going to move on to folium and do very similar stuff but folium is for interactive mapping where you can place the map into a website or mail it to a friend. Again, remember mapping is buggy. But we will take our time and work through it.

Here is a good site for an overview

<https://blog.dominodatalab.com/creating-interactive-crime-maps-with-folium/>

USE LOCAL PATHS!

Here is a website I made and hosting it on github <https://bmaillou.github.io/RedHookLead/>

The first basic parts are

1. A location
2. Then you make a folium map
3. Then you display the map.

```
In [59]: location = [40.8106, -73.9630]
m = folium.Map(location=location)
m
```

Out [59]: Make this Notebook Trusted to load map: File -> Trust Notebook

Now we will add a popup with our room!

```
In [13]: location = [40.8106, -73.9630]
m = folium.Map(location=location, zoom_start=16)
folium.Marker(location, popup='Wow This is our Room!').add_to(m)
m
```

Out[13]: Make this Notebook Trusted to load map: File -> Trust Notebook

Amazing.

We put a point on our classroom and if you click the point it has a message! I want to make the maps smaller. The best way I did this was I save the map as an html file and then open the file with iframe. But they don't print! so I will comment out the lines and you can use them. It is weird.

```
In [14]: mapName='FirstMap.html'

location = [40.8106, -73.9630]
m = folium.Map(location=location, zoom_start=16)
folium.Marker(location, popup='Wow This is our Room!').add_to(m)

m #This should show the map if you comment out the next two lines
m.save(outfile=mapName) #saves to a file you can open
IFrame(mapName, width=700, height=300) #opens in notebook
```

Out [14]:



Let's look at some things we can change. We will go back to `zoom_start=6` and try a few things.

First we can change what the map looks like!

<https://deparkes.co.uk/2016/06/10/folium-map-tiles/>

Here are some example tiles.

If we do `help(folium.Map)` we will learn a lot more.

So lets see what happens if we add the keyword `tile='cartodb positron'`

They have a few other options but I stick with the base

```
In [32]: mapName='FirstMap.html'
location =[40.8106,-73.9630]
m = folium.Map(location=location, zoom_start=14, tiles="cartodb positron")
folium.Marker(location, popup='Wow This is our Room!', color='red').add_to(m)
m

#tiles="https://api.mapbox.com/v4/mapbox.streets/{z}/{x}/{y}.png?access_token=mytoken",
# attr="Mapbox attribution"
```

Out [32]: Make this Notebook Trusted to load map: File -> Trust Notebook

You can change the icon and add symbols to it. The quickstart

<http://folium.readthedocs.io/en/latest/quickstart.html> and the help will give you more information.

```
In [29]: location = [40.8106, -73.9630]
         icon=folium.Icon(color='red', icon='info-sign', icon_color='blue')
         m = folium.Map(location=location, zoom_start=16)
         folium.Marker(location, popup='Wow This is our Room!', icon=icon).add_to(m)
         m
```

Out [29]: Make this Notebook Trusted to load map: File -> Trust Notebook

In []:

```
In [35]: location = [40.8106, -73.9630]
         icon = folium.Icon(color='red', icon_color='red')
         m = folium.Map(location=location, zoom_start=16)
         folium.Marker(location, popup='Wow This is our Room!', icon=icon).add_to(m)
         m
```

Out[35]: Make this Notebook Trusted to load map: File -> Trust Notebook

Now we are going to make an interactive map of lead in Brooklyn!

- First step is we need a circle marker

```
In [11]: #help(folium.CircleMarker)
```

It looks like we need to pass

1. location
2. radius
3. fill_color
4. color
5. fill_opacity
6. popup

Lets try changing our icon to a circle

```
In [60]: location = [40.8106, -73.9630]
         m = folium.Map(location=location, zoom_start=10)
         folium.CircleMarker(location, radius=10, popup='Wow This is our Room!'
                             , color='red', fill_color='red').add_to(m)
         m
```

Out [60]: Make this Notebook Trusted to load map: File -> Trust Notebook

So let's read in the lead data

```
In [55]: df=pd.read_excel('BrooklynPublicLead.xlsx',sheet_name='PublicData')
```

```
In [56]: #df
```

This is where folium is a pain. You CAN NOT pass an array to CircleMarker. You can only pass one item at a time. So you need to for loop over each row. iterrows!

- make an iterrows for loop
- set the location
- check the lead and set the color. since we are going one at a time set the color with an if statement
- Add the name to the popup
- use your .format notation to make a name for the popup that is the sample id and lead concentration
- test the for loop and then add it to the map and call circle maker

```
In [57]: for idx, dfR in df.iterrows():
          #print('for index {} the lead is {} ppm'.format(idx,dfR['Pb']))
          # uncomment to run
```

```
File "<ipython-input-57-d7c202c192f1>", line 2
    #print('for index {} the lead is {} ppm'.format(idx,dfR['Pb']))
                                                                    ^
```

SyntaxError: unexpected EOF while parsing

```
In [58]: location =[40.725,-73.9430]
          m = folium.Map(location=location,zoom_start=14)

          for idx, dfR in df.iterrows():
              if dfR['Pb']<400:
                  color='green'
              elif dfR['Pb']<1200:
                  color='yellow'
              elif dfR['Pb']>=1200:
                  color='red'
```

```

else:
    color='blue'

location =[dfR['Latitude'],dfR['Longitude']]
text='id: {} \nPb: {:.2f} mg/kg'.format(dfR['sample_id'],dfR['Pb'])
folium.CircleMarker(location=location,radius=5,popup=text
                    ,fill=True,color=color
                    ,fill_color=color,fill_opacity=0.7).add_to(m)

plugins.LocateControl().add_to(m)
mapName='BrooklynLead.html'
m.save(outfile=mapName) #saves to a file you can open

m

```

Out [58]: Make this Notebook Trusted to load map: File -> Trust Notebook

Now you have an html file you can share!

The html is on your computer and you can turn it into a website or share

Someone asked about adding photos to the popup. here it is. This is just for reference

- I add a column in my excels saying where I store the photo on my computer
- the photos need to be small in size
- you then read in the photo. convert it. add it to the text. then add it to the popup.

```
In [44]: import base64
```

```
In [45]: df=pd.read_excel('BrooklynPublicLead.xlsx',sheet_name='withPhotos')
```

```
In [52]: #df
```

```
In [ ]: data_uri = base64.b64encode(open(filename, 'rb').read()).decode()
        html = ''.format(data_uri)
        text=text+html
        location =[sed['gps-Latitude'],sed['gps-Longitude']]
        iframe = folium.IFrame(text,
```

```
width=200,
height=300)
```

```
In [51]: location =[40.725,-73.9430]
m = folium.Map(location=location, zoom_start=14)

for idx, dfR in df.iterrows():
    if dfR['Pb'] < 400:
        color='green'
    elif dfR['Pb'] < 1200:
        color='yellow'
    elif dfR['Pb'] >= 1200:
        color='red'
    else:
        color='blue'

    location =[dfR['Latitude'], dfR['Longitude']]
    text='id: {} \nPb: {:.2f} mg/kg'.format(dfR['sample_id'], dfR['Pb'])

    ##### This adds the photo
    filename=dfR['photo']
    data_uri = base64.b64encode(open(filename, 'rb').read()).decode()
    html = ''.format(data_uri)
    text=text+html
    iframe = folium.IFrame(text,
                            width=100,
                            height=400)

    folium.CircleMarker(location=location, radius=5, popup=text
                        , fill=True, color=color, fill_color=color, fill_opacity=0.7).add_to(m)

plugins.LocateControl().add_to(m)
mapName='BrooklynLead.html'
m.save(outfile=mapName) #saves to a file you can open

m
```

Out [51]: Make this Notebook Trusted to load map: File -> Trust Notebook

In []:

In []: