GeoPandas

Data analysis with GeoPandas

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```python
import geopandas as gpd
import pandas as pd
from shapely.geometry import LineString

# for interactive maps
import folium
from folium import Choropleth, Circle, Marker
from folium.plugins import HeatMap, MarkerCluster
import math
```

GeoDataFrame which has all capabilities of Pandas DataFrame

- Basic information (Gograhical data Frame)

  gdf.info()

  gdf.columns

  gdf.shape

  gdf.dtypes

- Geospatial-Attributes

  gdf.geometry

  gdf.crs

  gdf.geom_type - provides geometry for each row (ponit, LineString, Polygon, etc.)

- Data Exploration:

  gdf.head()

  gdf.describe()

- Spatial Operation:

  gdf.area

  gdf.distance

  gdf.buffer

- Plotting

  gdf.plot()

```
data = gpd.read_file("C:\\Users\\Khurana_Kunal\\Downloads\\DEC_lands 2\\DEC_lands")
```

```
data.head()
```

	OBJECTID	CATEGORY	UNIT	FACILITY	CLASS
0	1	FOR PRES DET PAR	CFP	HANCOCK FP DETACHED PARCEL	WILD I
1	2	FOR PRES DET PAR	CFP	HANCOCK FP DETACHED PARCEL	WILD I
2	3	FOR PRES DET PAR	CFP	HANCOCK FP DETACHED PARCEL	WILD I
3	4	FOR PRES DET PAR	CFP	GREENE COUNTY FP DETACHED PARCEL	WILD I
4	6	FOREST PRESERVE	AFP	SARANAC LAKES WILD FOREST	WILD I

```
data_selected = data.loc[:, ['CLASS', 'COUNTY', 'geometry']].copy()
```

```
data_selected.CLASS.value_counts()
```

```
CLASS
WILD FOREST                  965
INTENSIVE USE                108
PRIMITIVE                     60
WILDERNESS                    52
ADMINISTRATIVE                17
UNCLASSIFIED                   7
HISTORIC                       5
```

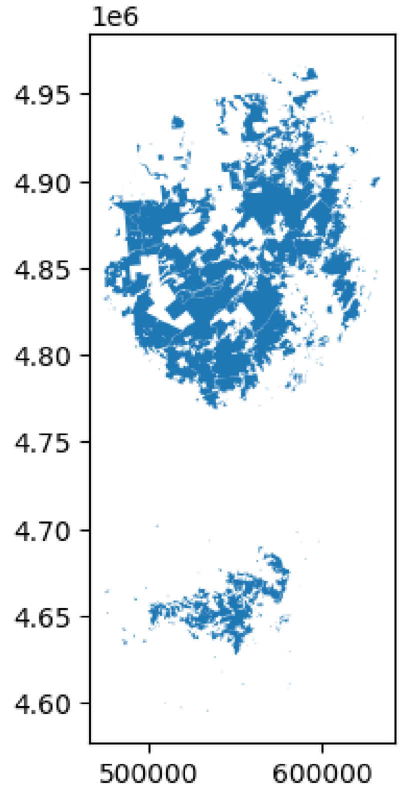
```
PRIMITIVE BICYCLE CORRIDOR      4
CANOE AREA                      1
Name: count, dtype: int64
```

```
# select lands under 'wild forest' or 'wilderness' category
wild_lands = data_selected.loc[data_selected.CLASS.isin(['WILD FOREST', 'WILDERNESS'])].co
wild_lands.head()
```

	CLASS	COUNTY	geometry
0	WILD FOREST	DELAWARE	POLYGON ((486093.245 4635308.586, 486787.235 4...
1	WILD FOREST	DELAWARE	POLYGON ((491931.514 4637416.256, 491305.424 4...
2	WILD FOREST	DELAWARE	POLYGON ((486000.287 4635834.453, 485007.550 4...
3	WILD FOREST	GREENE	POLYGON ((541716.775 4675243.268, 541217.579 4...
4	WILD FOREST	ESSEX	POLYGON ((583896.043 4909643.187, 583891.200 4...

```
wild_lands.plot()
```

```
<Axes: >
```




```
wild_lands.geometry.head()
```

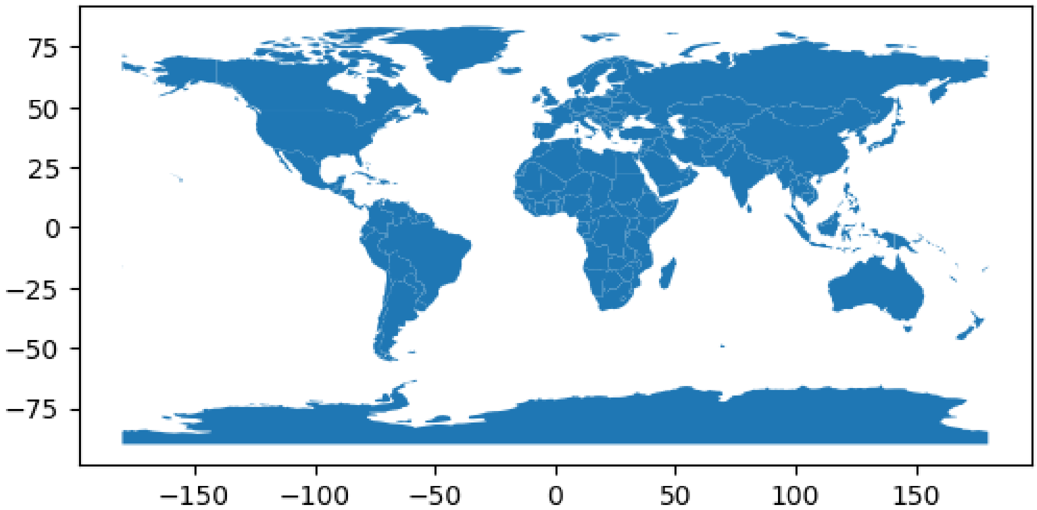
```
0    POLYGON ((486093.245 4635308.586, 486787.235 4...
1    POLYGON ((491931.514 4637416.256, 491305.424 4...
2    POLYGON ((486000.287 4635834.453, 485007.550 4...
3    POLYGON ((541716.775 4675243.268, 541217.579 4...
4    POLYGON ((583896.043 4909643.187, 583891.200 4...
Name: geometry, dtype: geometry
```

```
world_filepath ='geopandas\\ne_110m_admin_0_countries\\ne_110m_admin_0_countries.shx'
world = gpd.read_file(world_filepath)
world.head()
```

	featurecla	scalerank	LABELRANK	SOVEREIGNT	SOV_A3	ADM0_DIF	L
0	Admin-0 country	1	6	Fiji	FJI	0	2

	featurecla	scalerank	LABELRANK	SOVEREIGNT	SOV_A3	ADM0_DIF	I
1	Admin-0 country	1	3	United Republic of Tanzania	TZA	0	2
2	Admin-0 country	1	7	Western Sahara	SAH	0	2
3	Admin-0 country	1	2	Canada	CAN	0	2
4	Admin-0 country	1	2	United States of America	US1	1	2

```
ax = world.plot()
```




```
#plotting a map with coordinates
ax = world.plot(figsize=(20,20), color='whitesmoke', linestyle=':', edgecolor='black')
```


```python
PHL_loans = data.loc[data.COUNTY=="Philippines"].copy()
```

```python
print(world.columns)
```

```
Index(['featurecla', 'scalerank', 'LABELRANK', 'SOVEREIGNT', 'SOV_A3',
       'ADM0_DIF', 'LEVEL', 'TYPE', 'TLC', 'ADMIN',
       ...
       'FCLASS_TR', 'FCLASS_ID', 'FCLASS_PL', 'FCLASS_GR', 'FCLASS_IT',
       'FCLASS_NL', 'FCLASS_SE', 'FCLASS_BD', 'FCLASS_UA', 'geometry'],
      dtype='object', length=169)
```

```python
world.info()
```

```
<class 'geopandas.geodataframe.GeoDataFrame'>
RangeIndex: 177 entries, 0 to 176
Columns: 169 entries, featurecla to geometry
dtypes: float64(6), geometry(1), int64(25), object(137)
memory usage: 233.8+ KB
```

```python
world.head()
```

	featurecla	scalerank	LABELRANK	SOVEREIGNT	SOV_A3	ADM0_DIF	I
0	Admin-0 country	1	6	Fiji	FJI	0	2
1	Admin-0 country	1	3	United Republic of Tanzania	TZA	0	2
2	Admin-0 country	1	7	Western Sahara	SAH	0	2
3	Admin-0 country	1	2	Canada	CAN	0	2
4	Admin-0 country	1	2	United States of America	US1	1	2

Coordinate Reference Systems

- shape file imports CRS automatically
- settings (DataFrame uses **EPSG 32630**; csv file uses **EPSG 4326**)

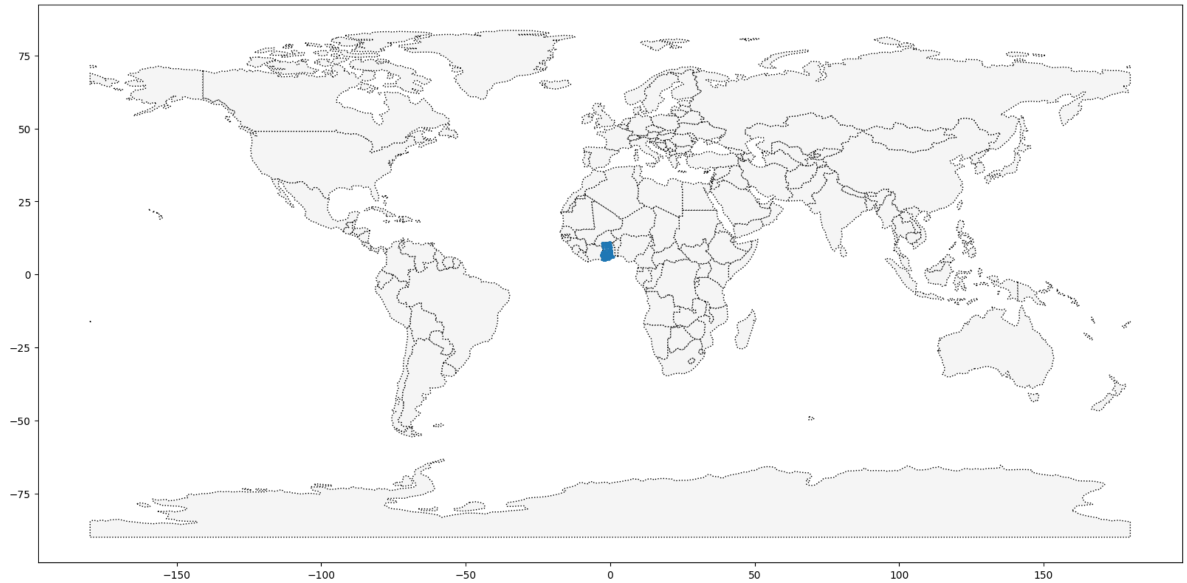
```
facilities_df = pd.read_csv('geopandas\health_facilities.csv')

# convert to GeoDataFrame
facilities = gpd.GeoDataFrame(facilities_df, geometry = gpd.points_from_xy
                              (facilities_df.Longitude, facilities_df.Latitude))

# set CRS
facilities.crs = ('epsg:4326')

#view first 5 rows
facilities.head()
```

	Region	District	FacilityName	Type	Town	Ownership
0	Ashanti	Offinso North	A.M.E Zion Clinic	Clinic	Afrancho	CHAG
1	Ashanti	Bekwai Municipal	Abenkyiman Clinic	Clinic	Anwiankwanta	Private
2	Ashanti	Adansi North	Aboabo Health Centre	Health Centre	Aboabo No 2	Government
3	Ashanti	Afigya-Kwabre	Aboabogya Health Centre	Health Centre	Aboabogya	Government
4	Ashanti	Kwabre	Aboaso Health Centre	Health Centre	Aboaso	Government

```
# plotting facilities of Ghana on world map
ax = world.plot(figsize=(20,20), color='whitesmoke', linestyle=':', edgecolor='black')
facilities.to_crs(epsg=4326).plot(markersize=.25, ax=ax)
```

```
C:\Users\Khurana_Kunal\anaconda3\Lib\site-packages\shapely\measurement.py:103: RuntimeWarning
  return lib.bounds(geometry_arr, out=out, **kwargs)
```

```
<Axes: >
```




```
#get the x coordinates of each point
facilities.geometry.head().x
```

```
0   -1.96317
1   -1.58592
2   -1.34982
3   -1.61098
4   -1.61098
dtype: float64
```

```
birds_df = pd.read_csv("data_for_all_courses\purple_martin.csv")
birds_df.head()
```

	timestamp	location-long	location-lat	tag-local-identifier
0	2014-08-15 05:56:00	-88.146014	17.513049	30448
1	2014-09-01 05:59:00	-85.243501	13.095782	30448
2	2014-10-30 23:58:00	-62.906089	-7.852436	30448
3	2014-11-15 04:59:00	-61.776826	-11.723898	30448
4	2014-11-30 09:59:00	-61.241538	-11.612237	30448

```
print(f"There are {birds_df['tag-local-identifier'].nunique()} different birds in the data
```

```
There are 11 different birds in the dataset.
```

```
birds = gpd.GeoDataFrame(birds_df,
                         geometry = gpd.points_from_xy(birds_df["location-long"],
                                                       birds_df['location-lat']))
birds.head()
```

	timestamp	location-long	location-lat	tag-local-identifier	geometry
0	2014-08-15 05:56:00	-88.146014	17.513049	30448	POINT (-88.14601 17.51305)
1	2014-09-01 05:59:00	-85.243501	13.095782	30448	POINT (-85.24350 13.09578)
2	2014-10-30 23:58:00	-62.906089	-7.852436	30448	POINT (-62.90609 -7.85244)
3	2014-11-15 04:59:00	-61.776826	-11.723898	30448	POINT (-61.77683 -11.72390)
4	2014-11-30 09:59:00	-61.241538	-11.612237	30448	POINT (-61.24154 -11.61224)

```
# set the CRS

birds.crs = ('epsg:4326')
```

```
# plot the data
americas = world.loc[world['CONTINENT'].isin(['North America', 'South America',])]
americas.head()
```

	featurecla	scalerank	LABELRANK	SOVEREIGNT	SOV_A3	ADM0_DIF	LE
3	Admin-0 country	1	2	Canada	CAN	0	2
4	Admin-0 country	1	2	United States of America	US1	1	2
9	Admin-0 country	1	2	Argentina	ARG	0	2
10	Admin-0 country	1	2	Chile	CHL	0	2
16	Admin-0 country	1	5	Haiti	HTI	0	2

```
world.head()
```

	featurecla	scalerank	LABELRANK	SOVEREIGNT	SOV_A3	ADM0_DIF	I
0	Admin-0 country	1	6	Fiji	FJI	0	2

	featurecla	scalerank	LABELRANK	SOVEREIGNT	SOV_A3	ADM0_DIF	L
1	Admin-0 country	1	3	United Republic of Tanzania	TZA	0	2
2	Admin-0 country	1	7	Western Sahara	SAH	0	2
3	Admin-0 country	1	2	Canada	CAN	0	2
4	Admin-0 country	1	2	United States of America	US1	1	2

```
# checking for all the columns in a data frame with for loop
for column in world.columns:
    print(column)
```

```
featurecla
scalerank
LABELRANK
SOVEREIGNT
SOV_A3
ADM0_DIF
LEVEL
TYPE
TLC
ADMIN
ADM0_A3
GEOU_DIF
GEOUNIT
GU_A3
SU_DIF
SUBUNIT
SU_A3
BRK_DIFF
NAME
NAME_LONG
BRK_A3
BRK_NAME
BRK_GROUP
ABBREV
POSTAL
FORMAL_EN
FORMAL_FR
NAME_CIAWF
NOTE_ADM0
NOTE_BRK
```

```
NAME_SORT
NAME_ALT
MAPCOLOR7
MAPCOLOR8
MAPCOLOR9
MAPCOLOR13
POP_EST
POP_RANK
POP_YEAR
GDP_MD
GDP_YEAR
ECONOMY
INCOME_GRP
FIPS_10
ISO_A2
ISO_A2_EH
ISO_A3
ISO_A3_EH
ISO_N3
ISO_N3_EH
UN_A3
WB_A2
WB_A3
WOE_ID
WOE_ID_EH
WOE_NOTE
ADM0_ISO
ADM0_DIFF
ADM0_TLC
ADM0_A3_US
ADM0_A3_FR
ADM0_A3_RU
ADM0_A3_ES
ADM0_A3_CN
ADM0_A3_TW
ADM0_A3_IN
ADM0_A3_NP
ADM0_A3_PK
ADM0_A3_DE
ADM0_A3_GB
ADM0_A3_BR
ADM0_A3_IL
ADM0_A3_PS
```

ADM0_A3_SA
ADM0_A3_EG
ADM0_A3_MA
ADM0_A3_PT
ADM0_A3_AR
ADM0_A3_JP
ADM0_A3_KO
ADM0_A3_VN
ADM0_A3_TR
ADM0_A3_ID
ADM0_A3_PL
ADM0_A3_GR
ADM0_A3_IT
ADM0_A3_NL
ADM0_A3_SE
ADM0_A3_BD
ADM0_A3_UA
ADM0_A3_UN
ADM0_A3_WB
CONTINENT
REGION_UN
SUBREGION
REGION_WB
NAME_LEN
LONG_LEN
ABBREV_LEN
TINY
HOMEPART
MIN_ZOOM
MIN_LABEL
MAX_LABEL
LABEL_X
LABEL_Y
NE_ID
WIKIDATAID
NAME_AR
NAME_BN
NAME_DE
NAME_EN
NAME_ES
NAME_FA
NAME_FR
NAME_EL

NAME_HE
NAME_HI
NAME_HU
NAME_ID
NAME_IT
NAME_JA
NAME_KO
NAME_NL
NAME_PL
NAME_PT
NAME_RU
NAME_SV
NAME_TR
NAME_UK
NAME_UR
NAME_VI
NAME_ZH
NAME_ZHT
FCLASS_ISO
TLC_DIFF
FCLASS_TLC
FCLASS_US
FCLASS_FR
FCLASS_RU
FCLASS_ES
FCLASS_CN
FCLASS_TW
FCLASS_IN
FCLASS_NP
FCLASS_PK
FCLASS_DE
FCLASS_GB
FCLASS_BR
FCLASS_IL
FCLASS_PS
FCLASS_SA
FCLASS_EG
FCLASS_MA
FCLASS_PT
FCLASS_AR
FCLASS_JP
FCLASS_KO
FCLASS_VN

```
FCLASS_TR
FCLASS_ID
FCLASS_PL
FCLASS_GR
FCLASS_IT
FCLASS_NL
FCLASS_SE
FCLASS_BD
FCLASS_UA
geometry
```

```
# plot americas
ax_americas = americas.plot(figsize=(10,10), color='whitesmoke', linestyle=':', edgecolor=
```

Starting and end journey of birds

```
# GeoDataFrame showing path for each bird
path_df = birds.groupby("tag-local-identifier")['geometry'].apply(list).apply(lambda x: Li
path_gdf = gpd.GeoDataFrame(path_df, geometry = path_df.geometry)
path_gdf.crs = ('epsg:4326')

# GeoDataFrame showing starting point for each bird
start_df = birds.groupby("tag-local-identifier")['geometry'].apply(list).apply(lambda x: x
start_gdf = gpd.GeoDataFrame(start_df, geometry = start_df.geometry)
```

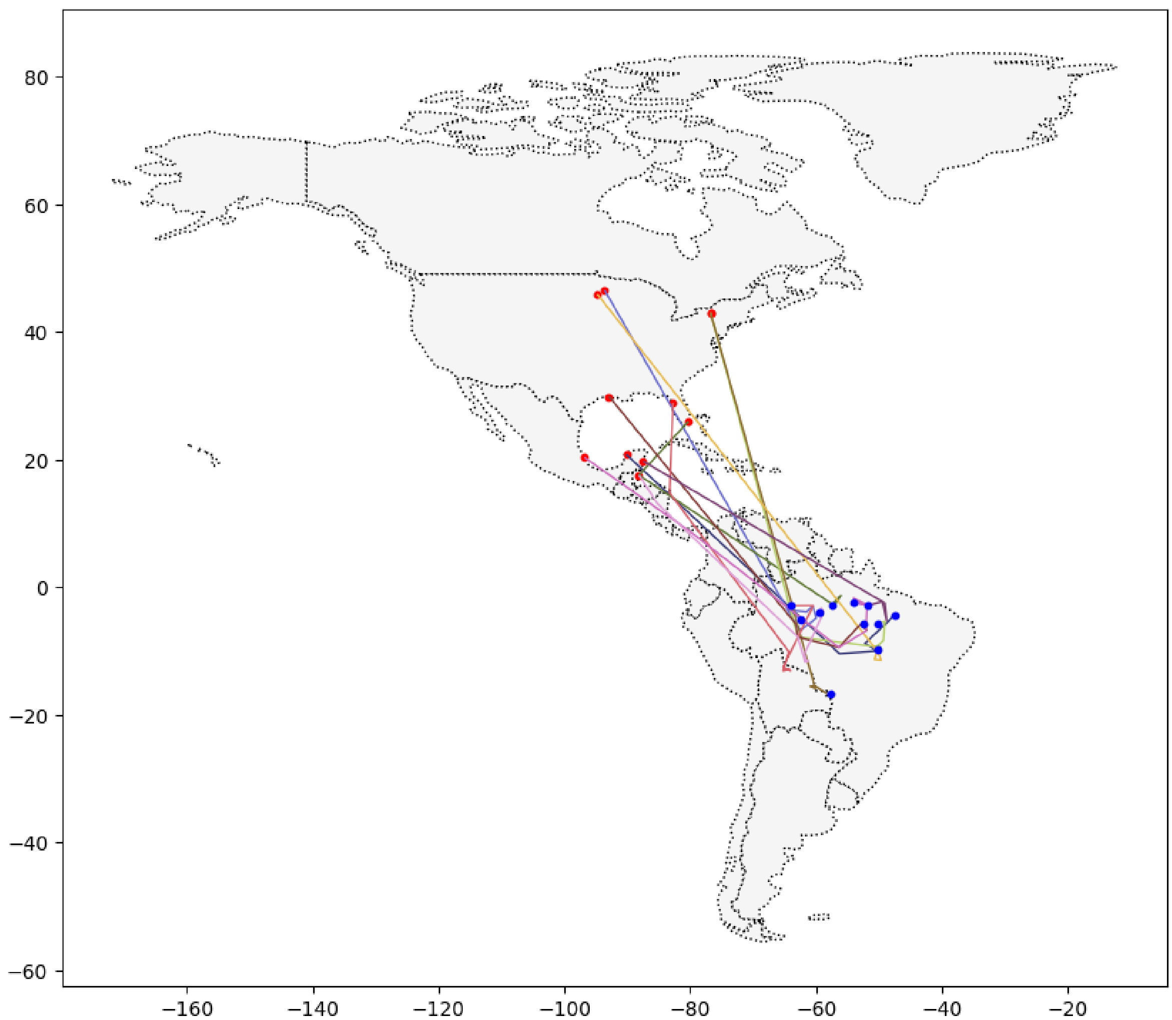
```
start_gdf.crs = ('epsg:4326')

# Show first five rows of GeoDataFrame
start_gdf.head()
```

	tag-local-identifier	geometry
0	30048	POINT (-90.12992 20.73242)
1	30054	POINT (-93.60861 46.50563)
2	30198	POINT (-80.31036 25.92545)
3	30263	POINT (-76.78146 42.99209)
4	30275	POINT (-76.78213 42.99207)

```
# end point of each bird
end_df = birds.groupby("tag-local-identifier")['geometry'].apply(list).apply(lambda x: x[-
end_gdf = gpd.GeoDataFrame(end_df, geometry = end_df.geometry)
end_gdf.crs = ('epsg:4326')
```

```
# plot americas
ax_americas = americas.plot(figsize=(10,10), color='whitesmoke', linestyle=':', edgecolor=

start_gdf.plot(ax = ax_americas, color = 'red', markersize = 10)
path_gdf.plot(ax = ax_americas, cmap = 'tab20b', linestyle= '-', linewidth = 1, zorder = 1
end_gdf.plot(ax = ax_americas, color = 'blue', markersize = 10)
```

```
<Axes: >
```




```
# no file found; gives 'Driver Error' - à voir plustard
protected_filepath = 'data_for_all_courses/add_0.shp'
protected_area = gpd.read_file(protected_filepath)
```

Interactive maps

```
# Create a map
montréal_1 = folium.Map(location=[45.50, -73.56], tiles='openstreetmap', zoom_start=10)


# Display the map
montréal_1
```

```
<folium.folium.Map at 0x1dc44f1ac10>
```

```
# crimes

crimes = pd.read_csv("data_for_all_courses\crime.csv", encoding = 'latin-1')
crimes.describe()
```

	OFFENSE_CODE	YEAR	MONTH	HOUR	Lat	Long
count	319073.000000	319073.000000	319073.000000	319073.000000	299074.000000	299074.00000
mean	2317.546956	2016.560586	6.609719	13.118205	42.214381	-70.908272
std	1185.285543	0.996344	3.273691	6.294205	2.159766	3.493618
min	111.000000	2015.000000	1.000000	0.000000	-1.000000	-71.178674
25%	1001.000000	2016.000000	4.000000	9.000000	42.297442	-71.097135
50%	2907.000000	2017.000000	7.000000	14.000000	42.325538	-71.077524
75%	3201.000000	2017.000000	9.000000	18.000000	42.348624	-71.062467
max	3831.000000	2018.000000	12.000000	23.000000	42.395042	-1.000000

```
crimes.head()
```

	INCIDENT_NUMBER	OFFENSE_CODE	OFFENSE_CODE_GROUP	OFFENSE_DESCRIPTIO
0	I182070945	619	Larceny	LARCENY ALL OTHERS
1	I182070943	1402	Vandalism	VANDALISM
2	I182070941	3410	Towed	TOWED MOTOR VEHIC
3	I182070940	3114	Investigate Property	INVESTIGATE PROPER
4	I182070938	3114	Investigate Property	INVESTIGATE PROPER

```
# drop missing locations
crimes.dropna(subset= ['Lat', 'Long', 'DISTRICT'], inplace = True)
```

```
# focus on major crimes
crimes = crimes[crimes.OFFENSE_CODE_GROUP.isin([
    'Larceny', 'Auto Theft', 'Robbery', 'Larceny From Motor Vehicle', 'Residential Burglar
    'Simple Assault', 'Harassment', 'Ballistics', 'Aggravated Assault', 'Other Burglary',
    'Arson', 'Commercial Burglary'
])]

crimes = crimes[crimes.YEAR>=2018]

crimes.head()
```

	INCIDENT_NUMBER	OFFENSE_CODE	OFFENSE_CODE_GROUP	OFFENSE_DESCRIPTIO
0	I182070945	619	Larceny	LARCENY ALL OTHER
6	I182070933	724	Auto Theft	AUTO THEFT
8	I182070931	301	Robbery	ROBBERY - STREET
19	I182070915	614	Larceny From Motor Vehicle	LARCENY THEFT FRO
24	I182070908	522	Residential Burglary	BURGLARY - RESIDEN

```
# crimes between 9 to 18

daytime_robberies = crimes[((crimes.OFFENSE_CODE_GROUP == 'Robbery') &
                            crimes.HOUR.isin(range(9,18)))]
```

```
# create a map

map2 = folium.Map(location=[42.32,-71.0589], tiles='openstreetmap', zoom_start=13)

# add points
for idx, row in daytime_robberies.iterrows():
    Marker([row['Lat'], row['Long']]).add_to(map2)


# display
map2
```

```
<folium.folium.Map at 0x1dc4a4b6210>
```

folium.plugin.MarkerCluster

```
# plotting points
m_3 = folium.Map(location= [42.32,-71.0589], tiles='cartodbpositron', zoom_start=13)

# add points
mc = MarkerCluster()
for idx, row in daytime_robberies.iterrows():
    if not math.isnan(row['Long']) and not math.isnan(row['Lat']):
        mc.add_child(Marker([row['Lat'], row['Long']]))
m_3.add_child(mc)
```

```
<folium.folium.Map at 0x1dc4b900ad0>
```

Bubble maps

```
# create a base map

m_4 = folium.Map(location=[42.32,-71.0589], tiles='cartodbpositron', zoom_start=11)

def color_producer(val):
    if val >=12:
        return 'forestgreen'
    else:
        return 'darkred'

# add bubble map to the base map
for i in range(0, len(daytime_robberies)):
    Circle(
    location = [daytime_robberies.iloc[i]['Lat'],
                daytime_robberies.iloc[i]['Long']],
    radius = 20,
    color = color_producer(daytime_robberies.iloc[i]['HOUR'])).add_to(m_4)

# display
m_4
```

```
<folium.folium.Map at 0x1dc4739cc10>
```

Heatmaps

```
# basemaps
m_5 = folium.Map(location=[42.32,-71.0589], tiles='cartodbpositron', zoom_start=11)

# add heatmaps to the base map
HeatMap(data= crimes[['Lat', 'Long']], radius = 10).add_to(m_5)

# display
m_5
```

```
<folium.folium.Map at 0x1dc4a314590>
```

Choropleth maps

```
help(folium.Choropleth)
```

```
Help on class Choropleth in module folium.features:

class Choropleth(folium.map.FeatureGroup)
 |  Choropleth(geo_data: Any, data: Optional[Any] = None, columns: Optional[Sequence[Any]] =
 |
 |  Apply a GeoJSON overlay to the map.
 |
 |  Plot a GeoJSON overlay on the base map. There is no requirement
 |  to bind data (passing just a GeoJSON plots a single-color overlay),
 |  but there is a data binding option to map your columnar data to
 |  different feature objects with a color scale.
 |
 |  If data is passed as a Pandas DataFrame, the "columns" and "key-on"
 |  keywords must be included, the first to indicate which DataFrame
 |  columns to use, the second to indicate the layer in the GeoJSON
 |  on which to key the data. The 'columns' keyword does not need to be
 |  passed for a Pandas series.
 |
 |  Colors are generated from color brewer (https://colorbrewer2.org/)
 |  sequential palettes. By default, linear binning is used between
 |  the min and the max of the values. Custom binning can be achieved
 |  with the `bins` parameter.
```

```
|
|  TopoJSONs can be passed as "geo_data", but the "topojson" keyword must
|  also be passed with the reference to the topojson objects to convert.
|  See the topojson.feature method in the TopoJSON API reference:
|  https://github.com/topojson/topojson/wiki/API-Reference
|
|
|  Parameters
|  ----------
|  geo_data: string/object
|      URL, file path, or data (json, dict, geopandas, etc) to your GeoJSON
|      geometries
|  data: Pandas DataFrame or Series, default None
|      Data to bind to the GeoJSON.
|  columns: tuple with two values, default None
|      If the data is a Pandas DataFrame, the columns of data to be bound.
|      Must pass column 1 as the key, and column 2 the values.
|  key_on: string, default None
|      Variable in the `geo_data` GeoJSON file to bind the data to. Must
|      start with 'feature' and be in JavaScript objection notation.
|      Ex: 'feature.id' or 'feature.properties.statename'.
|  bins: int or sequence of scalars or str, default 6
|      If `bins` is an int, it defines the number of equal-width
|      bins between the min and the max of the values.
|      If `bins` is a sequence, it directly defines the bin edges.
|      For more information on this parameter, have a look at
|      numpy.histogram function.
|  fill_color: string, optional
|      Area fill color, defaults to blue. Can pass a hex code, color name,
|      or if you are binding data, one of the following color brewer palettes:
|      'BuGn', 'BuPu', 'GnBu', 'OrRd', 'PuBu', 'PuBuGn', 'PuRd', 'RdPu',
|      'YlGn', 'YlGnBu', 'YlOrBr', and 'YlOrRd'.
|  nan_fill_color: string, default 'black'
|      Area fill color for nan or missing values.
|      Can pass a hex code, color name.
|  fill_opacity: float, default 0.6
|      Area fill opacity, range 0-1.
|  nan_fill_opacity: float, default fill_opacity
|      Area fill opacity for nan or missing values, range 0-1.
|  line_color: string, default 'black'
|      GeoJSON geopath line color.
|  line_weight: int, default 1
|      GeoJSON geopath line weight.
```

```
|  line_opacity: float, default 1
|      GeoJSON geopath line opacity, range 0-1.
|  legend_name: string, default empty string
|      Title for data legend.
|  topojson: string, default None
|      If using a TopoJSON, passing "objects.yourfeature" to the topojson
|      keyword argument will enable conversion to GeoJSON.
|  smooth_factor: float, default None
|      How much to simplify the polyline on each zoom level. More means
|      better performance and smoother look, and less means more accurate
|      representation. Leaflet defaults to 1.0.
|  highlight: boolean, default False
|      Enable highlight functionality when hovering over a GeoJSON area.
|  use_jenks: bool, default False
|      Use jenkspy to calculate bins using "natural breaks"
|      (Fisher-Jenks algorithm). This is useful when your data is unevenly
|      distributed.
|  name : string, optional
|      The name of the layer, as it will appear in LayerControls
|  overlay : bool, default True
|      Adds the layer as an optional overlay (True) or the base layer (False).
|  control : bool, default True
|      Whether the Layer will be included in LayerControls.
|  show: bool, default True
|      Whether the layer will be shown on opening.
|
|  Returns
|  -------
|  GeoJSON data layer in obj.template_vars
|
|  Examples
|  --------
|  >>> Choropleth(geo_data="us-states.json", line_color="blue", line_weight=3)
|  >>> Choropleth(
|  ...     geo_data="geo.json",
|  ...     data=df,
|  ...     columns=["Data 1", "Data 2"],
|  ...     key_on="feature.properties.myvalue",
|  ...     fill_color="PuBu",
|  ...     bins=[0, 20, 30, 40, 50, 60],
|  ... )
|  >>> Choropleth(geo_data="countries.json", topojson="objects.countries")
|  >>> Choropleth(
```

```
|  ...     geo_data="geo.json",
|  ...     data=df,
|  ...     columns=["Data 1", "Data 2"],
|  ...     key_on="feature.properties.myvalue",
|  ...     fill_color="PuBu",
|  ...     bins=[0, 20, 30, 40, 50, 60],
|  ...     highlight=True,
|  ... )
|
|  Method resolution order:
|      Choropleth
|      folium.map.FeatureGroup
|      folium.map.Layer
|      branca.element.MacroElement
|      branca.element.Element
|      builtins.object
|
|  Methods defined here:
|
|  __init__(self, geo_data: Any, data: Optional[Any] = None, columns: Optional[Sequence[Any]
|      Initialize self.  See help(type(self)) for accurate signature.
|
|  render(self, **kwargs) -> None
|      Render the GeoJson/TopoJson and color scale objects.
|
|  ----------------------------------------------------------------------
|  Methods inherited from branca.element.Element:
|
|  __getstate__(self)
|      Modify object state when pickling the object.
|      jinja2 Environment cannot be pickled, so set
|      the ._env attribute to None. This will be added back
|      when unpickling (see __setstate__)
|
|  __setstate__(self, state: dict)
|      Re-add ._env attribute when unpickling
|
|  add_child(self, child, name=None, index=None)
|      Add a child.
|
|  add_children(self, child, name=None, index=None)
|      Add a child.
|
```

```
 |  add_to(self, parent, name=None, index=None)
 |      Add element to a parent.
 |
 |  get_bounds(self)
 |      Computes the bounds of the object and all it's children
 |      in the form [[lat_min, lon_min], [lat_max, lon_max]].
 |
 |  get_name(self)
 |      Returns a string representation of the object.
 |      This string has to be unique and to be a python and
 |      javascript-compatible
 |      variable name.
 |
 |  get_root(self)
 |      Returns the root of the elements tree.
 |
 |  save(self, outfile, close_file=True, **kwargs)
 |      Saves an Element into a file.
 |
 |      Parameters
 |      ----------
 |      outfile : str or file object
 |          The file (or filename) where you want to output the html.
 |      close_file : bool, default True
 |          Whether the file has to be closed after write.
 |
 |  to_dict(self, depth=-1, ordered=True, **kwargs)
 |      Returns a dict representation of the object.
 |
 |  to_json(self, depth=-1, **kwargs)
 |      Returns a JSON representation of the object.
 |
 |  ----------------------------------------------------------------------
 |  Data descriptors inherited from branca.element.Element:
 |
 |  __dict__
 |      dictionary for instance variables (if defined)
 |
 |  __weakref__
 |      list of weak references to the object (if defined)
```