

assignment_six

March 12, 2023

0.1 Timothy Miller

0.2 GTECH 73100, Dr. Sun

1 Assignment Six

1.1 Task 1

Install `geopandas` and other required packages

```
[ ]: import geopandas as gpd
import matplotlib.pyplot as plt
```

1.2 Task 2

- Find three sets of spatial data
- Import the data into GeoDataFrame using `geopandas`
- Take one dataset and show the specific types of:
 - the entire dataframe
 - the geometry column
 - individual geometry object
- Export all three GeoDataFrames into a single geopackage

Read the data files, automatically coerced into GeoDataFrame

```
[ ]: bus_routes_express = gpd.read_file(
    "data/express_bus_routes_nyc_nov2020/express_bus_routes_nyc_nov2020.shp"
)
bus_stops_express = gpd.read_file(
    "data/express_bus_stops_nyc_nov2020/express_bus_stops_nyc_nov2020.shp"
)

ages = gpd.read_file("data/boi_select_ages_tract_borders.geojson")
```

1.2.1 Show the types of the express bus routes data

whole data

```
[ ]: bus_stops_express.head()
```

```
[ ]:      stop_id      stop_name  stop_lat  stop_lon  GEOID  \
0    200008    RICHMOND TER/SOUTH AV  40.640108 -74.165755  36085
1    200097    MIDLAND AV/KISWICK ST  40.574051 -74.096488  36085
2    200102  FR CAPODANNO BL/HUNTER AV  40.572924 -74.087670  36085
3    200104  FR CAPODANNO BL/SIOUX ST  40.575144 -74.083856  36085
4    200115  FR CAPODANNO BL/SAND LA  40.590397 -74.066399  36085
```

```
      NAMELSAD      geometry
0  Richmond County  POINT (938248.054 172528.505)
1  Richmond County  POINT (957445.189 148433.469)
2  Richmond County  POINT (959894.458 148020.300)
3  Richmond County  POINT (960954.797 148828.064)
4  Richmond County  POINT (965808.564 154380.952)
```

```
[ ]: type(bus_stops_express.head())
```

```
[ ]: geopandas.geodataframe.GeoDataFrame
```

```
[ ]: for field in bus_stops_express:
      print(type(bus_stops_express[field][0]))
```

```
<class 'numpy.int64'>
<class 'str'>
<class 'numpy.float64'>
<class 'numpy.float64'>
<class 'str'>
<class 'str'>
<class 'shapely.geometry.point.Point'>
```

```
[ ]: bus_routes_express.dtypes
```

```
[ ]: route_id      object
     route_dir     object
     route_shor    object
     route_long    object
     color          object
     geometry       geometry
     dtype: object
```

geometry field

```
[ ]: type(bus_stops_express)
```

```
[ ]: geopandas.geodataframe.GeoDataFrame
```

```
[ ]: bus_stops_express.geometry.dtypes
```

```
[ ]: <geopandas.array.GeometryDtype at 0x7f9bc2dfcaf0>
```

individual geometry object

```
[ ]: type(bus_stops_express.geometry[0])
```

```
[ ]: shapely.geometry.point.Point
```

1.2.2 Export to single geopackage

```
[ ]: bus_routes_express.to_file(
      "data/package.gpkg", layer="bus_routes_express", driver="GPKG"
    )
bus_stops_express.to_file("data/package.gpkg", layer="bus_stops_express",
    ↪driver="GPKG")
ages.to_file("data/package.gpkg", layer="ages", driver="GPKG")
```

1.3 Task 3

- Use basic web mapping methods in geopandas to visualize the data.
(The plot has bus data for all five boroughs but it excludes the age data for Staten Island. This is because I am actively working with this data and it's in awkward stage.)

```
[ ]: common_crs = 4326
fig, ax = plt.subplots()
ax.set_aspect('equal')
ages.plot(ax=ax, column="tot_pop_over_65_est", zorder=0, legend=True,
    ↪legend_kwds={
      'label': 'Total Population of People over 65',
      'orientation': 'horizontal'
    })
bus_routes_express.to_crs(common_crs).plot(ax=ax, color="green", linewidth=0.75,
    ↪zorder=1)
bus_stops_express.to_crs(common_crs).plot(ax=ax, color="orange", marker='o',
    ↪markersize=1, alpha=0.5, zorder=2)
```

```
[ ]: <Axes: >
```

