Extending Plotting

It's time to extend your plotting skills. Over the past two lessons, you've learned how to create a range of interactive plots using hvPlot and Plotly Express; however, you haven't had one centralized location to embed these plots. Now you do! Integrate Plotly map visualizations with hvPlot scatter plots to create a Population and Crimes dashboard.

[1]:
```
import plotly.express as px
import panel as pn
import pandas as pd
import os
from pathlib import Path
from dotenv import load_dotenv
```

Use extension function to specify plugin

[2]:
```
# Set up Panel Plotly extension
pn.extension('plotly')
```

Import hvplot.pandas after pn.extension

[3]:
```
# Import hvplot.pandas after pn.extension
# This avoids plotly initialization failure
import hvplot.pandas
```

Set up Mapbox token and prepare data

[4]:
```
# Read the Mapbox API key
load_dotenv()
map_box_api = os.getenv("mapbox")

# Set token using Plotly Express set function
px.set_mapbox_access_token(map_box_api)

# Read in data
city_pop = pd.read_csv(Path("../Resources/population_counts.csv")).drop_duplicates()
crime_rates = pd.read_csv(Path("../Resources/crime_rates.csv")).drop_duplicates()

pop_with_index = city_pop.set_index("city")
crime_with_index = crime_rates.set_index("city")
population_crime = (
    pd.concat([pop_with_index, crime_with_index], axis=1, sort=True)
    .dropna()
    .reset_index()
)
```

Create plots

[5]:
```
# Create plots
population_plot = px.scatter_mapbox(
    population_crime,
    lat="latitude",
    lon="longitude",
    size="pop_2015",
    color="index",
    color_continuous_scale=px.colors.cyclical.IceFire,
    title="City Population",
    zoom=3,
    width=1000,
)

crime_plot = px.scatter_mapbox(
    population_crime,
    lat="latitude",
    lon="longitude",
    size="violent_crime",
    color="index",
    color_continuous_scale=px.colors.cyclical.IceFire,
    title="City Crime",
    zoom=3,
    width=1000,
)

population_violence = population_crime.hvplot.scatter(
    x="pop_2015",
    y="violent_crime",
    title="Violent Crime by Population Correlation",
    width=1000,
).opts(yformatter="%.0f")

violent_murder = population_crime.hvplot.scatter(
    x="violent_crime",
    y="murder",
    title="Correlation Between Number of Violent Crimes and Murder",
    width=1000,
).opts(yformatter="%.0f")
```

Create Panel columns and tabs

[6]:
```
# Create panels to structure the layout of the dashboard
geo_column = pn.Column("## Population and Crime Geo Plots", population_plot, crime_plot)
scatter_column = pn.Column(
    "## Correlation of Population and Crime Plots", population_violence, violent_murder
)
```

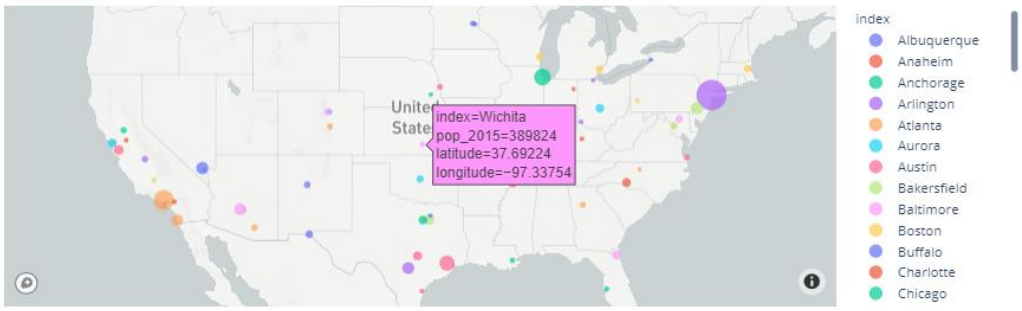
[7]:
```
crime_pop_dashboard = pn.Tabs(
    (
        "Geospatial",
        geo_column
    ),
    (
        "Correlations",
        scatter_column
    )
)

crime_pop_dashboard
```

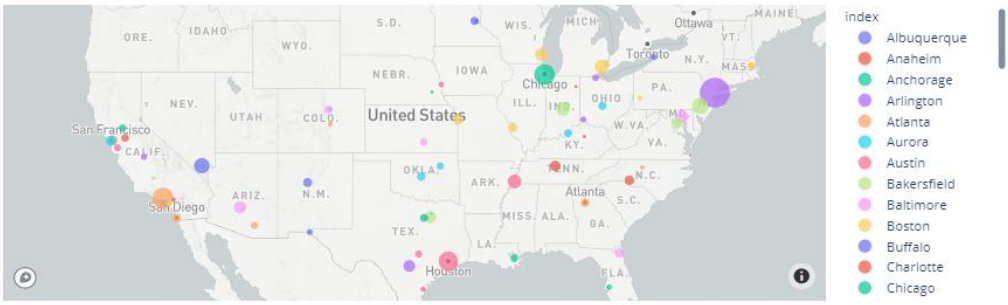
[7]: Geospatial | Correlations

Population and Crime Geo Plots

City Population



City Crime



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