import pandas as pd import geopandas as gpd import folium from folium.plugins import HeatMap import matplotlib.pyplot as plt import seaborn as sns from statsmodels.tsa.seasonal import seasonal\_decompose

**Load the dataset**

file\_path = "/mnt/data/terrorism\_incident.csv" df = pd.read\_csv(file\_path)

**Data Cleaning: Remove rows with missing latitude or longitude**

df\_cleaned = df.dropna(subset=['latitude', 'longitude'])

**Ensure there are valid coordinates before proceeding**

if df\_cleaned.empty: raise ValueError("No valid latitude/longitude data available for analysis.")

**Create a GeoDataFrame**

gdf = gpd.GeoDataFrame( df\_cleaned, geometry=gpd.points\_from\_xy(df\_cleaned.longitude, df\_cleaned.latitude), crs='EPSG:4326' )

**Summary statistics of numerical columns**

summary\_stats = gdf.describe() import ace\_tools as tools tools.display\_dataframe\_to\_user(name="Summary Statistics", dataframe=summary\_stats)

**Creating a base map with markers**

base\_map = folium.Map(location=[df\_cleaned['latitude'].mean(), df\_cleaned['longitude'].mean()], zoom\_start=2) for \_, row in df\_cleaned.iterrows(): folium.CircleMarker( location=[row['latitude'], row['longitude']], radius=2, color='red', fill=True, fill\_color='red', fill\_opacity=0.5, popup=row['city'] ).add\_to(base\_map) base\_map\_file = "/mnt/data/base\_map.html" base\_map.save(base\_map\_file)

**Creating a heatmap of incidents**

heatmap = folium.Map(location=[df\_cleaned['latitude'].mean(), df\_cleaned['longitude'].mean()], zoom\_start=2) HeatMap(df\_cleaned[['latitude', 'longitude']].values, radius=10).add\_to(heatmap) heatmap\_file = "/mnt/data/heatmap.html" heatmap.save(heatmap\_file)

**Top 5 attack types**

attack\_counts = df\_cleaned['attacktype1\_txt'].value\_counts().head(5)

**Pie chart**

plt.figure(figsize=(8, 6)) attack\_counts.plot(kind='pie', autopct='%1.1f%%', startangle=90, cmap='coolwarm') plt.title("Top 5 Attack Types") plt.ylabel('') plt.show()

**Bar chart**

plt.figure(figsize=(10, 5)) sns.barplot(x=attack\_counts.index, y=attack\_counts.values, palette='viridis') plt.title("Frequency of Top 5 Attack Types") plt.xlabel("Attack Type") plt.ylabel("Count") plt.xticks(rotation=45) plt.show() tools.display\_dataframe\_to\_user(name="Top 5 Attack Types Frequency", dataframe=attack\_counts.to\_frame())

**Number of incidents per year**

yearly\_incidents = df\_cleaned.groupby('iyear').size()

**Line plot of incidents per year**

plt.figure(figsize=(12, 6)) plt.plot(yearly\_incidents.index, yearly\_incidents.values, marker='o', linestyle='-') plt.title("Terrorism Incidents per Year") plt.xlabel("Year") plt.ylabel("Number of Incidents") plt.grid() plt.show()

**Time series decomposition**

try: decomposed = seasonal\_decompose(yearly\_incidents, model='additive', period=5) # Adjusted period # Plot decomposition results fig, axes = plt.subplots(3, 1, figsize=(10, 8), sharex=True) decomposed.trend.plot(ax=axes[0], title='Trend') decomposed.seasonal.plot(ax=axes[1], title='Seasonality') decomposed.resid.plot(ax=axes[2], title='Residuals') plt.xlabel("Year") plt.show() except ValueError: print("Not enough data points for seasonal decomposition. Consider increasing dataset size.")

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**Terrorism Incident Analysis Report**

**1. Geographical Distribution of Incidents**

* The **base map** with markers highlights global terrorism incidents, with high concentrations in conflict-prone regions such as **South Asia, the Middle East, and parts of Africa**.
* The **heatmap** provides a density visualization, clearly identifying regions with repeated attacks.

**2. Most Common Attack Types**

* The **top 5 attack types** (in descending order of frequency) are:
  1. **Bombing/Explosion** – Most common, used in urban and high-density areas.
  2. **Armed Assault** – Typically targeted at security forces or civilians.
  3. **Assassination** – Aimed at high-profile individuals.
  4. **Facility/Infrastructure Attack** – Attacks on government, military, or public infrastructure.
  5. **Hostage Taking (Kidnapping)** – Often for ransom or political leverage.
* The **pie chart and bar chart** effectively visualize the frequency of these attack types.

**3. Trends and Patterns in Time Series Analysis**

* The **line chart** of incidents per year shows a steady increase in terrorism incidents over time, particularly **post-2000**, with a peak in the **early 2010s**.
* **Time series decomposition** reveals:
  + A **clear upward trend**, highlighting a rise in global terrorism incidents.
  + Some **seasonality**, though less pronounced than the overall trend.
  + **Residual noise**, indicating sudden spikes in specific years, likely due to major conflicts.

**4. Key Insights and Conclusion**

* Terrorism incidents have significantly increased in recent decades, especially in conflict zones.
* **Bombing and armed assaults dominate** the attack methods used worldwide.
* **Geospatial visualizations confirm** that certain regions face **repeated and concentrated attacks**.
* Time series analysis suggests that terrorism patterns are influenced by global events, conflicts, and geopolitical factors.

This analysis provides valuable insights into terrorism trends and can aid policymakers, researchers, and security analysts in understanding and mitigating threats.

**Output Charts: -**

A graph showing a blue and black object

AI-generated content may be incorrect.

A graph of a graph

AI-generated content may be incorrect.A graph with blue lines

AI-generated content may be incorrect.A graph of a number of people

AI-generated content may be incorrect.A pie chart with text on it

AI-generated content may be incorrect.

**HTML files and CSV. :-**

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