

Exploratory Analysis of Global Earthquake-Tsunami Events (2001–2022)

Objective:

To conduct an in-depth exploratory data analysis (EDA) using Python on the *Global Earthquake-Tsunami Risk Assessment Dataset*. The goal is to identify patterns, trends, and differences between tsunami-generating and non-tsunami earthquakes based on seismic features, using statistical summaries and visualizations — all implemented using **Matplotlib** and **Seaborn**.

Key Objectives:

1. Time-Based Analysis:

- Explore how earthquake occurrences and tsunami events have changed over the 22-year period (2001–2022).
- Identify any trends in the frequency or magnitude of earthquakes over time.

2. Magnitude and Depth Analysis:

- Analyze the distribution of earthquake magnitudes and depths.
- Compare the average magnitude and depth of tsunami vs. non-tsunami events.
- Highlight major earthquakes (≥ 8.0) and their characteristics.

3. Geographic Distribution Using 2D Plotting:

- Plot earthquake locations using latitude and longitude on a 2D scatter plot.
- Visually distinguish between tsunami and non-tsunami events.
- Identify clusters or regions with higher concentration of tsunami events (without using map tiles or interactive maps).

4. Statistical and Comparative Analysis:

- Use box plots, histograms, and bar charts to compare seismic features between tsunami and non-tsunami events.
- Analyze correlations between variables using heatmaps.

5. Insights and Observations:

- Summarize key differences in seismic behavior between tsunami and non-tsunami earthquakes.
 - Identify seismic thresholds or indicators associated with increased tsunami potential.
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Python Libraries to Use:

- **Pandas** – for data loading and manipulation

- **NumPy** – for numerical operations
 - **Matplotlib & Seaborn** – for creating all visualizations including:
 - Time-series plots
 - Histograms and box plots
 - 2D scatter plots of latitude vs. longitude (static mapping)
 - Heatmaps for correlation analysis
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Expected Deliverables:

1. **Jupyter Notebook** or Python script with:
 - Clean and well-structured code
 - Visualizations for each analysis step
 - Clear observations and comments
2. **Summary Report** (optional):
 - Key findings from the analysis
 - Visual summaries of tsunami risk factors
 - Interpretation of patterns in earthquake characteristics