WHO–WHAT–HOW Framework: Global Cryptocurrency Trends Visualization

1. Storytelling Framework Overview
This framework defines the **narrative and analytical intent** of the project *“Global Cryptocurrency Trends Visualization”*.
It connects the technical work (data cleaning, geospatial and temporal visualization) with the **storytelling perspective**, clarifying **who** the analysis is for, **what** actions or insights it enables, and **how** the data provides evidence to support those findings.

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2. WHO – Audience

Primary Audience
Students and Data Enthusiasts (Ages 18–30)
Individuals with basic-to-intermediate data literacy who want to understand how interest in cryptocurrencies evolves globally.
- **Motivation:** Curiosity about global crypto adoption and regional differences.
- **Challenge:** Lack of access to intuitive, visual explanations of global trends.
- **Need:** Clear, interactive visuals that explain complex temporal–spatial patterns.

Secondary Audience
Financial Analysts and Crypto Researchers
Professionals interested in behavioral indicators derived from public attention data (Google Trends).
- **Motivation:** Link between public sentiment and potential market shifts.
- **Challenge:** Interpreting large, noisy datasets without context.
- **Need:** Reliable visual evidence of geographic and temporal correlations in public interest.

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3. WHAT – Desired Action

The primary goal of this project is to **help audiences interpret the evolution of public attention toward cryptocurrencies** through space and time.

Specifically, the visualizations enable users to:
1. Identify **which countries show the highest overall engagement** with cryptocurrencies.
2. Observe **how interest evolves over time**, detecting peaks and declines that align with real-world events.
3. Compare **regional and cross-cryptocurrency trends**, such as differences between Bitcoin, Ethereum, and Dogecoin.
4. Recognize **periods of social-driven hype**, like the global Dogecoin surge in mid-2021.

Ultimately, the project aims to promote **data literacy** and **contextual understanding** of global digital trends, rather than financial speculation.

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4. HOW – Data as Evidence

Visualization	Dataset Used	Analytical Method	Main Insight
Global Choropleth Map	`trends.csv`	Aggregated mean interest by ISO country code	Japan, South Korea, Brazil, Germany, and the U.S. show the highest average interest.
Animated Map (2020–2025)	`trends.csv`	Monthly grouping and temporal animation	Visualizes the dynamic rise and fall of attention — e.g., strong global rise in early 2021, decline in late 2022.
Time Series by Region	`sample_temporal.csv` + `trends.csv`	Grouped line plots by country and cryptocurrency	Highlights that Asian regions (Japan, China) maintain consistent high interest; Dogecoin shows sharp, short-lived spikes.
Top 10 Countries Ranking	`trends.csv`	Aggregation and mean ranking	Confirms the global leaders in crypto attention; provides visual comparison among top performers.

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5. Storyboard Overview

Scene 1 – *Setting the Context*
- **Purpose:** Introduce global crypto adoption as a social–technological phenomenon.
- **Visual Element:** World map highlighting active regions of search interest.
- **Message:** “Interest in cryptocurrencies isn’t uniform — some nations lead the digital finance conversation.”

Scene 2 – *The Temporal Evolution*
- **Purpose:** Show how global attention fluctuates across time.
- **Visual Element:** Animated map with time slider (2020–2025).
- **Message:** “Crypto attention moves in waves — peaks in early 2021, falls in 2022, then stabilizes.”

Scene 3 – *Regional Deep Dive*
- **Purpose:** Analyze interest evolution by region and keyword.
- **Visual Element:** Time series by region (Bitcoin, Ethereum, Dogecoin).
- **Message:** “Asian countries sustain long-term engagement, while Dogecoin shows short-lived hype cycles.”

Scene 4 – *Comparative Ranking*
- **Purpose:** Rank global leaders in crypto awareness.
- **Visual Element:** Bar chart of Top 10 countries with flag annotations.
- **Message:** “Japan, South Korea, Brazil, Germany, and the U.S. lead global attention, with Bitcoin and Ethereum as the most dominant keywords.”

Scene 5 – *Interpretation & Takeaway*
- **Purpose:** Conclude the narrative with key findings.
- **Visual Element:** Text summary or captioned insights.

- **Message:** “Interest in cryptocurrencies mirrors global economic and cultural differences — technology-driven countries show more stable engagement, while social media trends create temporary global spikes.”

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6. Data Story Synthesis

The visual narrative reveals a **clear spatiotemporal dynamic**:
- **High-Interest Regions:** Japan, South Korea, Brazil, Germany, and the U.S. consistently lead.
- **Temporal Peaks:** Early 2021 showed a strong global rise in crypto curiosity; late 2022 saw a decline.
- **Cultural Patterns:** Asian countries maintain steady engagement; Western regions show more volatility.
- **Hype Phenomena:** Dogecoin’s spike in May 2021 highlights the power of viral influence.

The data collectively demonstrates that **public attention is a proxy for technological adoption and global sentiment**, emphasizing how data visualization can transform abstract behavior into interpretable patterns.

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7. Strategic Implications

For students and enthusiasts:
> Visual analytics can help decode global technology adoption and cultural behavior patterns.

For researchers and analysts:
> Behavioral data, such as Google Trends, can complement financial data to forecast emerging topics and public sentiment shifts.

For educators and communicators:
> Visual storytelling enhances data literacy and supports more intuitive understanding of complex global phenomena.

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