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CYBERSECURITY INCIDENT ANALYSIS

Dashboard Report

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1. INTRODUCTION

In the digital era, cybersecurity incidents have become increasingly frequent and sophisticated, causing significant damage to organizations and governments worldwide.

Our final Data Visualization project aims to explore and analyze cybersecurity incident data through a professional, insightful, and interactive dashboard using Power BI and Python.

This report outlines our rationale for choosing the dataset, the structure and insights of the dashboard, the tools used, and the added value of integrating Python.

2.DATASET DESCRIPTION AND JUSTIFICATION

The dataset we selected contains 3,000 records detailing global cybersecurity incidents across various countries from 2015 to 2024. It includes attributes such as country, year, attack type, targeted industry, financial loss (in million \$), number of affected users, attack source, vulnerability type, defense mechanism, and incident resolution time.

REASONS FOR CHOOSING THIS DATASET:



- **Relevance:** Cybersecurity is a critically relevant topic for governments, businesses, and individuals alike.



- **Richness:** The dataset includes multiple dimensions (temporal, categorical, numerical) suitable for diverse types of visualizations.



- **Real-World Application:** The insights can inform cybersecurity strategies and policies.



- **Data Variety:** It supports the development of comparative visualizations and trend analysis.

3.TOOLS AND TECHNOLOGIES

POWER BI



Used for its powerful, user-friendly interface to build professional dashboards and visually appealing charts.

PYTHON



Used for data preprocessing and creating complex, interactive visualizations using Plotly.

GITHUB



GitHub is used to manage code, track changes, collaborate with others, and store projects online.

4. DASHBOARD STRUCTURE AND VISUALIZATION PLAN

The Power BI dashboard offers a comprehensive view of global cybersecurity incidents from 2015 to 2024, visualized through interactive filters, KPIs, maps, and column charts. It provides stakeholders with high-level summaries and detailed breakdowns by year, attack type, industry, and geography

4.1 Affected Users by Attack Type and Target Industry.

Type: Clustered Column Chart

Details: Displays the number of affected users for each attack type (e.g., DDoS, Phishing, Ransomware) segmented by target industry (e.g., Banking, Education, IT).

Insight: Identifies which combinations of attack types and industries impact users most severely.

Usage: Helps industries and security teams prioritize awareness and prevention strategies.

4.2 Financial Loss (Million \$) by Year and Target Industry.

- Type: Clustered Column Chart
- Details: Visualizes annual financial loss in millions of dollars across industries from 2015 to 2024.
- Insight: Reveals trends in economic impact over time and highlights the most financially vulnerable sectors.
- Usage: Supports budgeting and investment planning in cybersecurity across critical industries.

4.3 Country and Financial Loss (in Million \$)

- Type: Filled Map
- Details: Geographical representation of financial losses by country.
- Insight: Shows which regions are most financially affected by cyber threats.
- Usage: Useful for policy makers and international organizations to assess global threat landscapes.

4.4 Key Performance Indicators (KPIs)

- Type: Card Visuals
- Sum of Affected Users: Displays global total (e.g., 2 billion users).
- Sum of Financial Loss: Displays cumulative monetary damage (e.g., \$151,480,000).
- Usage: Provides a quick executive-level summary of the global scale of impact.

4.5 Interactive Slicers

- Type: Dropdown and List Filters
- Year Slicer: Allows filtering data from 2015–2024.
- Attack Type Slicer: Enables focus on specific attack vectors.
- Country Slicer: Filters all visuals to a selected country.
- Usage: Empowers users to drill down into data segments of interest and perform comparative analysis.

5. PYTHON INTEGRATION IN POWER BI

Using Python in Power BI allowed us to:

- Clean and preprocess data for better accuracy and consistency.
- Generate custom visuals, such as a KPI-style tooltip card using matplotlib, which displays key insights like country-specific financial loss, number of affected users, and a severity level indicator.
- Perform precise data transformations that go beyond the default capabilities of Power BI.

This integration was particularly useful for enhancing interactivity, especially in the map-based tooltip, which would not have been possible with standard Power BI visuals alone.

DATA CLEANING AND PREPARATION

Although the dataset was largely clean, we performed the following preprocessing steps:

- Stripped and standardized column names for easier access.
- Checked for and confirmed the absence of null values.
- Verified and corrected data types (e.g., converting year and resolution time to integers).
- Aggregated and grouped data for use in charts.

6. VALUE AND PROFESSIONAL APPLICATION

This dashboard provides stakeholders with actionable insights into the evolving cybersecurity landscape.

Organizations can use these insights to:

- Anticipate and prepare for common attack types.
- Allocate cybersecurity budgets effectively.
- Choose the most efficient defense mechanisms.
- Understand industry-specific risks.
- Monitor trends and adjust strategies proactively.

The dashboard also demonstrates our ability to blend technical tools with analytical storytelling, a key skill in professional data visualization roles.

7. CHALLENGES AND MITIGATIONS

- Data Ambiguity: Some attack types and defense mechanisms were broad; we handled this by standardizing similar values.
- Visual Clutter: To maintain readability, we limited the number of categories in some graphs to top 5–10.
- Tool Integration: Embedding Python visuals required additional configuration.

8. CONCLUSION

Through this project, we have successfully built a professional dashboard that addresses a crucial modern issue: cybersecurity.

By combining Power BI's visualization strengths with Python's analytical power, we delivered a compelling, interactive, and informative product.

The structured design, choice of dataset, and insights gained validate our approach and reflect real-world data storytelling skills.