Hackathon Case Study:

S.E.G. — Preventing Hand Injuries in Manufacturing

Overview:

This zip file presents a comprehensive **Tableau, AI, NLP-based case study** for analyzing hand injuries in the manufacturing sector. It uses **OSHA's Severe Injury dataset** to uncover root causes of injuries, assess their severity, and evaluate risk at the employer level using both **statistical NLP** and **LLMs (Large Language Models)**.

The objective is to build an intelligent system that enables **incident analysis, visualization, and risk assessment**, specific to any employer queried by the user.

Deliverables:

1. **Tableau (Data Visualization Dashboard)**
2. **Python Notebook (Post Processing using NLP and LLM)**
3. **Presentation (Explaining the Business Case Study)**

Brief Explanation:

I. Tableau:

Dashboard 1: Most Occurring Events & Their Source

Dashboard 2: Company-Wise Events & Hospitalization Trends

Dashboard 3: Geographic Risk Mapping

II. Python:

Phase 1: Data Cleaning & Filtering

Phase 2: NLP Keyword Analysis (TF-IDF)

Phase 3: Trial GPT-Based Cause Extraction

🧪 **Note:** This phase focused on **trial and experimentation**, testing how LLMs understand narrative-based injury data.

Phase 4: Visualization & Narratives.

Phase 5: Final Implementation — Employer-Specific Root Cause & Risk Analysis

This is the **core phase** of the project and the culmination of all prior exploration.

III.   Presentation:

- **Why:** To address the rising number of hand injuries in the manufacturing sector and help SEG identify the root causes behind these incidents.

- **What:** We analyzed real-world injury reports to uncover patterns, understand how these injuries occur, and assess the severity of incidents across different employers.

- **How:** By examining narrative data, identifying key causes, and evaluating injury severity, we built a structured framework to assess and compare safety performance at the company level.

- **Value to SEG:** This analysis enables SEG to:

  - Identify high-risk companies and recurring injury patterns
  - Prioritize safety audits and interventions
  - Communicate data-driven safety insights with employers
  - Enhance their role as a proactive safety improvement partner