Phase 01: Data Selection and Project Proposal

Project Name:

Unveiling Aviation Safety: A Visual and Interactive Exploration of Accident Data

Group Members:

- **Member 1 – Dhvanil Bhagat**
  - Student ID – 924235556
  - Email – dbhagat@sfsu.edu

- **Member 2 – Divya Panchal**
  - Student ID – 924317352
  - Email – dpanchal@sfsu.edu

- **Member 3 – Chetas Parekh**
  - Student ID – 923873155
  - Email – cparekh1@sfsu.edu

Target Dataset:

Aviation Accident Database & Synopses, up to 2023 (kaggle.com)

The dataset consists of the below details.

1. **AviationData.csv** => Detailed accident data includes a categorization of accidents by aircraft category, injury, and contributing factors, including weather and phase of flight. Data are presented on the frequency and trend in accident occurrence by specific aircraft types, injury distribution, and environmental and operational factors that contribute to aviation safety.

2. **USState_Codes.csv** => This consist of US States and their abbreviations.

Project Proposal:

Since aviation accidents are infrequent from a statistical perspective, the consequences of an accident call for deep understanding of the complex factors that contribute to such an incident. We aim at developing, on an interactive basis, a visualization platform outlining the usually camouflaged risks in aviation.

The project will use advanced data visualization, and other techniques to derive meaningful insights from the given Aviation Accident Database for the following key objectives:

1. How are the causes of accidents distributed according to the Broad Phase of Flight, with categories such as takeoff, cruise, and landing, by aircraft category?
2. Does the severity of the weather conditions (using a combined metric of severity) positively relate to the severity of injury sustained in the accident, by aircraft category?
3. Over the years present in the dataset, do specific aircraft models-that is, combinations of make and model-present statistically significant increases or decreases in their proportion of total accidents, indicating perhaps an emerging risk or a successful safety improvement?
4. From the 'Purpose of Flight' column, is there a clear difference in the distribution of the different categories of 'Accident Damage' across 'Personal', 'Business', and 'Scheduled' flights?

5. Considering the trends and patterns highlighted in the data, what precisely are the safety improvement focal points? Are there specific sequences of contributing factors or accident types that might be amenable to policy changes, technological changes, or pilot training programs?

Target Users:

The interactive visualizations and insights derived from this project will be of significant value to a wide range of stakeholders within the aviation domain, including:

- **3.1 Pilots:** Improve the situational awareness and decisions of pilots by building their knowledge relating to risk factors and patterns of accidents.
- **3.2 Flight Instructors:** This informs the development of training curricula, emphasizing critical safety consideration through data-driven insights.
- **3.3 Aviation Regulators & Investigators:** A powerful tool for complete analysis of accidents, identification of trends, and formulation of more effective safety regulations
- **3.4 Aircraft Manufacturers:** Facilitate the identification of potential design vulnerabilities by examining the role of aircraft type and design in accidents, promoting safer aircraft development.
- **3.5 The General Public:** Increase public awareness of aviation safety complexities, fostering greater transparency and informed discourse on risk mitigation strategies.

End goals:

- **4.1 Enhanced Safety Awareness:** Make the invisible risk visible in Aviation to every stakeholder by creating a culture of increased safety awareness.
- **4.2 Data-Driven Safety Strategies:** Enable decision-makers at all levels in the aviation industry by providing accessible and effective insights from data to drive safety improvements.
- **4.3 Advanced Accident Analysis:** Provide aviation professionals with an intuitive and detailed single platform for in-depth investigation and causal analysis of accidents.
- **4.4 Evolution of Aviation Safety:** Help further develop a safer and more resilient air transportation system through proactive identification and addressing of emerging risk.