Car Crash Severity Prediction Dataset Explanation

1. Introduction

Car crashes are a major public safety concern, leading to injuries, fatalities, and economic losses. Predicting crash severity can help in designing safer roads, improving vehicle safety measures, and enhancing emergency response strategies. The goal of this dataset is to generate synthetic yet realistic crash data that can be used to train machine learning models for severity prediction.

2. Business Context

Why is this important?

Accurately predicting car crash severity is crucial for multiple stakeholders:

- **Government & Transportation Agencies: To improve road safety regulations and reduce accidents.**
- **Insurance Companies: To assess risk and determine fair premiums.**
- **Automobile Manufacturers: To enhance vehicle safety features based on real-world accident patterns.**
- **Emergency Services: To optimize resource allocation and response times.**

Understanding the factors that contribute to crash severity enables better decision-making in safety policy, infrastructure development, and vehicle design.

3. Dataset Features

The dataset consists of multiple features categorized into crash-specific, vehicle-specific, driver-specific, and environmental factors. Below is a detailed explanation of each feature and its relevance.

Crash-Specific Features

Feature Name	Description	Business Relevance
Crash Speed (km/h)	Speed of the vehicle at the time of impact.	Higher speeds often lead to more severe crashes.
Impact Angle (degrees)	Angle at which the crash occurred.	Determines force distribution, affecting severity.
Airbag Deployed	Whether airbags were activated (Yes/No).	Can reduce injury severity significantly.
Seatbelt Used	Whether the driver was wearing a seatbelt (Yes/No).	Seatbelt usage is a key safety factor in reducing fatalities.
Weather Conditions	Weather at the time of the crash (Clear, Rain, Fog, Snow).	Adverse weather conditions increase accident risks.
Road Conditions	Surface condition of the road (Dry, Wet, Icy, Uneven).	Poor road conditions contribute to higher severity crashes.
Crash Type	Type of crash (Head-on, Side impact, Rear-end, Rollover).	Some crash types are inherently more dangerous than others.

Vehicle-Specific Features

Feature Name	Description	Business Relevance
Vehicle Type	Type of vehicle involved (Sedan, SUV, Truck, Motorcycle).	Different vehicles have varying crash impact absorption.
Vehicle Age (years)	Age of the vehicle.	Older vehicles may have outdated safety features.
Brake Condition	Condition of the brakes (Good, Worn out).	Poor brakes increase stopping distance,

		worsening crashes.
Tire Condition	Condition of the tires (Good, Worn out).	Worn-out tires reduce grip and increase crash likelihood.

Driver-Specific Features

Feature Name	Description	Business Relevance
Driver Age	Age of the driver.	Young and elderly drivers have higher accident risks.
Driver Experience (years)	Number of years of driving experience.	Experienced drivers may react better in crash situations.
Alcohol Level (BAC%)	Blood Alcohol Concentration level.	Higher BAC levels are linked to severe crashes.
Distraction Level	Level of driver distraction (None, Phone, Drowsiness, Other).	Distractions are a major cause of accidents.

Environmental Features

Feature Name	Description	Business Relevance
Time of Day	When the crash occurred (Morning, Afternoon, Night).	Night driving increases accident risk due to low visibility.
Traffic Density	Level of traffic congestion (Low, Medium, High).	High traffic can lead to multi-vehicle accidents.
Visibility Distance (m)	Distance a driver can see ahead.	Low visibility increases the likelihood of severe crashes.

Target Variable (Severity Level)

Feature Name	Description	Business Relevance
Severity	The severity of the crash	Helps in prioritizing

	(Minor Injury, Severe Injury, Fatal).	**emergency response and risk mitigation.**