

Data Dictionary for SynSHRP 2 Dataset

Overview

This document describes the structure of the dataset, which includes tabular event records, kinematic signal data, and synthetic visual keyframes. It is intended to support multimodal research on driving behavior, crash analysis, and AI model development.

1. Tabular Records (Tabular_records.csv)

Column Name	Data Type	Description
Event_ID	string	Unique identifier for the event, consistent across modalities.
Event_start	int (ms)	Start time of the event in milliseconds (usually set to 0).
Reaction_start	int or NaN (ms)	Timestamp when driver's reaction begins. Null if not annotated.
Impact	int or NaN (ms)	Timestamp of impact, if the event is a crash. Null otherwise.
Event_end	int (ms)	End time of the event in milliseconds.
Event_type	string	Category: Crash or Near-Crash .
Crash_severity	string	Severity classification (e.g., III - Minor Crash). May be empty or Not a Crash .
Incident_type	string	Type of incident behavior (e.g., Rear-end , striking , Pedestrian-related).
Conflict_type	string	Description of the conflict (e.g., Conflict with vehicle turning across another vehicle's path).
Narrative	string or NaN	Natural language description of the event. Present only for matched events in the narrative file.

2. Kinematic Signal Data (*.json per Event)

Each event includes a JSON file containing time-series sensor data from 10 seconds before **Event_start** to 10 seconds after **Event_end**, sampled at approximately 10 Hz.

Field Name	Data Type	Description
TimeStamp	float (ms)	Absolute timestamp relative to trip timeline.
Lon_Acc	float	Longitudinal acceleration (forward/backward), in g.
Lat_Acc	float	Lateral acceleration (left/right), in g.
Ver_Acc	float	Vertical acceleration (up/down), in g.

Speed	float or null	Vehicle speed in mph. Some values may be missing.
Ped_BS	binary or null	
W_Lane	float	Brake Pedal Status — 1 indicates that the brake pedal is pressed, 0 means not pressed, and null indicates missing or unavailable data.
Dist_L	float	Estimated lane width in meters.
Dist_R	float	Distance to the left lane boundary (negative = left of centerline).
		Distance to the right lane boundary (positive = right of centerline).

3. Synthetic Keyframes (*.jpg images per Event)

Each event is also represented by several synthetically rendered keyframes derived by SHRP2 video dataset aligned to key moments in the timeline.

Image Name	Timepoint	Description
Prior.jpg	5s before Event_start	Captures the pre-event driving context.
Start.jpg	At Event_start	Marks the official beginning of the event.
Reaction.jpg	At Reaction_start (if available)	Shows the moment of the driver's observed reaction.
Impact.jpg	At Impact (if applicable)	Displays the point of collision for crash events.
End.jpg	At Event_end	Depicts the state of the scene at the event's conclusion.

Note: Not all events will have all images. For instance, `Impact.jpg` is only present for crashes, and `Reaction.jpg` is missing if no reaction is coded.

4. Categorical breakdown of crash and near-crash events

This table summarizes the categorical distribution of crash and near-crash events, including event type, crash severity, incident type, and conflict type with their corresponding frequencies.

Variable	Category	Count
Event_type	Crash	1,340
	Near-Crash	5,191
Crash_severity	IV - Low-risk Tire Strike	581
	III - Minor Crash	549
	II - Police-reportable Crash	134
	I - Most Severe	76
Incident_type	Rear-end, striking	2,830
	Road departure (left or right)	867
	Sideswipe, same direction (left or right)	821
	Turn into path (same direction)	293
	Animal-related	298
	Turn into path (opposite direction)	242
	Turn across path	233
	Other	166
	Rear-end, struck	154
	Straight crossing path	147
	Pedestrian-related	115

	Road departure (end)	104
	Backing into traffic	97
	Opposite direction (head-on or sideswipe)	61
	Backing, fixed object	55
	Pedalcyclist-related	48
Conflict_type	Conflict with a lead vehicle	2,352
	Conflict with vehicle in adjacent lane	1,210
	Single vehicle conflict	1,012
	Conflict with vehicle turning into another vehicle path (same direction)	290
	Conflict with animal	298
	Conflict with vehicle turning into another vehicle path (opposite direction)	241
	Conflict with vehicle turning across another vehicle path (opposite direction)	183
	Conflict with obstacle/object in roadway	130
	Conflict with a following vehicle	147
	Conflict with parked vehicle	138
	Conflict with vehicle moving across another vehicle path (through intersection)	144
	Conflict with pedestrian	115
	Conflict with merging vehicle	102
	Conflict with oncoming traffic	60
	Conflict with vehicle turning across another vehicle path (same direction)	48
	Conflict with pedal cyclist	48
	Other	13