We propose **IDD-3D** a 3D Driving Dataset for **Unstructured Road environments** with **LiDAR** data and 3D object annotations.

IDD-3D: Indian Driving Dataset for 3D Unstructured Road Scenes

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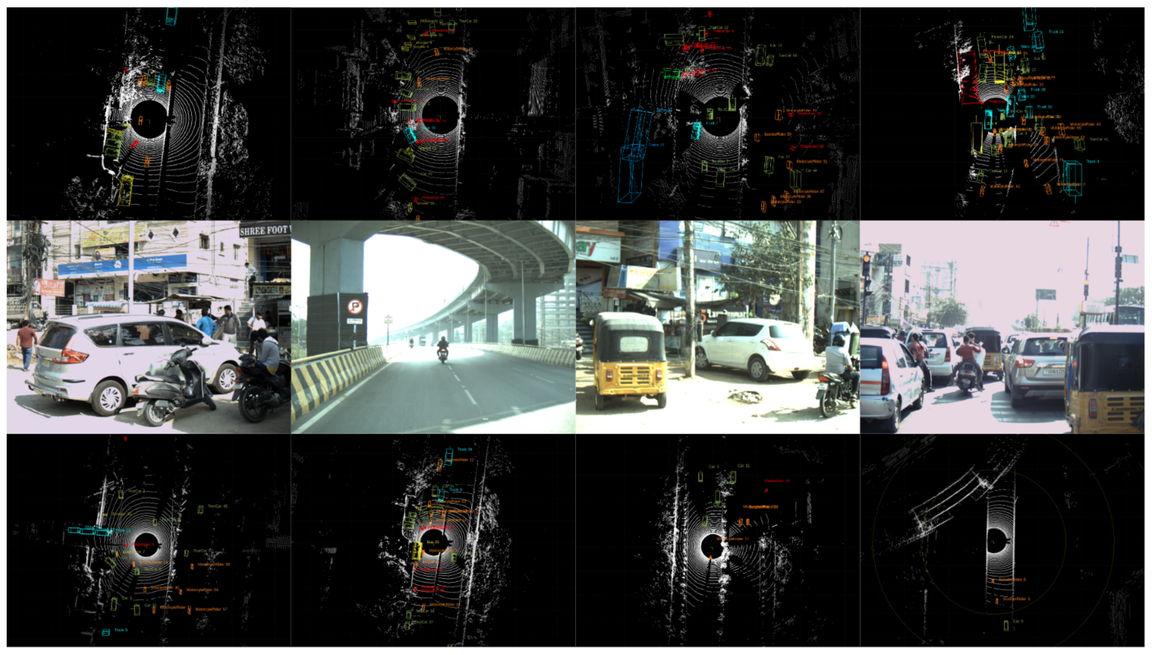
Problem Statement

Unstructured Road environments pose a multitude of difficulties such as unpredictable driving behaviour, traffic violations, non-driveable and imprecise surfaces, lanes hold less meaning, and complex pedestrian activity in unsafe road conditions. Using only 2D annotations on RGB images is not enough for sophisticated ADAS methods.

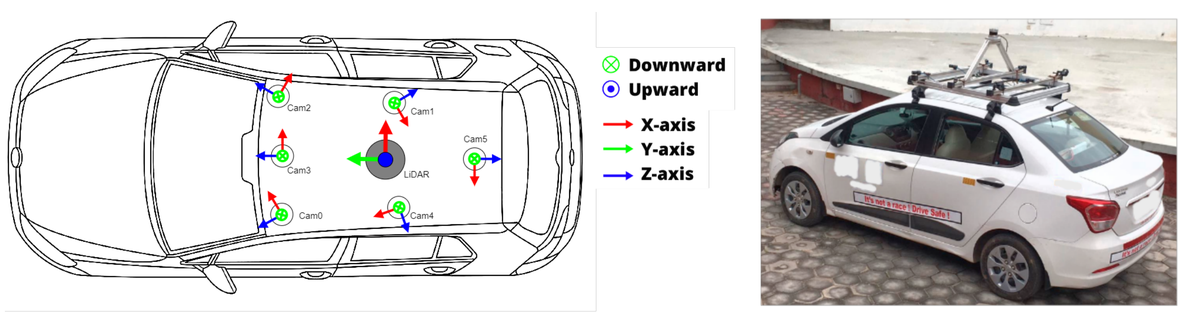
Proposed Dataset

We propose a dataset especially targeted towards unstructured environments while extending the existing modalities in IDD. 3D information in such conditions provide allow for more accurate and faster decision-making. Annotations for 3D bouning boxes, Instance IDs and trajectory information are available. Figure below shows a sample of the dataset.



Data Collection

We use 6 RGB cameras in conjunction with a LiDAR sensor as the primary source of data and record raw data from Hyderabad, India. The data is then processed and prepared for annotation as sequences of 100 frames each at 10 FPS. Figure below shows the positions and orientations of the sensors on the data collection vehicle along with an image of the sensor rig on the car. Refer to the paper for more details.



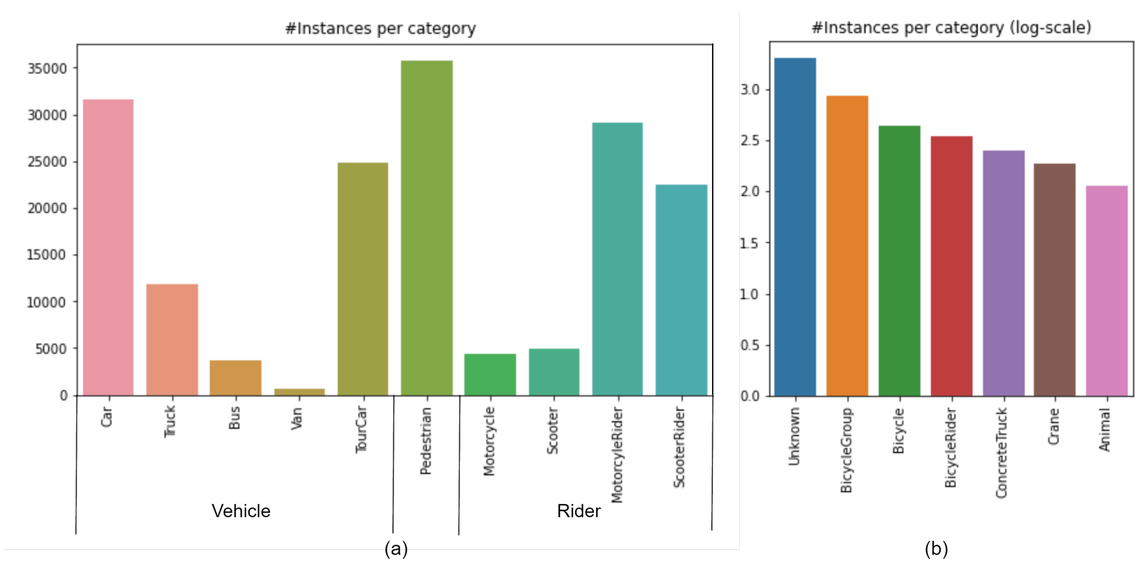
(a)

(b)

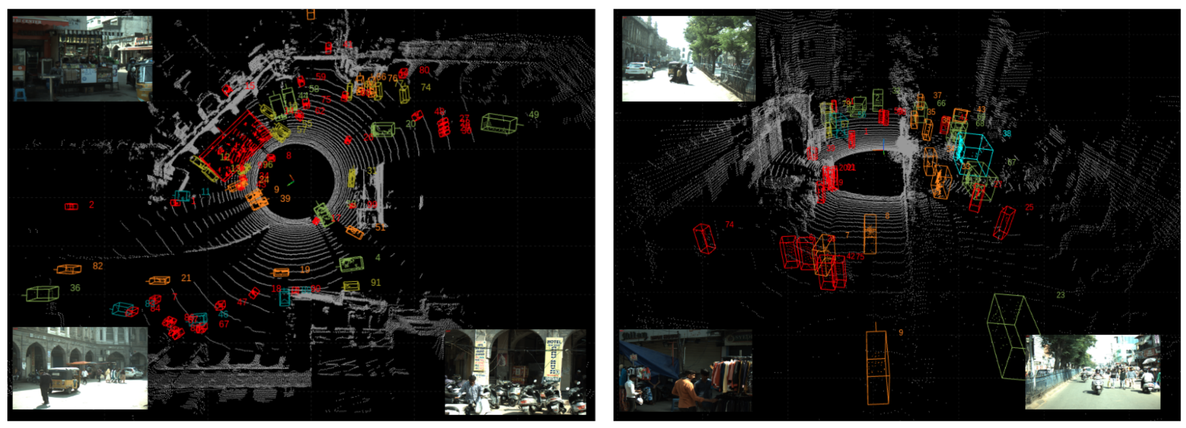
Dataset Statistics

Dataset	3D Scenes	Cameras	Lidar	Images	Classes	3D Boxes	Diversity
KITTI	15k	2	yes	15k	3	80k	Low
nuScenes	40k	6	yes	1.4M	23	1.4M	Mid
Apolloscape	20k	6	yes	0	6	475k	Low
KAIST	8.9k	2	yes	8.9k	3	0	Low
Waymo Open	230k	5	yes	1M	4	12M	Mid
ONCE	1M (16k)	7	yes	7M	5	417k	Mid
Cityscapes-3D	20k	-	no	490k	8	-	Low
A* 3D	39k	1	yes	39k	7	230k	Mid
Ours	15.5k*	6	yes	93k	10 (17**)	223k*	High

The table above shows a comparison with existing popular 3D autonomous driving datasets. (*) Number reported on train-val-test set, experiments/statistics reported on train-val set. (**) The 17 classes are total of the 10 primary and 7 additional classes. The figure below shows the class distribution of the 10 categories and the additional 7 classes in the proposed dataset.



A sample of the interesting cases from the dataset highlights high density traffic scenarios and the road environment from different angles in 3D visualization. Diverse traffic scenarios are abundant in the proposed dataset along with benchmarks on 3D object detection and tracking of objects using LiDAR data. Refer to the paper for more details!



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Scan for Toolkit code, Paper, Dataset and related resources

github.com/shubham1810/idd3d_kit

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