Technical Board
IIT Guwahati

InterIIT TechMeet

BootCamp

2024-25

Problem Statement

AI/ML

Team Size: Individual

Kaggle Submission Deadline: 11th October EOD

Report Submission Deadline: 12th October EOD

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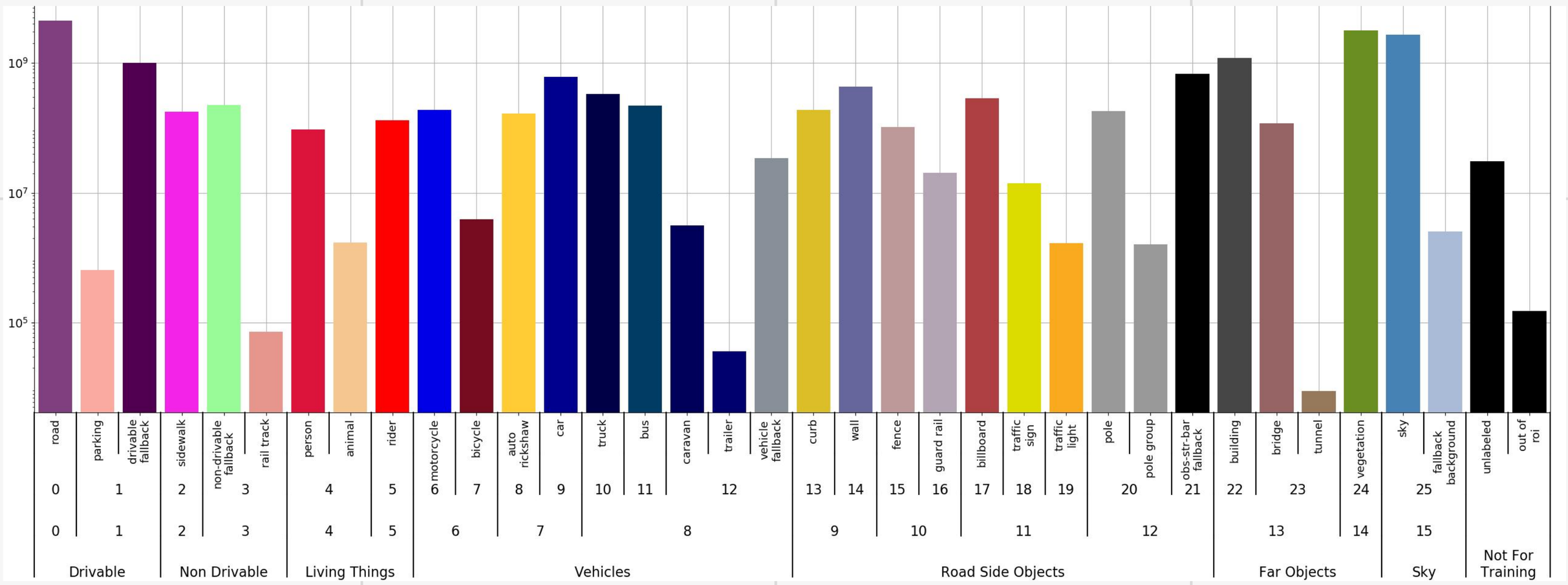
Towards Efficient Image Segmentation for Indian Roadways

The goal of this problem statement is to develop an end-to-end (E2E) prototype of an image segmentation model designed specifically for self-driving cars navigating Indian roadways. The model should accurately segment all relevant objects and road elements from images captured on Indian streets and highways. The final solution must balance both segmentation accuracy for all classes and inference time to be suitable for real-time applications in self-driving technology.

Dataset

The dataset contains over 10,000 annotated images divided into training, validation, and test sets. The segmentation task spans 25 distinct classes, including road elements, vehicles, pedestrians, and other critical categories for autonomous navigation. The relative frequency of various classes is shown below.



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Challenges

- **Class Imbalance:** The dataset's relative frequency of classes indicates that some classes are underrepresented, making accurate segmentation of rare classes a significant challenge.
- **Diverse Road Conditions**: The dataset captures various lighting, weather, and traffic conditions typical of Indian roadways, adding to the complexity of the segmentation task.
- **Efficient Inference**: The model must not only provide accurate segmentation but also be efficient enough to perform real-time inference suitable for self-driving cars.

Evaluation

The model will be evaluated based on the following criteria:

1. **Leaderboard Metric:**
   - **Mean Dice Coefficient (with F-beta Score):** To evaluate segmentation accuracy across all classes. We'll be keeping the value of beta to be 0.5 to give more weight to precision.

2. **Additional Metrics:**
   - **Inference Time**: The model's inference time for a single input image must be measured and reported accurately in the final report, to ensure it meets the requirements for real-time operation.
   - **Quality of solutions** including the approach taken and the experimentation involved.

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Report Submission Format

The following files needs to be submitted:

- Report made in the following format: Link
- All your notebooks should be made public and linked in the report
- Your report should cover all implementation details of your project

Link to the Competition

The competition is hosted on Kaggle. The dataset is also provided in the Kaggle competition.
(https://tinyurl.com/5bjac4k2)

Note: The Competition will launch at 10:30 pm on the 4th of October, 2024