Model Performance Evaluation Report

Objective

This report details the performance of a machine learning model developed to identify vehicles erroneously involved in traffic accidents. The primary goal is to enhance the accuracy and reliability of traffic monitoring systems.

Methodology

The model utilizes a sophisticated convolutional neural network based on the YOLO algorithm, tailored for real-time object detection. Training was conducted on a dataset comprising images of vehicles in diverse accident scenarios, emphasizing the detection of misidentified vehicles.

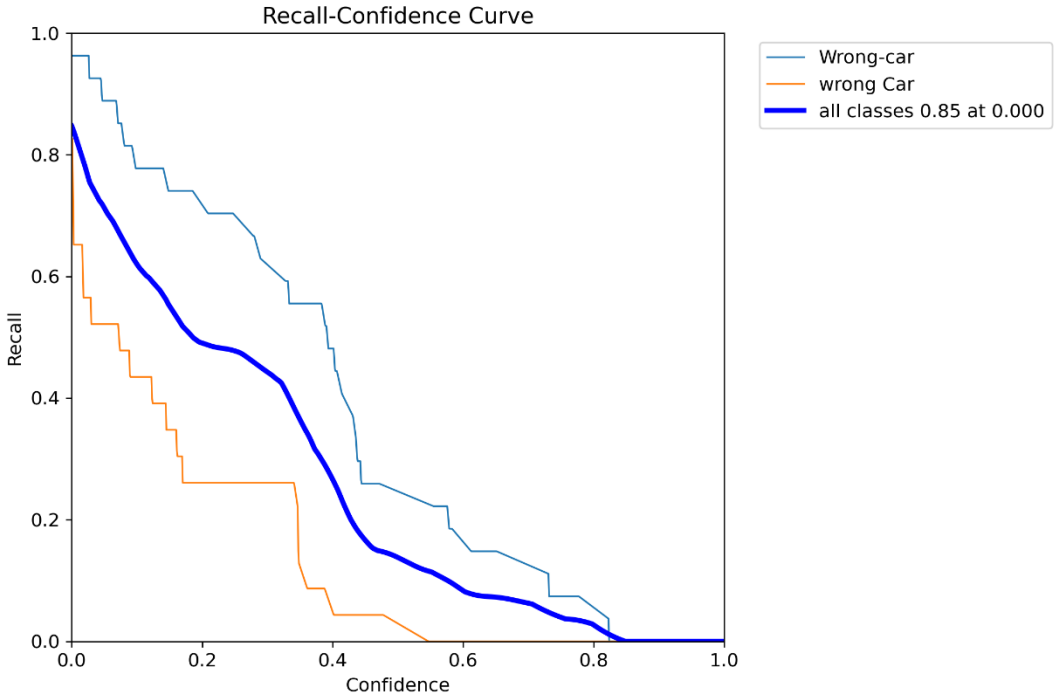
Evaluation Metrics Explained

•**Precision**: Measures the accuracy of predictions for the accident involvement of vehicles.

•**Recall**: Assesses the model's ability to identify all relevant cases of misidentification.

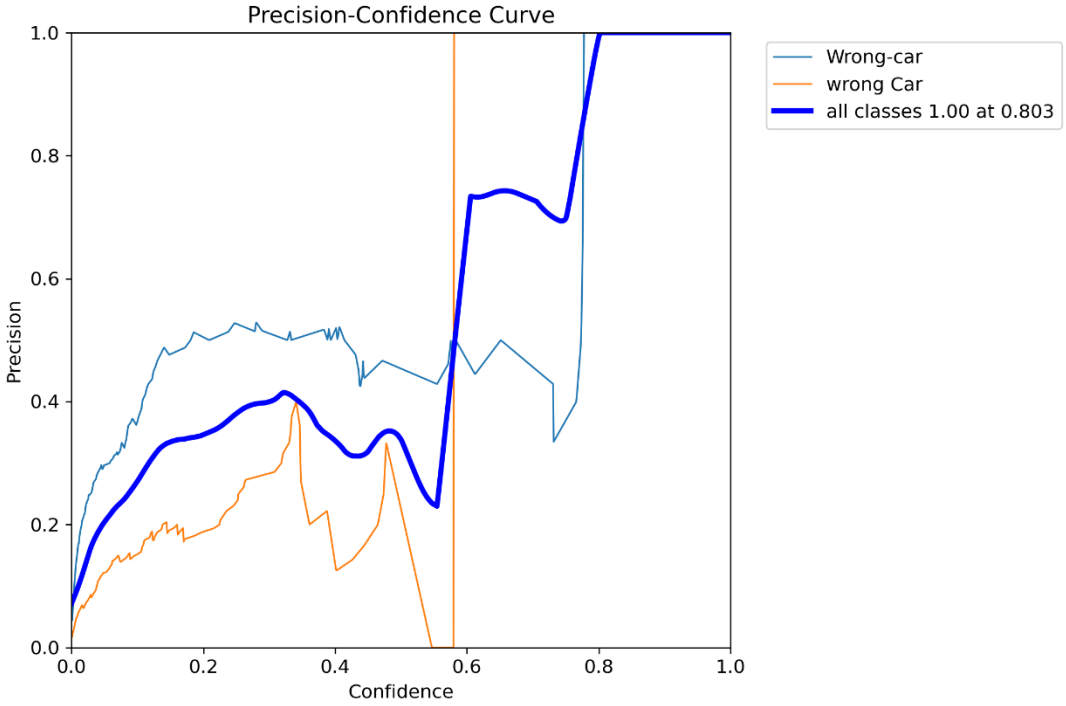
•**F1-Score**: Balances precision and recall, providing a holistic view of model accuracy.

•**Mean Average Precision (mAP):** Represents average precision at various recall levels, offering a comprehensive performance metric.



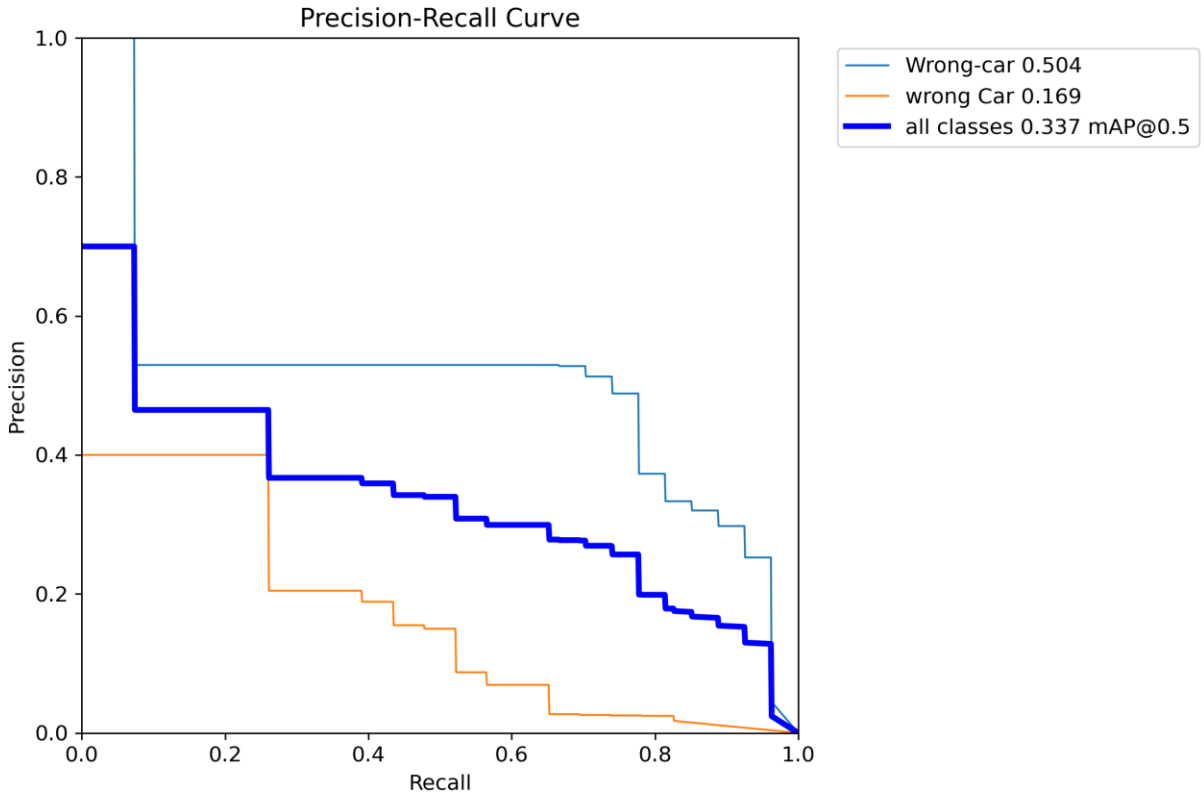
Recall-Confidence Curve

- **Description**: Displays the recall over various confidence thresholds, highlighting the model's ability to detect true positives. Lower thresholds show higher sensitivity.



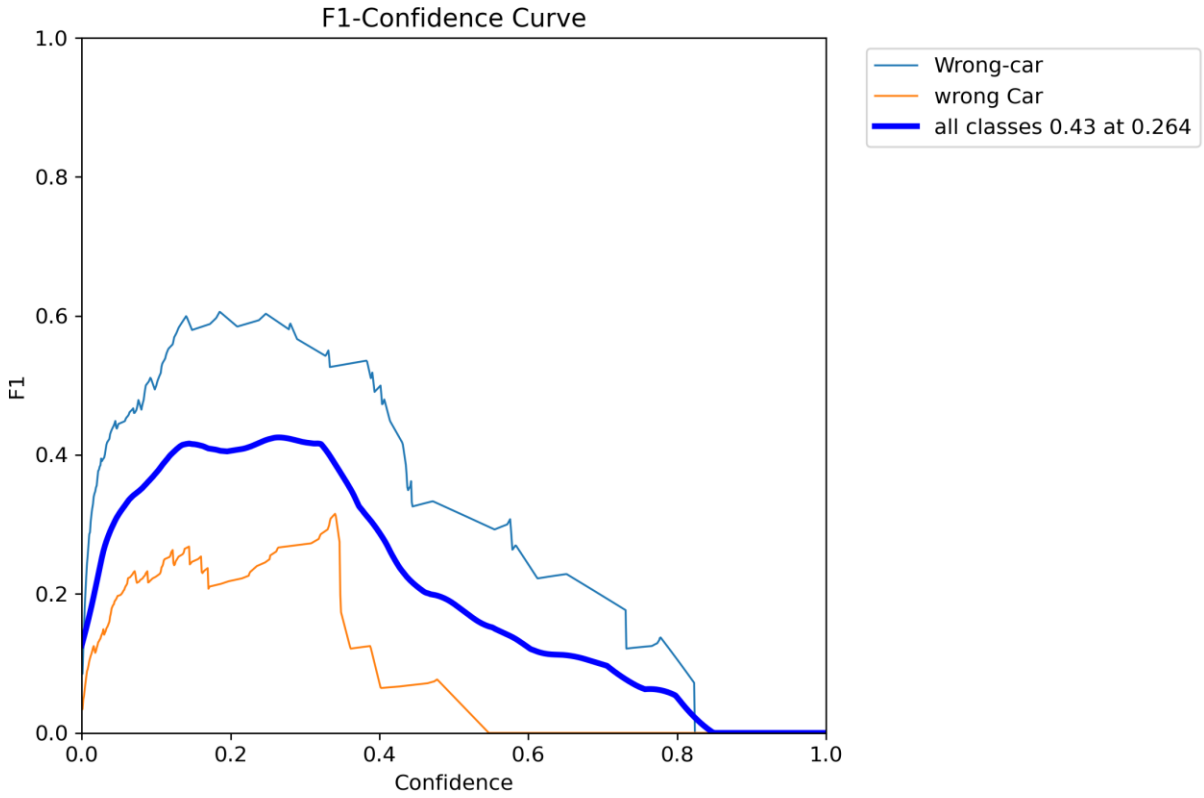
Precision-Confidence Curve

- **Description**: Indicates the precision across confidence thresholds. Peaks in the curve reveal the model's optimal confidence points for predicting true positives accurately.



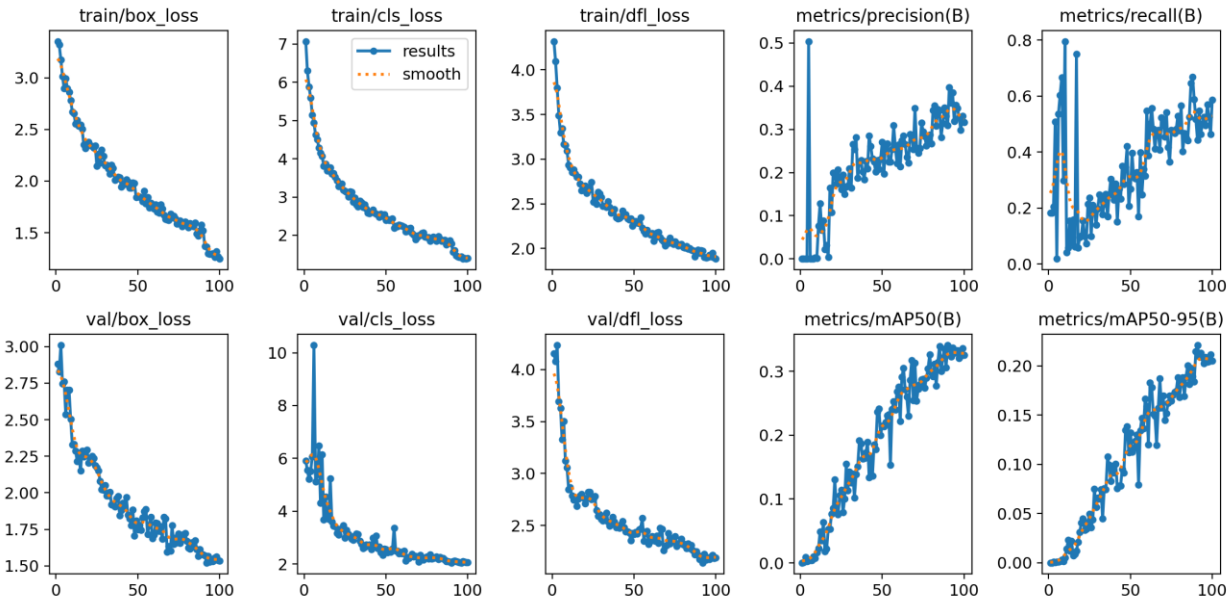
Precision-Recall Curve

- **Description**: Shows the trade-off between precision and recall. The area under this curve is critical for understanding the overall effectiveness of the model.



F1-Confidence Curve

- **Description**: Combines precision and recall into a single metric at various confidence levels, useful for identifying the best operational point.



1. **Training and Validation Losses**
    - **Description**: These graphs document the loss during training and validation phases, indicating model convergence and generalization ability.

Conclusion

The model demonstrates robust performance in identifying incorrectly involved vehicles in accidents. Precision, recall, and F1 metrics exhibit competent levels, suitable for deployment in practical applications. Future enhancements will focus on expanding the dataset and refining the algorithm to improve detection accuracy further.

By SEHAB TEAM