Driver Monitoring System — Performance Analysis Report

This comprehensive report evaluates the Driver Monitoring System (DMS) across multiple performance dimensions including face detection, gaze estimation, drowsiness detection, and distraction classification.

Report Configuration: - Dataset: ds_dms_eval_2024_v2 - Model Version: DMS-Core-v3.2.1 - Evaluation Date: 2024-12-15

Executive Summary

This section provides high-level metrics suitable for external stakeholders.

Overall system accuracy across all detection tasks.

Metric	Value
Overall System Accuracy	96.7 %

Summary of key performance indicators for executive review.

Category	Metric	Value	Target	Status
Detection	Face Detection	98.0%	>95%	PASS
Detection	Eye Detection	96.5%	>95%	PASS
Estimation	Gaze Accuracy	4.2°	<5°	PASS
Estimation	Pose Accuracy	3.1°	<5°	PASS
Classification	Drowsiness	94.5%	>90%	PASS
Classification	Distraction	91.3%	>90%	PASS
Performance	Latency P99	23.4ms	<30ms	PASS

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1. Face Detection Performance

1.1 Detection Accuracy

1.2 Pose Estimation

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2. Gaze Estimation

2.1 Gaze Vector Accuracy

2.2 Gaze Zone Classification

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3. Drowsiness Detection

3.1 Eye State Analysis

3.2 Yawn Detection

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4. Distraction Classification

4.1 Activity Recognition

4.2 Attention Score

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5. System Performance

5.1 Latency Analysis

5.2 Resource Utilization

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6. Failure Analysis (Internal Only)

This section contains detailed failure analysis for internal engineering review.

6.1 Error Categorization

6.2 Edge Cases

6.3 Debug Information

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7. Experimental Results (Draft)

These results are from experimental features not yet validated for production.

7.1 Multi-Occupant Detection

7.2 Emotion Recognition (WIP)

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8. Recommendations

Based on the analysis, we recommend the following improvements:

1. **Sunglasses Handling**: Implement adaptive IR intensity for sunglasses detection

2. **Gaze Calibration**: Add per-driver gaze calibration for improved accuracy
3. **Latency Optimization**: Target 15ms reduction through model pruning
4. **Edge Case Coverage**: Expand training data for identified failure modes

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Appendix A: Methodology

A.1 Dataset Description

The evaluation dataset (ds_dms_eval_2024_v2) contains: - 150,000 annotated frames - 500 unique subjects - 12 lighting conditions - 8 vehicle types

A.2 Evaluation Protocol

All metrics were computed using: - 5-fold cross-validation - Stratified sampling by subject - Held-out test set (20% of data)

Appendix B: Detailed Tables (Verbose)

B.1 Per-Subject Performance

B.2 Per-Frame Analysis

B.3 Raw Feature Distributions

Appendix C: Dossier-Only Content

This section contains highly condensed summary for regulatory dossier.

Regulatory compliance summary table.

Regulatory Requirement	Standard	Test Result	Compliance
Driver Attention Detection	UNECE R79	PASS	Compliant
Drowsiness Warning	EU 2019/2144	PASS	Compliant
Distraction Warning	EU 2019/2144	PASS	Compliant
System Availability	ISO 26262	99.2%	ASIL-B
False Positive Rate	Internal	<2%	Compliant

Composite safety score for regulatory filing.

Metric	Value
Composite Safety Score	94.8 %