

SOVEREIGN: What is the impact of attention mechanism sparsity levels on segmentation accuracy for [drivable surface, obst

SOVEREIGN Research Kernel

Autonomous draft — Owner review required before publication

May 28, 2026

Abstract

Automated driving systems (ADSs) promise a safe, comfortable and efficient driving experience. However, fatalities involving vehicles equipped with ADSs are on the rise. The full potential of ADSs cannot be realized unless the robustness of state-of-the-art is improved further. This paper discusses unsolved problems and surveys the technical aspect of automated driving. Studies regarding present challenges, high-level system architectures, emerging methodologies and core functions including localization, mapping, perception, planning, and human machine interfaces, were thoroughly reviewed. Fur

1 Introduction

Analysis of: A Survey of Autonomous Driving: *Common Practices and Emerging Technologies*. Research goal: What is the impact of attention mechanism sparsity levels on segmentation accuracy for [drivable surface, obstacle, vegetation] categories in real-time navigation scenarios?.

2 Methodology

Multi-query arXiv search (4 parallel queries, Relevance-sorted). TF-IDF cosine semantic verification (bigrams, threshold=0.15). NIM nv-embedqa-e5-v5 (dim=1024) for semantic indexing. Tribunal v2: 3-role parallel review (SKEPTIC/VALIDATOR/SYNTHESIZER) with revision round if score < 6.5.

3 Results

9 papers retrieved. 5 claims extracted, 5 verified. Tribunal: 7.7/10 → APPROVE (revision_round=0). Policy: AUTO_APPROVE.

4 Uncertainties

NIM free tier latency varies. TF-IDF verification is a weak signal. arXiv Relevance ranking is query-dependent. Tribunal consensus is LLM-based and prompt-sensitive.

5 Extracted Claims

Claim	Verified	Confidence
Fatalities involving vehicles equipped with automated driving systems are on the rise.	✓	0.26
The paper discusses unsolved problems and surveys the technical aspect of automated driving.	✓	0.34
Studies regarding present challenges, high-level system architectures, emerging methodologies and core functions include	✓	0.49
Many state-of-the-art algorithms were implemented and compared on our own platform in a real-world driving setting.	✓	0.34
The paper concludes with an overview of available datasets and tools for ADS development.	✓	0.30

References

- <https://doi.org/10.3390/s21062140>
- <https://doi.org/10.1016/j.inffus.2024.102644>
- <https://doi.org/10.1109/access.2020.2983149>