

# **ROAD LANE LINE DETECTION**

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# **ABSTRACT**

Road lane line detection is a crucial aspect of autonomous driving and advanced driver-assistance systems (ADAS). The objective of this technology is to accurately identify and track the position of lane lines on roads in real-time. This information is then used to control the vehicle's steering, navigation, and other functions.

There are various methods for detecting road lane lines, including traditional computer vision techniques and machine learning-based approaches. The computer vision-based techniques use image processing algorithms to detect lane lines by looking for distinctive features such as color, edges, and curves. Machine learning-based methods, on the other hand, involve training a model on a large dataset of images to recognize the characteristics of road lane lines.

One of the main challenges in road lane line detection is ensuring the accuracy and robustness of the system under different lighting conditions, road surfaces, and weather conditions. To address these challenges, researchers have proposed various techniques such as adaptive thresholding, perspective transformation, and post-processing to improve the performance of road lane line detection algorithms.

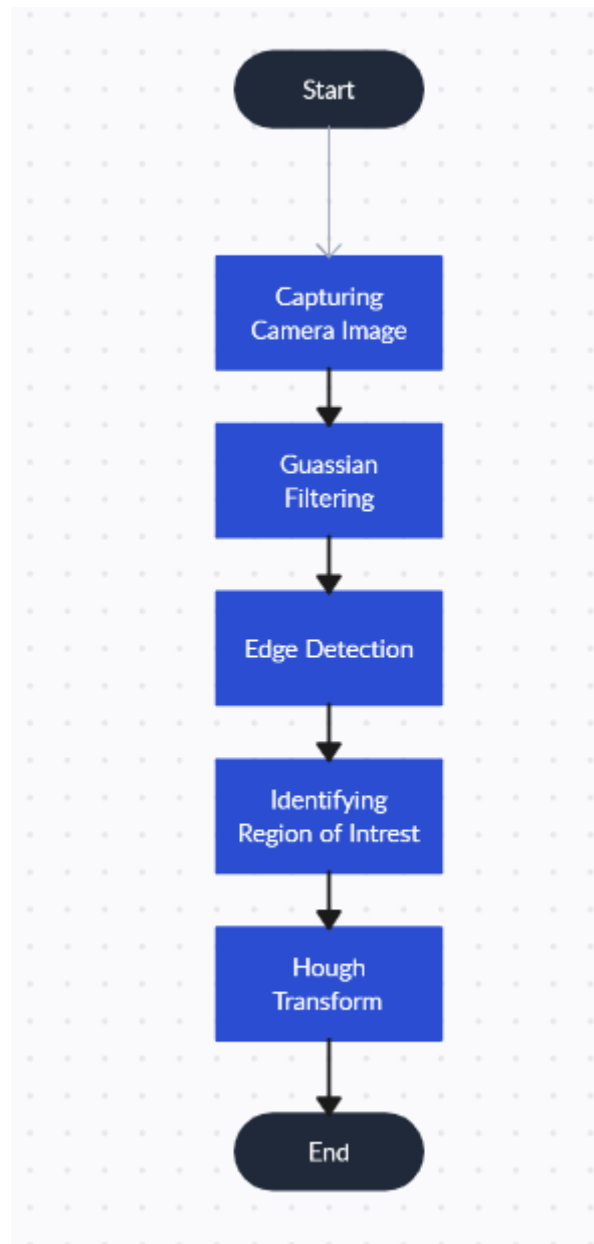
# **INTRODUCTION**

Lane line detection plays a critical role in ensuring the safety and stability of vehicles, especially in situations where the driver may be distracted or drowsy. In addition, the information obtained from lane line detection can also be used to improve the overall driving experience by providing warnings or assisting with lane changes and navigation.

There have been numerous methods proposed for detecting road lane lines, ranging from traditional computer vision techniques to more sophisticated machine learning-based approaches. These techniques have varying levels of complexity and accuracy, and the choice of method often depends on the specific requirements and constraints of the system being developed.

In this introduction, we will provide an overview of the various techniques used for road lane line detection, highlighting the key features, benefits, and limitations of each approach. Additionally, we will discuss the current state-of-the-art in this field, as well as future directions for research and development.

## PROCESS FLOW DIAGRAM



## LITERATURE REVIEW

S. No	Author & Year	Title	Journal	Technique	Advantage
1	<u>Wael Farag</u> (2018)	Road Lane-Lines Detection in Real-Time for Advanced Driving Assistance Systems	<a href="https://ieeexplore.ieee.org/abstract/document/8855797/keywords#keywords">https://ieeexplore.ieee.org/abstract/document/8855797/keywords#keywords</a>	<i>LaneRTD</i> algorithm	it is only using a single CCD camera.
2	Fang Ding (2022)	Lane Line Identification and Research Based on Markov Random Field	<a href="https://www.mdpi.com/2032-6653/13/6/106">https://www.mdpi.com/2032-6653/13/6/106</a>	Markov Random Field	It describes different labels of pixels
3	Bin Liu, Hongzhe Liu, Jiazheng Yuan	Lane Line Detection based on Mask R-CNN	<a href="https://www.atlantis-press.com/proceedings/icmeit-19/55917250">https://www.atlantis-press.com/proceedings/icmeit-19/55917250</a>	R-CNN	It can solve lane line detection in complex situations in road scenes, reduces the amount of calculation and improving efficiency
4	<u>Youcheng Zhang</u> (2021)	Ripple-GAN	<a href="https://ieeexplore.ieee.org/abstract/document/9091897">https://ieeexplore.ieee.org/abstract/document/9091897</a>	RiLLD-Net	It highlights the lane line properties as well as to remove the interference, and thus detect the lane line effectively for most common scenes.

5	Mingzhou LIU	Detection of highway lane lines and drivable regions	<a href="https://www.sciencedirect.com/science/article/pii/S0045790620307631">https://www.sciencedirect.com/science/article/pii/S0045790620307631</a>	dynamic image enhancement algorithm	high operation speed and good <u>noise suppression</u> effect
6	Huifeng Wang (2019)	Lane Detection of Curving Road	<a href="https://ieeexplore.ieee.org/abstract/document/8700240">https://ieeexplore.ieee.org/abstract/document/8700240</a>	straight-curve model	It can be used when the view field is far
7	Sheng Luo, Kang Song, Chang-Wei Yan & Mu-Chou Wang 16 June 2018	Improved Lane Line Detection Algorithm Based on Hough Transform	<a href="https://link.springer.com/article/10.1134/S1054661818020049">https://link.springer.com/article/10.1134/S1054661818020049</a>	Hough Transform	results showed that the lane can be better identified on expressways and structured roads. Compared with traditional algorithm, the identification is effectively improved.
8	Malik Haris, Jin Hou, Xiaomin Wang November 2021	Multi-scale spatial convolution algorithm for lane line detection	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0923596521001971">https://www.sciencedirect.com/science/article/abs/pii/S0923596521001971</a>	Multi-scale spatial convolution algorithm	multi-tasking processing and improve performance, and end-to-end lane offset estimation network is used in addition to the lane line detection network.
9	Samia Sultana; Boshir Ahmed 29 March 2021	Robust Nighttime Road Lane Line Detection using Bilateral	<a href="https://ieeexplore.ieee.org/abstract/document/9386516">https://ieeexplore.ieee.org/abstract/document/9386516</a>	Bilateral Filter and SAGC	Experimental results show that the average detection rate is 94.05%, and the average detection time is 26.11ms

		Filter and SAGC under Challenging Conditions			per frame which outperformed state-of-the-art method.
10	Luo-Wei Tsai; Jun-Wei Hsieh; Chi-Hung Chuang ; Kuo-Chin Fan 05 September 2008	Lane detection using directional random walks	<a href="https://ieeexplore.ieee.org/abstract/document/4621271">https://ieeexplore.ieee.org/abstract/document/4621271</a>	directional random walks	Without defining any mathematical curve models, various road lane shapes and types can be well extracted from road frames even with complicated backgrounds. Experimental results show that the proposed scheme is powerful in lane detection.