

Detecting road lanes through image analysis with computer vision

By: Vivek Mange

Introduction:

Road lane detection is a crucial aspect of autonomous vehicles and advanced driver assistance systems (ADAS). The ability to accurately identify and track lanes helps in navigation, ensuring vehicle safety, enabling autonomous decision-making, lane-keeping assistance and lane departure warning systems. The objective of this project was to create a reliable computer vision algorithm capable of detecting road lanes in images under varying road conditions. The project involves implementing a comprehensive image processing pipeline, specifically designed to visually illustrate each stage of the lane detection process.

Analysis:

In the analysis phase, various image processing techniques were explored to detect road lanes effectively. These techniques were chosen based on their common use in the field of computer vision for lane detection and their potential to handle challenges such as varying lighting conditions and road geometries.

Methodology:

- Grayscale conversion, Gaussian blur, and Canny edge detection for image preprocessing.
- Region of interest masking to focus on the area where lane lines are expected.
- Application of the Hough Transform to detect lines in the masked region.
- Calculation of average slope and intercept for left and right lane lines.
- Visualization of the detected lane lines on the original image.

Data Collection:

The project utilizes static images representing road scenes.

Data Analysis:

The Hough Transform effectively identifies lines in the region of interest, and the average slope and intercept calculation successfully distinguishes between left and right lanes.

Results:

Image1:



Image2:

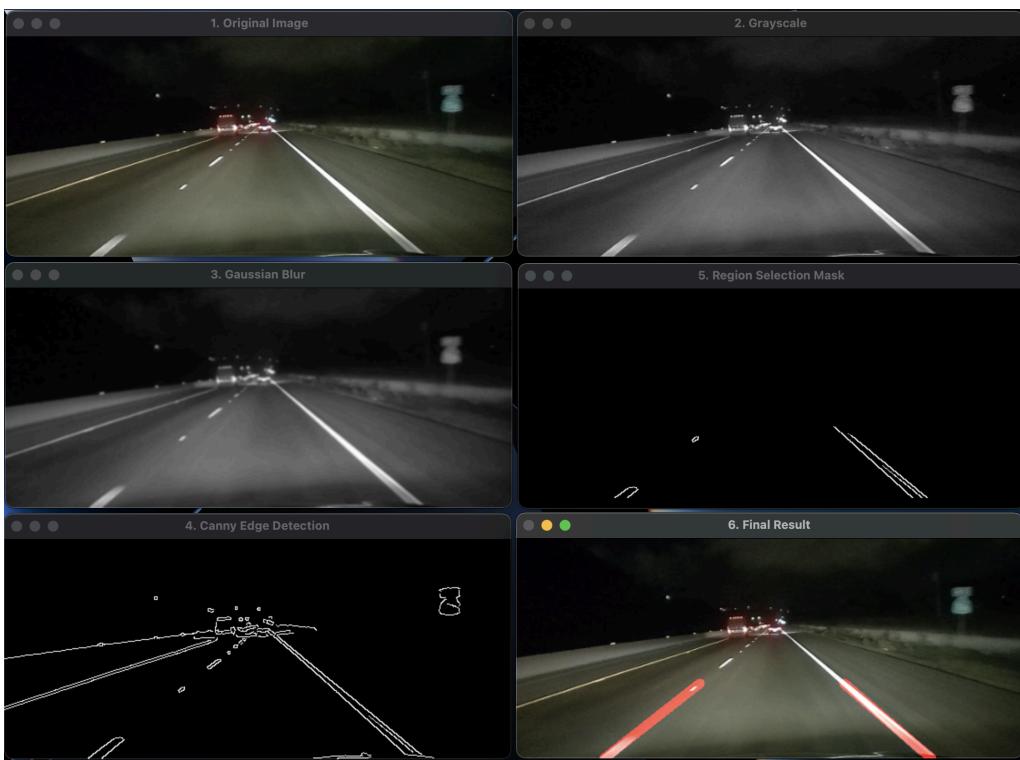


Image3:

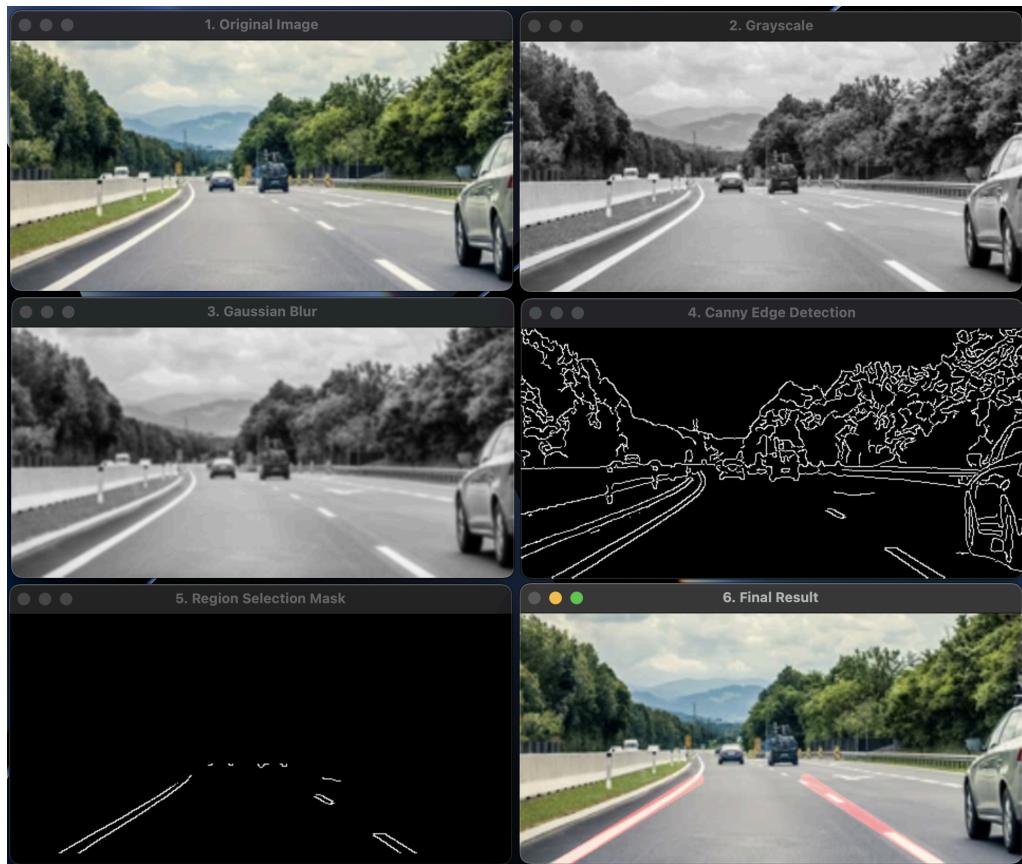


Image4:



Conclusion:

In conclusion, the computer vision algorithm successfully detects road lanes in diverse scenarios, showcasing robust performance and adaptability. Implemented in Python with OpenCV, the algorithm holds promise for enhancing intelligent transportation systems. Particularly noteworthy is its success in detecting lanes seamlessly, whether during daytime or nighttime driving conditions.

Bibliography:

Goyal, A., Singh, M., & Srivastava, A. (2019). Lane Detection on Roads using Computer Vision. *International Journal of Engineering and Advanced Technology (IJEAT)*, Volume-9, Issue-1, October 2019, ISSN: 2249 – 8958, pp. 1200.

Yen-Chang Chen, Yen-Ning Su, "A Robust Real-Time Lane Detection Algorithm Based on the Hough Transform and Its Applications," IEEE Transactions on Intelligent Transportation Systems, vol. 9, no. 1, pp. 89-99, March 2008.