Project Report- Car Detection in Video Streams using OpenCV

Introduction

This project's goal is to use the computer vision library OpenCV to create a system for real-time automobile detection in video streams. The main goal is to identify autos in video data using a pre-trained Haar cascade classifier, opening up possibilities for automated systems, traffic monitoring, and surveillance.

Analysis

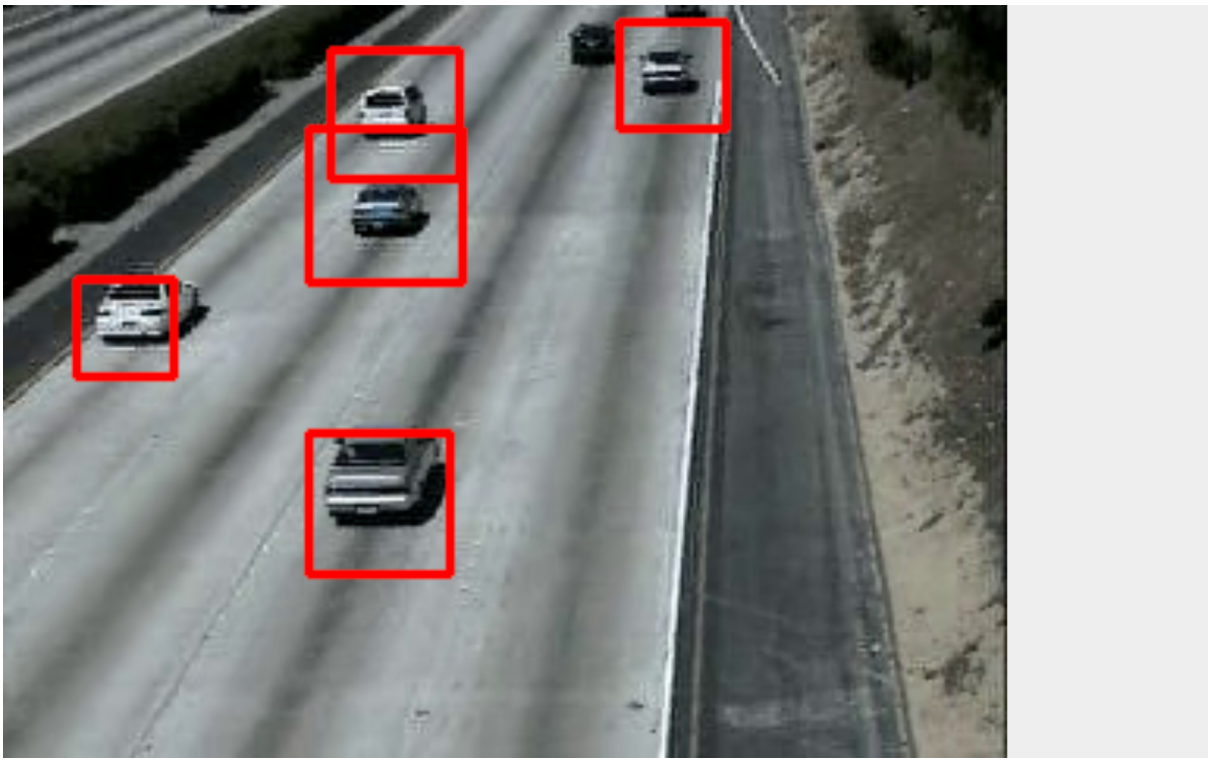
The algorithm uses a machine learning-based object detection method called the Haar cascade classifier, which is particularly trained to recognise cars. Frames are read sequentially from a video file using the cv2.VideoCapture() function. Grayscale conversion of each frame makes processing easier and improves the effectiveness of the detection method.

Car_cascade.detect is aThe MultiScale() function uses the scale factor, minimum neighbours, and minimum size as input parameters to search for car-like structures in each frame. Rectangles created with cv2.rectangle() are used to outline detected automobiles.

Results

The application shows that car detection in the video stream is successful. When recognised cars show up in the frames, the algorithm marks them with bounding boxes in real time. Variations in the size and direction of the vehicle, lighting, and

video source quality can all have an impact on how effective the detecting procedure is.



Conclusion

Although the system in place produces encouraging outcomes, there are still a few areas that may be improved. Playing around with parameter optimization—changing the minimum neighbours and scale factor, for example—may improve detection robustness and accuracy in a variety of video scenarios. Furthermore, investigating different cascade classifiers or sophisticated methods like deep learning-based models may improve detection skills even more.

Furthermore, the system's performance for real-time applications could be improved by optimising the code for parallel processing or hardware acceleration. The implementation of these improvements has the potential to greatly increase the car detection system's applicability and reliability.

Bibliography

Sources:

- OpenCV Documentation: https://docs.opencv.org/
- Bradski, G., & Kaehler, A. (2008). Learning OpenCV: Computer Vision with the OpenCV Library. O'Reilly Media.
- Viola, P., & Jones, M. (2004). Robust Real-Time Object Detection. International Journal of Computer Vision, 57(2), 137-154.
- Redmon, J., & Farhadi, A. (2018). YOLOv3: An Incremental Improvement. arXiv preprint arXiv:1804.02767.