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Parallelization Algorithm of Computer Vision for Autonomous Vehicles

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Abstract:

The important features that enable computer vision in autonomous vehicle technology and infotainment function are image processing and object identification. Image segmentation is the preliminary step of any image processing algorithm. This work uses the Union-Find algorithm to segment images on a grey scale. It is a simple yet effective algorithm for intense applications. A review of the image segmentation algorithms and parallelization techniques is presented in this paper. Initially, three different profiling techniques are applied in order to identify the hot-spots, i.e. most time-consuming parts of the code. Parallelization techniques are applied to the regions of the hot-spots identified during profiling. The Union-Find algorithm is parallelized using OpenMP, MPI, and CUDA. The execution time decreases with the increase in the number of threads till a certain optimal value of threads. The optimal number of threads is found for the respective parallelization techniques.

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