RESEARCH ARTICLE

A High-Performance Open-Source Framework for Real-Time LiDAR Point Cloud Processing

Alex Nguyen, Sofia Costa

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Abstract:

We introduce CloudProcX, an open-source framework for real-time LiDAR point cloud processing optimized for autonomous vehicle applications. The framework leverages GPU-accelerated voxelization, octree-based spatial indexing, and custom CUDA kernels to achieve processing speeds of 2 million points per second on consumer-grade hardware. Comparative benchmarks against existing solutions (PCL, Open3D) show 3-8x throughput improvements for common operations including filtering, segmentation, and registration. CloudProcX is released under the MIT license with comprehensive documentation and pre-trained models for common autonomous driving scenarios.