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A real-time state estimation for an electric race car

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Declaration of Authorship

I hereby declare that the thesis submitted with the title *A real-time state estimation for an electric race car* is my own unaided work. All direct or indirect sources used are acknowledged as references.

Neither this nor a similar work has been presented to an examination committee or published.

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Abstract

Real-time computer vision applications with deep learning-based inference require hardware-specific optimization to meet stringent performance requirements. Frameworks have been developed to generate the optimal low-level implementation for a certain target device based on a high-level input model using machine learning in a process called autotuning. However, current implementations suffer from inherent resource utilization inefficiency and bad scalability which prohibits large-scale use.

In this paper, we develop a load-aware scheduler which enables large-scale autotuning. The scheduler controls multiple, parallel autotuning jobs on shared resources such as CPUs and GPUs by interleaving computations, which minimizes resource idle time and job interference. The scheduler is a key component in our proposed Autotuning as a Service reference architecture to democratize autotuning. Our evaluation shows good results for the resulting inference performance and resource efficiency.

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3 Design

Requirements: flexible, robust, DV support, sensors

Design: Architecture, preprocessing, EKF, outlier detection, imu fusion

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