RICOH uses Silexica's SLX to discover and exploit hidden parallelism in the OpenCV computer vision library

Ricoh is empowering digital workspaces using technologies that enable smarter working. For more than 80 years, Ricoh has been driving innovation and is a leading provider of document management solutions, IT services, printers, cameras and industrial systems. Ricoh uses open-source software libraries to implement less disruptive algorithms for consumer imaging devices. These are tailor-made to cover a wide set of applications and fine-tuned for a target algorithm and hardware platform. SLX has supported Ricoh in analyzing, optimizing and implementing the flows on an OpenCV application.

RICOH

- Operates in 200 countries with regional HQ in Japan, Singapore, UK and USA
- Imaging and solutions, industrial products, network systems solutions, office imaging, production printing
- 105 613 employees globally
- 2,028.8 billion Yen in sales (March 2017)
- Established in 1936

> **"** *The analysis capabilities of Silexica's tools enabled us to get valuable application insight, which significantly reduced our design cycle for OpenCV based applications. The tools are stable and can analyze complex open-source libraries, which is a significant advantage over other analysis tools.* **"**

Sadahiro Kimura,
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Client challenges:

Ricoh uses open-source libraries to manage the complexities of modern consumer imaging devices such as all-in-one printing solutions, overhead projectors and cameras. These libraries implement non-differentiating algorithms so that development efforts can be focussed on killer applications. Although this approach significantly shortens design cycles, algorithms within the libraries may not be optimized for the hardware running on the consumer product. This is especially important for performance and size functions as open software is usually designed to be portable and not optimized for a specific target. The manual extraction of specific algorithms for a product can be a long and arduous task as it requires an in-depth knowledge of the library implementation. Once the algorithms are extracted, manual optimization is often required to achieve the desired real-time behavior. Ricoh wanted an efficient way to pin-point the used algorithms and to discover the underlying parallelism that could be exploited.

Solution:

SLX understands the exact behavior of an application by automatically and precisely analyzing its source code. It uses compiler technology by utilizing static and dynamic information to identify all data- and control- dependencies and build a complete application model. For parallel applications, existing communication and synchronization patterns are analyzed as well. A pattern-based framework allows the identification of missed opportunities for additional parallelism. Different levels of parallelism are supported, such as task-, pipeline-, and data- level parallelism for embedded high-performance computing applications.

Results:

Silexica applied its C/C++ flow on an OpenCV application. This enabled Ricoh to extract the exact portions of the library that were being used. Furthermore, SLX was able to detect parallelism on the sequential portions of the library, and to predict the achievable speedup, given that a parallel implementation was to be derived.

Contact us and get more information

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