

REAL TIME MONOCULAR SLAM ON A GPU

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Abstract

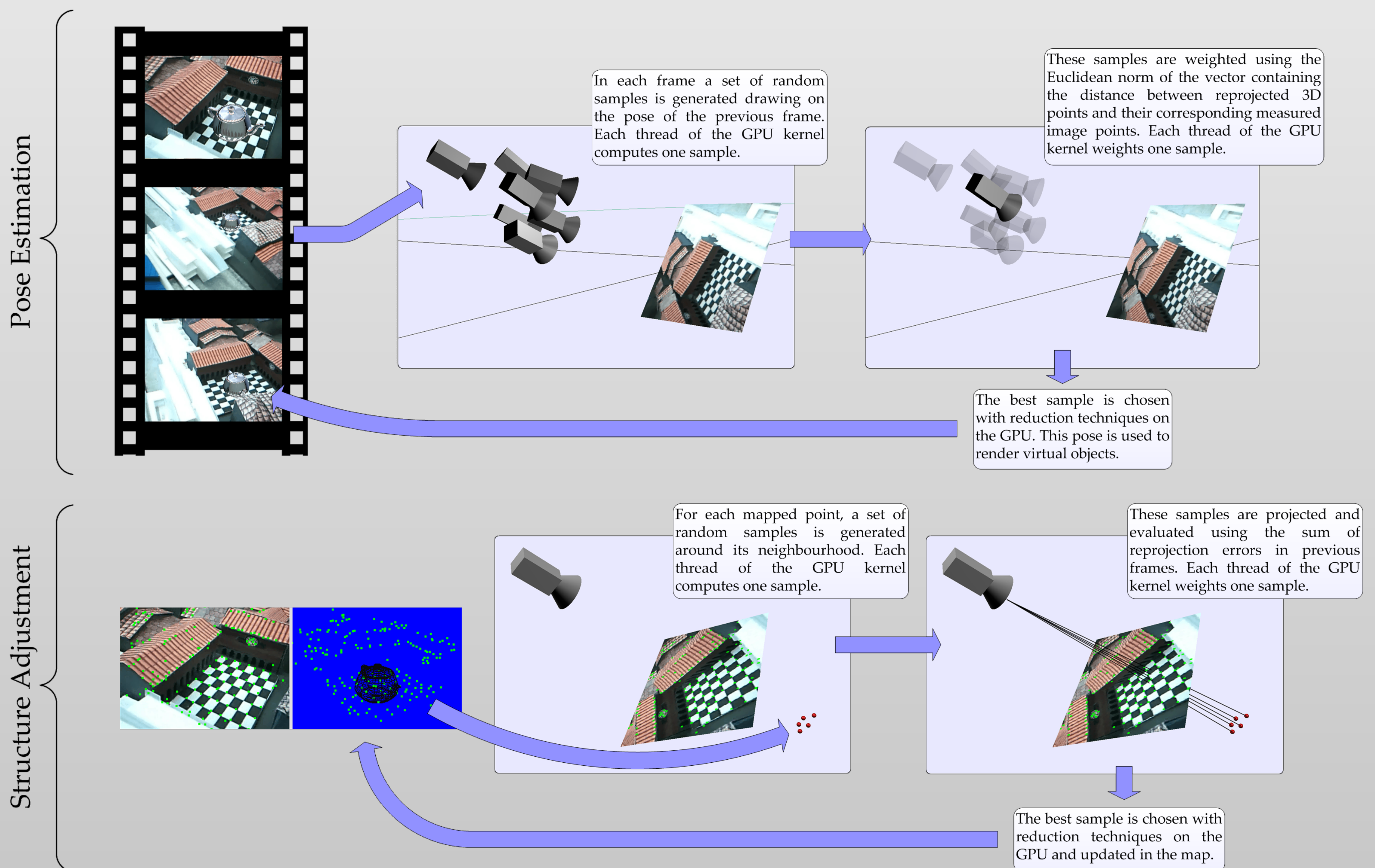
Traditionally the monocular SLAM problem is solved using non-linear minimization techniques that are very accurate but are hardly used in real time. This work presents a highly parallelizable random sampling approach based on Monte Carlo simulations that fits very well on the graphics hardware. It achieves the same precision as non-linear optimization methods, without losing the real time performance running on commodity graphics hardware.

Motivation

Monocular SLAM has been widely studied in previous works. However, almost solutions are based on expensive batch optimisations that are hardly implemented in real time. In recent years, GPUs are being used as general purpose parallel architectures. However, existing batch algorithms are not suitable for this parallel architecture, so this work presents a parallel approach to the SLAM problem that runs in real time on a standard GPU.

Highlights

- A monocular SLAM algorithm oriented to augmented reality applications
- Capable of operating in real time in the GPU, leaving the CPU free
- As robust as non-linear optimisation solutions, like Bundle-Adjustment



Total time < 20ms per frame
On a c2d @ 3.0GHz with a
nVidia GTX260

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