FOLKI-GPU : A powerful and versatile CUDA code for real-time optical flow computation

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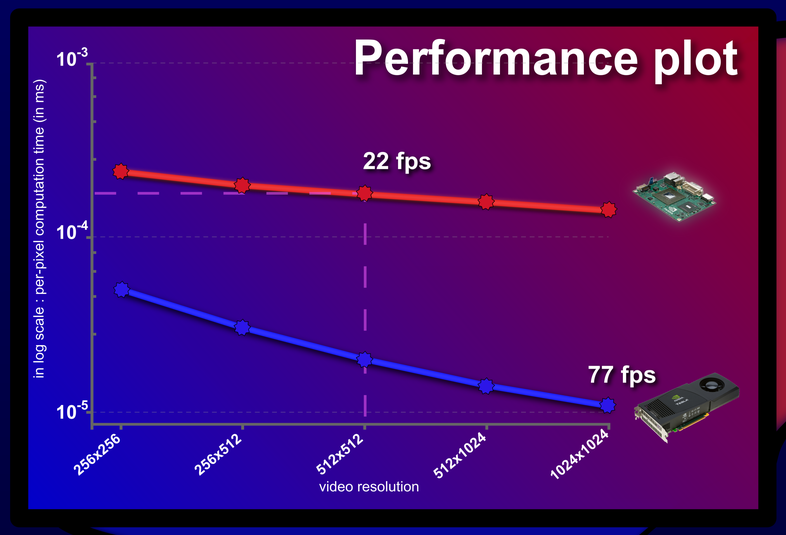
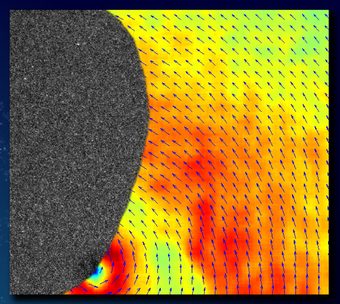


- Optical Flow (OF) is the vector field of apparent motions between frames of a video sequence.
- Based on an original convergent iterative Lucas & Kanade scheme [Le Besnerais & Champagnat, 2005] we derive a pixelwise parallelized CUDA code.
- FOLKI-GPU is a versatile OF estimation algorithm which offers an unprecedented performance/ precision trade-off.

PIV Metrology

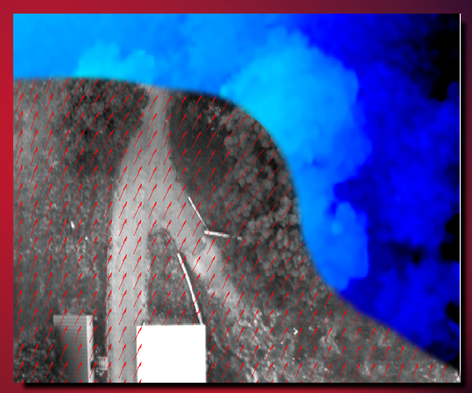


Displacement field and norm of a vortex
PIV images courtesy of ONERA/DAAP

- PIV (Particle Image Velocimetry) is an experimental process aimed at visualizing fluid motions.
- PIV experiments typically require OF estimation on thousand of large images (e.g. 2048x2048) usually via batch processing
- FOLKI-GPU allows on-the-fly OF estimation at video rate and opens the way to fully interactive PIV data processing platforms, see ref. by Champagnat *et al*. PIV'09, Melbourne, Australia.

UAV embedded vision

- OF is a fundamental information in animal vision; for instance, bees use OF estimation to control their flight.
- On lightweight platform such as ION, 512x512 OF can be computed at 20fps for only 1 Watt (extra consumption wrt. idle state).



Motion and relative height estimation on an aerial video from ONERA's UAV Ressac

www.onera.fr/dtim-en/gpu-for-image

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