Master Thesis in Visual Computing:
A Language for Non-Linear Least Squares Optimization in Graphics and Vision

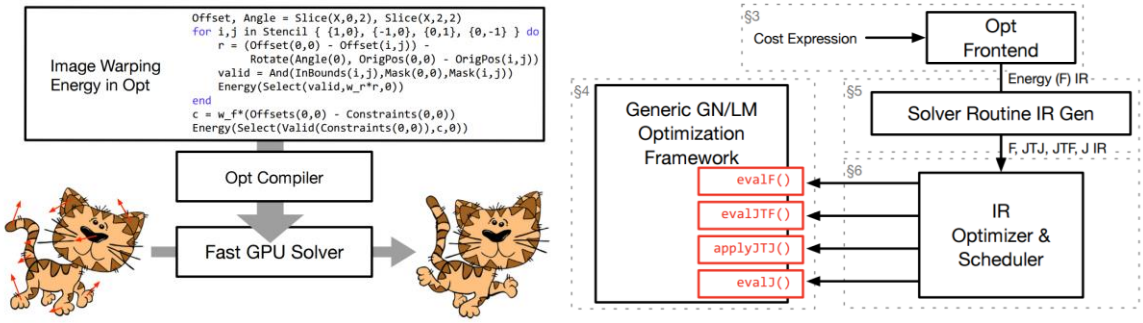
The goal of this thesis is to work on an efficient solver framework for common non-linear least squares problems in commuter graphics and vision. The core idea is to generate solver code for a specific problem. For instance, if a matrix is composed of fixed coefficients (e.g., Laplacian), then all entries can be hard-coded and procedurally generated on-the-fly. This strategy saves significant amounts of memory I/O, which is typically the performance bottleneck on many situations. These matrix-free formulations were often used by hand-written solvers, and led to significant speed ups, but the implementation is tedious. The final goal is automate the solver generation, thus achieve high speed ups and providing an easy-to-use API at the same time.

[DeVito et al. 16] Opt: A Non-Linear Least Squares Optimization Language

Milestones:
1) Gauss-Newton (GN) and Levenberg-Marquardt (LM) solver backend
2) CPU and/or mobile compute
3) Exploring schedules and threading for parallel solvers

Pre-requisites: Programming languages, numerical optimization (GN/LM), highly self-motivated ☺

References: Opt http://optlang.org/



[DeVito et al. 17] Opt

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