Least squares solvers overview

| **Lib name and website** | **Description** |
|---|---|
| DLIB (http://dlib.net/) | • Large library with many topics. (Image processing, statistics, machine learning etc.)<br>• Provides two solver objects for nonlinear least squares problems. (Levenberg-Marquardt or Levenberg-Marquardt+quasi-newton hybrid)<br>**Issues:**<br>• No constraints on algorithms<br>• Generation of data needed before optimization. |
| Eigen (http://eigen.tuxfamily.org/) | • Powerfu linear algebra related library.<br>• No installation needed (only header files)<br>**Issues:**<br>• Least squares solver only covers linear case. |
| Ceres solver(http://ceres-solver.org) | • Powerful library created especially for modelling and optimisation problems.<br>• Provides a number of good algorithms to solve nonlinear least squares problems.<br>**Issues:**<br>• As of the beginning of this study, stability issues with contstrained least squares solvers. https://github.com/ceres-solver/ceres-solver/issues/187 |
| GNU/GSL(https://www.gnu.org/software/gsl) | • Scientific library by GNU. Covers a lot of areas.<br>• Very efficient implementation of algorithms.<br>• Provides only trust region (no line search) type nonlinear least squares solvers.<br>**Issues:**<br>• A lot of extras.<br>• More difficult to use.<br>• If ALGLIB fails in later stage, this should be the fallback choice. |
| ALGLIB(http://www.alglib.net/) | • Efficient numerical analysis library.<br>• Easy to include into c++ project: only headers are needed.<br>• Constrained least square solver options.<br>• License allows scientific publications. |