
Software

Computers are useless. They can only
give you... answers.

P. PICASSO

TOSCA Code accompanying *Numerical geometry of nonrigid shapes*. Fast marching algorithms, farthest point sampling, Voronoi diagrams. Includes MATLAB interface to *QSlim*. MDS with vector extrapolation acceleration; Generalized MDS.

<http://tosca.cs.technion.ac.il>

License: Free

Language: MATLAB/MEX

Visualization Toolkit (VTK) Library for 3D data handling and visualization. Includes everything that can be desired for rendering, basic surface manipulation routines, importers/exporters for many 3D data formats.

<http://www.vtk.org>

License: Free

Language: C++

QSlim Mesh simplification code by Michael Garland [168].

<http://graphics.cs.uiuc.edu/~garland/software/qslim.html>

License: Free

Language: C++

Afront Advancing front remeshing; mesh extraction from volumetric data and point clouds. Based on [343, 342, 338].

<http://afront.sourceforge.net>

License: Free

Language: C++

Qhull One of the fastest codes for the computation of the convex hull and Euclidean Voronoi and Delaunay tessellations.

<http://www.qhull.org>

License: Free

Language: C

MATLAB Optimization Toolbox The best starting point for MATLAB users. Includes constrained and unconstrained optimization problems; nonlinear and multi-objective optimization; nonlinear least-squares; data fitting; nonlinear equations; quadratic and linear programming; integer programming.

<http://www.mathworks.com/products/optimization>

License: Commercial

Language: MATLAB

TOMLAB Nonlinear optimization; data fitting; global, non-convex and non-smooth optimization; linear, quadratic, and semidefinite programming. Supports large-scale sparse matrices. Compatible with *MATLAB Optimization Toolbox*.

<http://tomopt.com>

License: Commercial

Language: MATLAB

Iterative Methods for Optimization Codes accompanying Kelley's book [221]. Line search algorithms; trust region; Newton; conjugate gradients; BFGS.

http://www4.ncsu.edu/~ctk/matlab_darts.html

License: Free

Language: MATLAB

OPT++ Object-oriented nonlinear optimization library. Newton methods; nonlinear interior-point method; parallel direct search; trust region.

<http://csmr.ca.sandia.gov/opt++>

License: Free

Language: C++

LANCELOT Unconstrained and constrained optimization problems; nonlinear equations; nonlinear least-squares problems. Includes an implementation of Augmented Lagrangian method.

<http://www.cse.scitech.ac.uk/nag/lancelot>

License: Free

Language: Fortran 77

ANN David Mount's library for approximate nearest neighbor search.

<http://www.cs.umd.edu/~mount/ANN>

License: Free

Language: C++

MATLAB Statistics Toolbox Supports different types of MDS problems, including classic scaling.

<http://www.mathworks.com/products/statistics>

License: Commercial

Language: MATLAB

Nonmetric MDS Mark Steyvers' code allows minimization of different variants of stress.

<http://www.mathworks.com/products/statistics>

License: Free

Language: MATLAB

Isomap Low-dimensional embedding of Euclidean data.

<http://isomap.stanford.edu>

License: Free

Language: MATLAB

Toolbox for Dimensionality Reduction by Laurens van der Maaten. Includes PCA, LLE, HLLE, LTSA, and diffusion maps.

<http://www.cs.unimaas.nl/l.vandermaaten>

License: Free

Language: MATLAB

An up-to-date list of relevant software is available on the book website tosca.cs.technion.ac.il/book.