

Learning Kernels -Tutorial

Part IV: Software Solutions

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This Part

- Software Solutions

- Demo

Open-Source Software

- Provide easy-to-use and efficient implementations of useful learning kernel algorithms.
- Allows end-users to combine standard as well as specialized domain-specific kernels.
- Allow researchers to easily compare against established learning kernel algorithms.
- Allow developers to makes use of and extend existing algorithms.

Open-Source Software

■ Libraries and single algorithms - a starting point:

- SHOGUN <http://www.shogun-toolbox.org>
- OpenKernel.org <http://www.openkernel.org>
- DOGMA (online alg: UFO) <http://dogma.sourceforge.net/index.html>
- MKL-SMO, HKL <http://www.di.ens.fr/~fbach/index.htm#software>
- SMO q-norm, GMKL <http://research.microsoft.com/~manik/>
- SimpleMKL <http://asi.insa-rouen.fr/enseignants/~arakotom/code/mklindex.html>
- Mixed-Norm <http://www.cse.iitb.ac.in/saketh/research.html>
- DC-program <http://www.cs.ucl.ac.uk/staff/A.Argyriou/code/dc/>
- LP-B, LP- β <http://www.vision.ee.ethz.ch/~pgehler/>
- MC-MKL <http://http://www.fml.tuebingen.mpg.de/raetsch/>

SHOGUN



- www.shogun-toolbox.org
S. Sonnenburg, G. Raetsch, S. Henschel
- Large scale kernel methods, focusing on SVM
- MATLAB, R, Octave and Python interfaces.
- Choice of LibSVM, Liblinear, SVMLight for internal solver.
- Standard kernels (e.g. Gaussian) as well as some string kernels (e.g. Locality Improved, Fischer).
- LI-combinations, SLP implementation [Sonnenburg et al., 2006]
- Lq-combinations ($q > 1$), specialized interleaved optimization or Newton step wrapper method [Kloft et al., NIPS 2009]

OpenKernel

- www.openkernel.org
Cyril Allauzen, Mehryar Mohri, Afshin Rostami
- Supports standard kernels, general rational kernels (string kernels) and custom pre-computed kernels.
- Interfaces to LibSVM, includes Kernel Ridge Regression implementation.
- L1-regularized positive linear combinations
- L2-regularized positive linear combinations [Cortes et al., UAI 2009]
- L2-positive quadratic combinations [Cortes et al., NIPS 2009]
- Two-stage alignment based methods [Cortes et al., ICML 2010]

OpenKernel

- Command-line programs:
 - *klcombinekernels*: combine pre-computed kernels
 - LibSVM or binary format.
 - *klcombinefeatures*: combine explicit feature mappings
 - Supports sparse mappings, millions of features.
 - *klweightfeatures*: weights individual features, i.e. rank-1 kernel combinations
 - Feature weighting/selection.

OpenKernel

[DEMO]