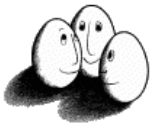

# SVM$^{light}$

# Support Vector Machine

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Version: 6.02
Date: 14.08.2008

## Overview

SVM$^{light}$ is an implementation of Support Vector Machines (SVMs) in C. The main features of the program are the following:

- fast optimization algorithm
  - working set selection based on steepest feasible descent
  - "shrinking" heuristic
  - caching of kernel evaluations
  - use of folding in the linear case
- solves classification and regression problems. For multivariate and structured outputs use SVM$^{struct}$.
- solves ranking problems (e. g. learning retrieval functions in *STRIVER* search engine).
- computes XiAlpha-estimates of the error rate, the precision, and the recall
- efficiently computes Leave-One-Out estimates of the error rate, the precision, and the recall
- includes algorithm for approximately training large transductive SVMs (TSVMs) (see also Spectral Graph Transducer)
- can train SVMs with cost models and example dependent costs
- allows restarts from specified vector of dual variables
- handles many thousands of support vectors
- handles several hundred-thousands of training examples
- supports standard kernel functions and lets you define your own
- uses sparse vector representation

NEW SVM$^{struct}$: SVM learning for multivariate and structured outputs like trees, sequences, and sets (available here).

NEW SVM$^{perf}$: New training algorithm for linear classification SVMs that can be much faster than SVM$^{light}$ for large datasets. It also lets you directly optimize multivariate performance measures like F1-Score, ROC-Area, and the Precision/Recall Break-Even Point. (available here).

NEW SVM$^{rank}$: New algorithm for training Ranking SVMs that is much faster than SVM$^{light}$ in '-z p' mode. (available here).

## Description

SVM$^{light}$ is an implementation of Vapnik's Support Vector Machine [Vapnik, 1995] for the problem of