

# Duality Formulaton of Max-Margin Classifier\*

Arash Rouhani

February 28, 2011

## Abstract

In this fake-paper I write a short mathematical explication of how to formulate the Max-Margin classifier in it's dual form. I go through it step by step.

## 1 Primal formulation

To be written ...

## 2 Lagrangian function

There will be as always 3 kinds of terms, coming from either the *the objective function*, *a constraint* or *a variable constraint*.

$$L(w, b, \xi, \mu, \nu) = \frac{1}{2} \|w\|_2^2 + \sum_{i=1}^n C\xi_i - \mu_i y_i (w^T x_i - b + \xi_i - 1) - \nu_i \xi_i \quad (1)$$

Can simply be rewritten to

$$L(w, b, \xi, \mu, \nu) = \frac{1}{2} \|w\|_2^2 + \sum_{i=1}^n C\xi_i + \mu_i y_i (b + 1 - w^T x_i - \xi_i) - \nu_i \xi_i \quad (2)$$

We now derivativs for each variable-type and get an equation. There are 3 'types' of variables here, so we will get 3 equations.

### 2.1 Derivative with respect to w

### 2.2 Derivative with respect to b

### 2.3 Derivative with respect to $\xi$

---

\*This is the first time I use latex