

2nd Homework Assignment

Project on Support Vector Machines

Vasileios Papageorgiou

June 18, 2024

Theoretical Background

We have the following non linear program:

$$\min\{F(x) = \frac{c^T x}{d^T x} : Ax = b; x \geq 0\} \quad (1)$$

Algorithm 1 Bisection Method for Optimal λ

```

1: Given: interval  $[L, U]$  that contains optimal  $\lambda$ 
2: repeat
3:    $\lambda := \frac{u+l}{2}$ 
4:   Solve the feasibility problem:
5:      $c^T x \leq \lambda d^T x$ 
6:      $d^T x > 0$ 
7:      $Ax = b$ 
8:   Adjust the bounds
9:   if feasible then
10:     $U := \lambda$ 
11:   else
12:     $L := \lambda$ 
13:   end if
14: until  $U - L \leq \epsilon$ 

```

Problem 4

References

- [1] John Platt. Sequential Minimal Optimization: A Fast Algorithm for Training Support Vector Machines. Technical Report MSR-TR-98-14, Microsoft, April 1998. <https://www.microsoft.com/en-us/research/publication/sequential-minimal-optimization-a-fast-algorithm-for-training-support-vector-machines/>.