



Adaptive and Optimal Online Linear Regression on L1-balls

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(Submitted on 20 May 2011 (v1), last revised 23 Jan 2012 (this version, v3))

We consider the problem of online linear regression on individual sequences. The goal in this paper is for the forecaster to output sequential predictions which are, after T time rounds, almost as good as the ones output by the best linear predictor in a given L1-ball in \mathbb{R}^d . We consider both the cases where the dimension d is small and large relative to the time horizon T . We first present regret bounds with optimal dependencies on the sizes U , X and Y of the L1-ball, the input data and the observations. The minimax regret is shown to exhibit a regime transition around the point $d = \sqrt{T} U X / (2 Y)$. Furthermore, we present efficient algorithms that are adaptive, i.e., they do not require the knowledge of U , X , and Y , but still achieve nearly optimal regret bounds.

Subjects: **Machine Learning (stat.ML)**; Learning (cs.LG); Statistics Theory (math.ST)

Cite as: **arXiv:1105.4042 [stat.ML]**
(or **arXiv:1105.4042v3 [stat.ML]** for this version)

Submission history

From: Sebastien Gerchinovitz [view email]
[v1] Fri, 20 May 2011 09:14:03 GMT (56kb)
[v2] Wed, 25 May 2011 07:54:09 GMT (62kb)
[v3] Mon, 23 Jan 2012 19:32:08 GMT (64kb)

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