ACCURATE PREDICTION OF ELECTORAL OUTCOMES

ABSTRACT. We present a new on-line learning algorithm for predicting the outcome of large elections, using as input the predictions made by several experts. Our algorithm benefits from theoretical guarantees that we present and discuss in detail. We also report the results of experiments demonstrating the performance of our algorithm for predicting electoral results both in Australia and in the United States.

1. MOTIVATION

Politicians and the general population largely rely on polls and predictions made by various experts for the prediction of electoral results. The failure of recent predictions made by such experts in the United Kingdom and the United States motivates the search for better tools and techniques. This paper presents a series of techniques based on on-line learning to tackle this problem.

2. PRELIMINARIES

Let $I \subseteq \mathbb{R}$ be an open interval and $f\colon I \to \mathbb{R}$ a convex function. It is known that f is Lipschitz continuous on any interval $[a, b] \subset I$, f admits both left and right derivatives f'_- and f'_+ over I, both non-decreasing, and f is differentiable everywhere except for a set that is at most countable.

3. TAYLOR-TYPE THEOREMS

Lemma 1. *Let $I \subseteq \mathbb{R}$ be an open interval and $f\colon I \to \mathbb{R}$ a convex function. Then, the following holds for all $a, b \in I$:*

$$f(b) - f(a) = \int_a^b f'(t)\,dt = \int_a^b f'_+(t)\,dt = \int_a^b f'_-(t)\,dt.$$

Proof. The result are based on [1]. Since f is Lipschitz continuous over the closed interval in I containing a and b, it is absolutely continuous, which proves the first equality. The second equality is clear for Lebesgue integrals since $f'(t) = f'_+(t) = f'_-(t)$ for all but at most a countable set of points. $\square$

REFERENCES

[1] M. Mohri, A. Rostamizadeh, and A. Talwalkar. *Foundations of Machine Learning*. The MIT Press, 2012.