Forecasting electricity consumption by aggregating specialized experts

A review of the sequential aggregation of specialized experts, with an application to Slovakian and French country-wide one-day-ahead (half-)hourly predictions

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Abstract We consider the setting of sequential prediction of arbitrary sequences based on specialized experts. We first provide a review of the relevant literature and present two theoretical contributions: a general analysis of the specialist aggregation rule of Freund et al. (Proceedings of the Twenty-Ninth Annual ACM Symposium on the Theory of Computing (STOC), pp. 334–343, 1997) and an adaptation of fixed-share rules of Herbster and Warmuth (Mach. Learn. 32:151–178, 1998) in this setting. We then apply these rules to the sequential short-term (one-day-ahead) forecasting of electricity consumption; to do so, we consider two data sets, a Slovakian one and a French one, respectively concerned with hourly and half-hourly predictions. We follow a general methodology to perform the stated empirical studies and detail in particular tuning issues of the learning parameters. The introduced aggregation rules demonstrate an improved accuracy on the data sets at hand; the improvements lie in a reduced mean squared error but also in a more robust behavior with respect to large occasional errors.

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