Kernel-based probabilistic path forecasting for electricity prices: empirical kernel calibration, scenario selection and dynamic forecast updating

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Abstract

We propose a kernel-based framework for probabilistic path forecasting and illustrate its performance using intraday electricity prices as a challenging case study. The methodology builds on a corrected Support Vector Regression (cSVR) model, where information from an auxiliary forecast is incorporated directly into the kernel function. Kernel bandwidths are calibrated empirically from pairwise distance distributions, avoiding computationally demanding hyperparameter tuning. To obtain compact yet informative predictive ensembles, we introduce Support Vector Sorting (SVS), a model-driven scenario selection procedure that exploits the dual representation of the SVR model to rank trajectories according to their contribution to the prediction function. The final ensemble size is determined using a Wasserstein-distance stopping criterion, allowing a substantial reduction in the number of scenarios while preserving the essential characteristics of the predictive distribution. We further propose a dynamic updating mechanism based on scenario reweighting, allowing predictive distributions to adapt online to newly observed trajectory segments without retraining the model. An empirical study on the German intraday electricity market demonstrates that the proposed framework delivers informative point and probabilistic forecasts while substantially reducing ensemble complexity.

The talk is based on [1, 2].

support vector regression, probabilistic path forecasting, scenario selection, kernel methods, weighted distribution.

References

[1] A. Puć, J. Janczura (2026) Corrected Support Vector Regression for intraday point forecasting of prices in the continuous power market. *International Journal of Forecasting* 42, 796–815.

[2] A. Puć, J. Janczura (2026) Scenario generation of intraday electricity price paths for optimal trading in continuous markets. Working paper. ArXiv:2605.13446.