Influence of Spikes in the Short-term Electricity Price Forecasting

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The main result of this paper is to combine a time series of electricity price under normal conditions with the spike time series caused by extreme conditions in order to obtain a better forecast of the spot price. Short term electricity price forecasting has become increasingly important due to the rising importance of the competitive spot electricity markets. One of the problems with predictions is high volatility combined with occasional spikes. Spot prices can thus be interpreted as a movement of two time series; one following daily, weekly and seasonal patterns as a result of cyclical everyday business activities and long-term climate conditions (e.g. temperatures), and the other one, caused by extreme weather, outages of production units, surplus generation or maintenance works. Therefore forecasting spot prices calls for a composite model as we present here, where prices are decomposed into 'normal' and 'spiky' ones. The normal price range is covered by a support vector machine (SVM) prediction, as a complement to ARMAX-GARCH forecast. We propose a two-step feature selection algorithm consisting of both relevance and redundancy filters using rank correlation coefficient to build input set for normal price range module. The treatment of spikes involves examination of influential factors and construction of a compound classifier to obtain occurrences of spikes, while their actual values are predicted with k-NN approach. Our main result is combined model predicting 7-day ahead hourly electricity spot prices of Hungarian market.