**ISF 2022 Paper Abstract**

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Iterative Load Shifting Disaggregation Algorithm

It is a common problem in natural gas demand time series forecasting that the required granularity level of the forecast does not match the existing granularity level of the historical gas consumption time series data. For example, only historical cycle-billing data is available and a daily forecast is needed. A forecaster can obtain an estimated, higher frequency series through temporal disaggregation of low frequency measurements to forecast at the desired frequency. Current direct-disaggregation methods are focused on the transformation of a single low frequency time series with uniformly spaced intervals and are unable to operate over multi-source time series with nonuniform and overlapping intervals. In this paper, we introduce an Iterative Load Shifting (ILS) disaggregation algorithm used to disaggregate multiple data sources structured at nonuniform, low levels of aggregation into a single daily representation while maintaining the direct-disaggregation constraints traditional methods rely on. Load shifting is carried out in an iterative two-step process; where first a prediction phase uses multi-parameter linear regression to generate high frequency time series based on the relationship between the observable low frequency series and high frequency independent correlated variables. Then second, load profiles are used in a piecewise linear update phase to “shift” or redistributing the low frequency load observations amongst the underlying high frequency periods within each low frequency measured interval. This two-step process is repeated, with each subsequent prediction phase modeling the updated estimates produced in the preceding update phase. The Iterative Load Shifting disaggregation algorithm produces an 8.6% MAPE evaluated over a three-year period and the most accurate disaggregation results as shown in the case studies included in this work.