

# SPC-based Strategy for Detecting Frauds in Power Consumption Time Series

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**Abstract** Non-technical power losses related to fraud and theft are a serious problem in the management of electric power systems, varying in intensity across countries as a function of factors such as effective accountability, political stability, and corruption levels. In the US, where power systems are generally deemed efficient, Nesbit (2000) estimates that nontechnical losses represent from 0.5

The first two modalities may be minimized (i) by investing in metering technology [4] and [3], (ii) through an efficient inspection program [2] and [1], or (iii) by changing system ownership from public to private or by some other market strategy [6]. To accomplish loss minimization through inspection, which is our main concern, one must first focus on the problem of selecting meters to be inspected from a population of consumers such that irregularity detection is maximized. Approaches vary in the literature, although usually dealing with predicting customers' future consumption and analyzing abnormalities in their demand time series. In this paper, we propose an SPC (Statistical Process Control)-based strategy for detecting unusual behavior in customers' demand time series. Although proposing a simplified and easily implementable forecasting model to predict demand, our method is essentially grounded on the analysis of historical demand behavior in search of potential fraudulent customers. For that purpose, we propose the combined use of robust statistics and SPC rules. Our proposal is illustrated in a case study using a large dataset provided by an electricity distributor located in southern Brazil.

## References

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