Real-time measurement error assessment for intelligent energy meters

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A study aimed at improving the accuracy and reliability of grid electricity meters, particularly under challenging on-site conditions is published in the *International Journal of Information and*

Communication Technology. The research offers practical suggestions for assessing and optimizing measurement performance.

Chencheng Wang of the State Grid Sichuan Electric Power Company Marketing Service Center in Sichuan, China, explains how he has developed a measurement error estimation method utilizing big data analysis technology. His method integrates environmental and electrical factor data collected during on-site operations, providing real-time measurement error assessment for intelligent energy meters.

Smart energy meters are subject to mandatory national verification and management. Errors in the readings they produce not only affect the interests of millions of households, but also affect the safety, stability, and economic operation of smart grids themselves. A prediction tool built on the Shapley combination model and a neural network was demonstrated to be more accurate at making predictions about demand than other approaches based on tests with historical data, according to Wang.

However, a hybrid model constructed using the Shapley approach to bring together the BP neural network and RBF neural network demonstrated fast convergence and high accuracy, outperforming the conventional Holt Winters model.

The findings could be used in the reliable evaluation of smart meters with a view to improving operational decision-making and maintenance based on their real-time status. The work, by integrating and analyzing maintenance and abnormal data, also offers a lifespan survival probability model for smart meters.

The practical implications of this work lie in the improvement of error verification for electric energy meters operating on the grid. The researchers provided a conversion relationship curve between on-site

measurement errors and laboratory reference conditions, aiding in identifying electric energy meters with larger measurement errors.

This approach facilitates the efficiency of error inspections in on-site operations and enables the prediction of out-of-tolerance failures in measuring equipment in advance. Overall, these advancements contribute to the reliability and performance of smart meters on the grid.

More information: Chencheng Wang, A method for identifying and evaluating energy meter data based on big data analysis technology, *International Journal of Information and Communication Technology* (2023). DOI: 10.1504/IJICT.2023.134852

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