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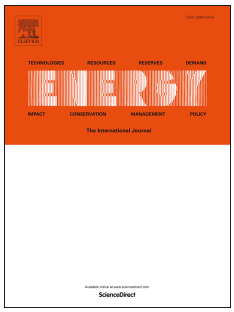

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A Combined Forecasting Approach with Model Self-Adjustment for Renewable Generations and Energy Loads in Smart Community

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Abstract: The short-term forecasting of wind power, photovoltaic (PV) generation and loads is important for the secure and economical dispatching of smart community with smart grid. Considering the smart community has plenty of distributed generations, here, a concept of net load is defined as the active power difference between renewable generations (wind and PV power) and loads. Then, a combined forecasting approach, which enables to build a real-time forecasting model with parameters self-adjustment, is proposed for the forecasting of the net load in smart community. Compared with the traditional forecasting methods such as support vector machine (SVM), the proposed approach can wavily optimize the parameters of the forecasting model. Besides, an optimal method named Grid-GA searching is developed to reduce the computation time during the forecasting. Therefore, it can improve the forecasting accuracy even if there is a great of uncertainty component in wind power, PV generation and loads. Detailed case studies give a contrastive analysis of the traditional and the proposed forecasting approach. The results show that the proposed approach has the capability of self-adaption on the fluctuations of wind and PV power, and can effectively improve the forecasting accuracy and efficiency.

Keywords: Wind power; photovoltaic generation; support vector machine; combined forecasting; smart community.

1. Nomenclature

ξ_i	Slack variables of the *i*-th forecasting moment.
N	Size of initial training data.
n	Size of forecasting data.
x_i	The *i*-th element of the input vector.
y_i	Desired output value of x_i.
w	Weight value of the linear function $f(x)$.
b	Coefficient of the linear function $f(x)$