A Deep Learning CNN and AI-Tuned SVM for Electricity Consumption Forecasting: Multivariate Time Series Data

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Abstract:
As part of their core function, distribution utilities must engage in power procurement planning, via long-term demand forecasting or electricity consumption forecasting. After all, accurate electricity consumption forecasting has numerous implications for energy optimization planning. However, electricity consumption forecasting is a very challenging task because of the non-stationary characteristics of the involved multivariate time series data, which must then be utilized for "stationary" predictive actions. Deep Learning (DL) is a prevalent technique, which can automatically extract features, "learn" from its filters, and classify the output. Yet, one of the main problems of utilizing DL, within the realm of machine learning techniques, is overfitting. Consequently, hybridizing the feature learning capabilities of DL with the ability of various machine learning methodologies to overcome this overfitting is necessary. In this paper, we propose a hybridized modelling technique based upon combining DL (along with Transfer Learning) with a Convolutional Neural Network (CNN) and an AI-Tuned Support Vector Machine (SVM) amalgam, which collectively successfully address the short-term load forecasting challenge. Previous research works pertaining to pertinent models and relevant applications are introduced. Based upon the related works analysis, further prospects are presented for consideration as pertains to Smart Grid endeavours.

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