Mixed Effects Models for Short-Term Load Forecasting for the Spanish Regions: Castilla-Leon, Castilla-La Mancha and Andalucia

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Abstract : This paper focuses on an application of linear mixed models to short-term load forecasting. The challenge of this research is to improve a currently working model at the Spanish Transport System Operator, programmed by us, and based on linear autoregressive techniques and neural networks. The forecasting system currently forecasts each of the regions within the Spanish grid separately, even though the behavior of the load in each region is affected by the same factors in a similar way. A load forecasting system has been verified in this work by using the real data from a utility. In this research it has been used an integration of several regions into a linear mixed model as starting point to obtain the information from other regions. Firstly, the systems to learn general behaviors present in all regions, and secondly, it is identified individual deviation in each regions. The technique can be especially useful when modeling the effect of special days with scarce information from the past. The three most relevant regions of the system have been used to test the model, focusing on special day and improving the performance of both currently working models used as benchmark. A range of comparisons with different forecasting models has been conducted. The forecasting results demonstrate the superiority of the proposed methodology.