

Day Ahead and Intraday Electricity Demand Forecasting in Himachal Region using Machine Learning

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Abstract : Predicting electricity usage is a crucial aspect of organizing and controlling sustainable energy systems. The task of forecasting electricity load is intricate and requires a lot of effort due to the combined impact of social, economic, technical, environmental, and cultural factors on power consumption in communities. As a result, it is important to create strong models that can handle the significant non-linear and complex nature of the task. The objective of this study is to create and compare three machine learning techniques for predicting electricity load for both the day ahead and intraday, taking into account various factors such as meteorological data and social events including holidays and festivals. The proposed methods include a LightGBM, FBProphet, combination of FBProphet and LightGBM for day ahead and Motifs(Stumpy) based on Mueens algorithm for similarity search for intraday. We utilize these techniques to predict electricity usage during normal days and social events in the Himachal Region. We then assess their performance by measuring the MSE, RMSE, and MAPE values. The outcomes demonstrate that the combination of FBProphet and LightGBM method is the most accurate for day ahead and Motifs for intraday forecasting of electricity usage, surpassing other models in terms of MAPE, RMSE, and MSE. Moreover, the FBProphet - LightGBM approach proves to be highly effective in forecasting electricity load during social events, exhibiting precise day ahead predictions. In summary, our proposed electricity forecasting techniques display excellent performance in predicting electricity usage during normal days and special events in the Himachal Region.

Keywords : feature engineering, FBProphet, LightGBM, MASS, Motifs, MAPE

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