

Developing Energy/Power Load Forecasting with Machine Learning Models

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Abstract—This study investigates how to develop short-term building load forecasting models for energy and power loads using machine learning techniques for time-series prediction applied to electricity demand. The authors study the key features utilized in load forecasting, compare machine learning models, and gain concepts that generalize to other time-series forecasting tasks.

Index Terms—energy demand, load forecasting, machine learning, short-term forecast, long-term forecast

<https://github.com/rolandtagayi-hash?tab=repositories>

I. INTRODUCTION

Accurately developing short and long-term load forecasts from minutes to days ahead is increasingly important for building and district operators, as well as utilities and power grid system operators, to support informed decision-making across a wide range of applications.

II. LITERATURE REVIEW

Recent literature studies shows load forecasting methods evolving from classical statistical and regression approaches toward machine learning models that better reflect uncertainty under weather variability, distributed energy resources integration, and changing consumer patterns; accordingly, modern techniques typically combine careful feature engineering and robust validation [1].

III. METHODOLOGY

A. Data Analysis

Obtain relevant and related data, describe the datasets, and elaborate on the data collection, cleaning, and preprocessing.

B. Models Development

Validate the model developed and compare it with other models.

C. Model Evaluation Metrics

List and define metrics to justify the performance of the model developed and confirm its efficiency.

IV. RESULTS AND DISCUSSION

A. Qualitative Analysis

Explain and analyze the results obtained, and make informed decisions that will be beneficial for system operators for their specific application.

B. Limitations and Potential Future Works

V. CONCLUSION

REFERENCES

- [1] M. Hasan, Z. Mifta and S.Janefar Papiya, P. Roy, P. Dey, N. A. Salsabil, N. Chowdhury and O. Farrok, "A state-of-the-art comparative review of load forecasting methods: Characteristics, perspectives, and applications," *Energy Conversion and Management*: X, vol. 26, April 2025.