Proceedings of International Conference on Recent Innovations in Computing pp 165–177Cite as

Short-Term Load Demand Forecasting Using Artificial Neural Network

- Temitope M. Adeyemi-Kayode,
- Hope E. Orovwode,
- Anthony U. Adoghe,
- Sanjay Misra &
- Akshat Agrawal

- Conference paper
- First Online: 03 May 2023

Part of the Lecture Notes in Electrical Engineering book series (LNEE,volume 1001)

Abstract

This work proposes a short-term electrical load demand forecaster for the Nigerian power distribution firms in Abuja, Benin, and Enugu. Using artificial neural network, the forecaster is created. Hour of the day, calendar day, day of the week (Sunday-Saturday), load demand of the previous day, load demand of the previous week, and average load demand of the preceding 24 h are the inputs to the neural network. The historical load demand for 2017–2020 includes hourly resolved dates and load demand for Abuja, Benin, and Enugu distribution firms for training purposes, while data for 2020 was used for testing the algorithm. The results generated a mean average percentage error ranging from 0.16 to 0.35. This forecaster is essential to Nigeria's efforts to expand access to power in accordance with Sustainable Development Goal 7.

Keywords

- **Short-term forecasting**
- **Artificial neural network**
- **ANN**
- **Day-ahead forecasting**

References

1. Xu L, DO, Boddeti M (2009) The roles of energy management system in Texas nodal power market. IEEE Access

Google Scholar

2. Ahmad A, Javaid N, Mateen A, Awais M, Khan ZA (2019) Short-Term load forecasting in smart grids: An intelligent modular approach. Energies, 12(1). https://doi.org/10.3390/en12010164
3. Raza MQ, Nadarajah M, Ekanayake C (2016) On recent advances in PV output power forecast. Sol Energy 136:125–144

CrossRef **Google Scholar**

4. Olagoke MD, Ayeni A, Hambali MA (2016) Short term electric load forecasting using neural network and genetic algorithm. Int J Appl Inf Syst (IJAIS)

Google Scholar

5. Ogunfunmi T (2007) Adaptive nonlinear system identification: the volterra and wiener model approaches: Springer Science & Business Media

Google Scholar

6. Hippert HS, Pedreira CE, Souza RC (2001) Neural networks for short-term load forecasting: a review and evaluation. IEEE Trans Power Syst 16(1):44–55

CrossRef Google Scholar

7. Nespoli A et al (2019) Day-ahead photovoltaic forecasting: a comparison of the most effective techniques. Energies 12(9):1621

CrossRef Google Scholar

8. Reikard G (2009) Predicting solar radiation at high resolutions: a comparison of time series forecasts. Sol Energy 83(3):342–349

CrossRef Google Scholar

9. Das UK et al (2018) Forecasting of photovoltaic power generation and model optimization: a review. Renew Sustain Energy Rev 81:912–928

CrossRef Google Scholar

10. Bird RE, RC (1986) Simple solar spectral model for direct and diffuse irradiance on horizontal and tilted planes at the Earth surface for cloudless atmospheres

Google Scholar

11. Dolara AG, Leva S, Mussetta M, Ogliaro E (2015) A physucal hybrid artificial neural network for short term forecasting of PV plant power output. Energies 8:1138–1153

CrossRef Google Scholar

12. Amjady NK, Zareipour H (2014) Short-term load forecast of microgrids by a new bilevel prediction strategy. IEEE Trans Smart Grid 1:286–294

CrossRef Google Scholar

13. Liu N, Tang Q, Zhang J, Fan W, Liu J (2014) A hybrid forecasting model with parameter optimization for short-term load forecasting of micro-grids. Appl Energy 129:336–345. https://doi.org/10.1016/j.apenergy.2014.05.023

CrossRef Google Scholar

14. Anderson CWS, EA, Shamsunder S (1998) Multivariate autoregressive models for classification of spontaneous electroencephalographic signals during mental tasks. IEEE Trans Biomed 45:277–286

Google Scholar

15. Peng Y, Wang Y, Lu X, Li H, Shi D, Wang Z, Li J (2019) Short-term load forecasting at different aggregation levels with predictability analysis. arXiv preprint arXiv:1903.10679
16. Deoras A (2021) Electricity load and price forecasting webinar case study retrieved from https://www.mathworks.com/matlabcentral/fileexchange/28684-electricity-load-and-price-forecasting-webinar-case-study

Download references

Author information

Authors and Affiliations

1. **Covenant University, Ota, Nigeria**
   Temitope M. Adeyemi-Kayode, Hope E. Orovwode & Anthony U. Adoghe
2. **Department of Computer Science and Communication, Ostfold University College, Halden, Norway**
   Sanjay Misra
3. **Amity University Haryana, Haryana, India**
   Akshat Agrawal

Corresponding author

Correspondence to Akshat Agrawal .

Editor information

Editors and Affiliations

1. **Computer Science and IT Department, Central University of Jammu, Jammu, Jammu and Kashmir, India**
   Yashwant Singh
2. **Department of Computer Science, KIET Group of Institutions, Ghaziabad, Uttar Pradesh, India**
   Pradeep Kumar Singh
3. **Department of Electrical Engineering, Indian Institute of Technology Patna, Patna, Bihar, India**
   Maheshkumar H. Kolekar
4. **School of Artificial Intelligence, Indian Institute of Technology Delhi, New Delhi, Delhi, India**
   Arpan Kumar Kar
5. **IDMEC, Polytechnic Institute of Castelo Branco, Castelo Branco, Portugal**
   Paulo J. Sequeira Gonçalves

Rights and permissions

Copyright information

About this paper

Cite this paper

Adeyemi-Kayode, T.M., Orovwode, H.E., Adoghe, A.U., Misra, S., Agrawal, A. (2023). Short-Term Load Demand Forecasting Using Artificial Neural Network. In: Singh, Y., Singh, P.K., Kolekar, M.H., Kar, A.K., Gonçalves, P.J.S. (eds) Proceedings of International Conference on Recent Innovations in Computing. Lecture Notes in Electrical Engineering, vol 1001. Springer, Singapore. https://doi.org/10.1007/978-981-19-9876-8_14

Download citation

- .RIS
- .ENW

- .BIB
- DOIhttps://doi.org/10.1007/978-981-19-9876-8_14
- Published03 May 2023
- Publisher NameSpringer, Singapore
- Print ISBN978-981-19-9875-1
- Online ISBN978-981-19-9876-8
- eBook PackagesIntelligent Technologies and RoboticsIntelligent Technologies and Robotics (R0)

- About this paper