

BIBLIOGRAPHY

- [1] S. Kalogirou, “Solar Energy Engineering: Processes and Systems: Second Edition,” *Sol. Energy Eng. Process. Syst. Second Ed.*, Jan. 2009.
- [2] A. Martin *et al.*, “Tinjauan Potensi dan Kebijakan Energi Surya di Indonesia,” vol. 6, no. 1, pp. 43–52, 2022.
- [3] M. Abumohsen, A. Y. Owda, and M. Owda, “Electrical Load Forecasting Using LSTM, GRU, and RNN Algorithms,” *Energies*, vol. 16, no. 5. p. 2283, 2023, doi: 10.3390/en16052283.
- [4] E. Lorenz, J. Ruiz-Arias, and S. Wilbert, “Forecasting Solar Radiation,” Jan. 2017.
- [5] A. Kharisma, S. Pinandita, and A. E. Jayanti, “Literature Review : Kajian Potensi Energi Surya Alternatif Energi Listrik,” 2024, doi: 10.14710/jebt.2024.23956.
- [6] E. Chodakowska, J. Nazarko, Ł. Nazarko, and H. S. Rabayah, “Solar Radiation Forecasting: A Systematic Meta-Review of Current Methods and Emerging Trends,” *Energies*, vol. 17, no. 13. p. 3156, 2024, doi: 10.3390/en17133156.
- [7] M. Ajith and M. Martínez-Ramón, “Deep learning algorithms for very short term solar irradiance forecasting: A survey,” *Renew. Sustain. Energy Rev.*, vol. 182, p. 113362, 2023, doi: <https://doi.org/10.1016/j.rser.2023.113362>.
- [8] R. Elmousaid, N. Drioui, R. Elgouri, H. Agueny, and Y. Adnani, “Ultra-short-term global horizontal irradiance forecasting based on a novel and hybrid GRU-TCN model,” *Results Eng.*, vol. 23, p. 102817, 2024, doi: <https://doi.org/10.1016/j.rineng.2024.102817>.
- [9] C. A. Siregar, A. Affandi, A. M. Siregar, and M D Nasution, “Pemetaan Potensi Radiasi Matahari Di Sumatera Utara Berdasarkan Perhitungan Matematika,” *Semin. Nas. Teknol. Edukasi Sos. dan Hum.*, vol. 1, no. 1 SE-Articles, pp. 72–77, Aug. 2021, doi: 10.53695/sintesa.v1i1.207.
- [10] H. Ambarita, “Development of software for estimating clear sky solar radiation in Indonesia,” *J. Phys. Conf. Ser.*, vol. 801, p. 12093, Jan. 2017, doi: 10.1088/1742-6596/801/1/012093.
- [11] T. Matahari and S. Rumah, “Jurnal Insinyur Profesional,” vol. 2, no. 1, pp. 9–15, 2022.
- [12] A. Niwanda, E. Kardiana, M. Arif, P. Rahmadani, and R. Amalan, “Analisis Potensi Pemanfaatan Energi Matahari Melalui Panel Surya di Kota Medan,” vol. 3, no. September, 2025.
- [13] J. F. Torres, D. Hadjout, A. Sebaa, F. Martínez-Álvarez, and A. Troncoso, “Deep

- Learning for Time Series Forecasting: A Survey,” *Big Data*, vol. 9, no. 1, pp. 3–21, Dec. 2020, doi: 10.1089/big.2020.0159.
- [14] P. Power, R. A. Rajagukguk, R. A. A. Ramadhan, and H. Lee, “A Review on Deep Learning Models for Forecasting Time Series Data of Solar Irradiance and,” 2020.
- [15] E. E. Avalos, M. A. R. Licea, H. R. González, A. E. Calderón, A. I. B. Gutiérrez, and F. J. P. Pinal, “Comparative Analysis of Multivariable Deep Learning Models for Forecasting in Smart Grids,” in *2020 IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC)*, 2020, vol. 4, pp. 1–6, doi: 10.1109/ROPEC50909.2020.9258732.
- [16] G. Gong and K. Lou, “Forecast of photovoltaic Power Generation Based on GRU Forecast of photovoltaic Power Generation Based on GRU,” no. October 2022, 2026, doi: 10.1145/3573428.3573477.
- [17] M. Kumar, K. Namrata, and N. Kumari, “Hyper-parametric improved machine learning models for solar radiation forecasting,” *Concurr. Comput. Pract. Exp.*, vol. 34, no. 23, p. e7190, Oct. 2022, doi: <https://doi.org/10.1002/cpe.7190>.
- [18] Z. Yan *et al.*, “Enhancing short-term solar radiation forecasting with hybrid VMD and GraphCast-based machine learning models,” *Expert Syst. Appl.*, vol. 285, p. 128042, 2025, doi: <https://doi.org/10.1016/j.eswa.2025.128042>.
- [19] J. Heaton, “Ian Goodfellow, Yoshua Bengio, and Aaron Courville: Deep learning: The MIT Press, 2016, 800 pp, ISBN: 0262035618,” *Genet. Program. Evolvable Mach.*, vol. 19, Oct. 2017, doi: 10.1007/s10710-017-9314-z.
- [20] L. Oumiguil and A. Nejmi, “Short-term PV plant power forecasting model using CNN-GRU with XGBoost algorithm,” *Sci. African*, vol. 31, p. e03184, 2026, doi: <https://doi.org/10.1016/j.sciaf.2026.e03184>.
- [21] B. Brahma and R. Wadhvani, “Visualizing solar irradiance data in ArcGIS and forecasting based on a novel deep neural network mechanism,” *Multimed. Tools Appl.*, vol. 81, no. 7, pp. 9015–9043, Mar. 2022, doi: 10.1007/s11042-021-11025-5.
- [22] F. Kihtir and K. Oztoprak, “Deep FS: A Deep Learning Approach for Surface Solar Radiation,” *Sensors (Basel)*, vol. 24, no. 24, Dec. 2024, doi: 10.3390/s24248059.
- [23] D. Keim, J. Kohlhammer, G. Ellis, and F. Mansmann, *Mastering The Information Age – Solving Problems with Visual Analytics*. 2010.
- [24] A. Faiz, A. Suhaimi, and S. Fahmy, “Data Visualization of Decision Support Systems Research in Sustainability: A Bibliometric Analysis,” *Int. J. Adv. Res. Technol. Innov.*, vol. 4, pp. 19–30, Dec. 2023, doi: 10.55057/ijarti.2022.4.3.3.

- [25] M. Rumbayan, A. Abudureyimu, and K. Nagasaka, "Mapping of solar energy potential in Indonesia using artificial neural network and geographical information system," *Renew. Sustain. Energy Rev.*, vol. 16, Apr. 2012, doi: 10.1016/j.rser.2011.11.024.
- [26] Mhd Aldi Primasyukra, "ANALISIS INTENSITAS RADIASI TERHADAP LAMA PENYINARAN MATAHARI DENGAN PARAMETER CUACA SERTA POTENSI PEMBANGKIT LISTRIK TENAGA SURYA (PLTS) DI-KOTA MEDAN," 2022.
- [27] I. U. Fakhriza, "Perbandingan Prediksi Radiasi Sinar Matahari Menggunakan Algoritma Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM) dan Deep Q-Network (DQN)," *Repos. Institusi USU, Univ. Sumatera Utara*, 2024.
- [28] M. Engineering, "Penerapan Kombinasi Model Deep Learning NARX-CNN-LSTM dalam Memprediksi Intensitas Radiasi Surya di Kota Medan," 2025.
- [29] A. N. M. F. Faisal, A. Rahman, M. T. M. Habib, A. H. Siddique, M. Hasan, and M. M. Khan, "Neural networks based multivariate time series forecasting of solar radiation using meteorological data of different cities of Bangladesh," *Results Eng.*, vol. 13, p. 100365, 2022, doi: <https://doi.org/10.1016/j.rineng.2022.100365>.
- [30] C. Gao *et al.*, "Photovoltaic Power Prediction Based on Similar Day Clustering Combined with CNN-GRU," *Sustainability*, vol. 17, no. 16, p. 7383, 2025, doi: 10.3390/su17167383.
- [31] A. S. Adistri, "Jurnal Vokasi Indonesia Optimalisasi Penggunaan Energi Matahari dalam Produk Photovoltaic pada Era Ekonomi Sirkular Optimalisasi Penggunaan Energi Matahari dalam Produk Photovoltaic pada Era," vol. 12, no. 1, 2024, doi: 10.7454/jvi.v12i1.1212.
- [32] A. Alim, H. Abdillah, and S. Ramdani, *Analisis perbandingan daya keluaran modul solar cell 50 WP terhadap penambahan reflector cermin datar*. 2022.
- [33] "Solar Radiation," in *Solar Engineering of Thermal Processes*, 2013, pp. 3–42.
- [34] C. A. Siregar, A. M. Siregar, M. Daud, and M. D. Nasution, "Pemetaan Potensi Radiasi Matahari Berdasarkan Perhitungan Matematika Di Sumatera Utara," pp. 72–78, 2021.
- [35] F. Hutagalung, P. B. Timotiwu, Y. C. Ginting, and T. K. B. Manik, "PENGARUH PENGURANGAN INTENSITAS RADIASI MATAHARI TERHADAP PERTUMBUHAN DAN KUALITAS SELADA ROMAINE(*Lactuca sativa* var. *Longifolia*)," *J. Agrotek Trop.*, vol. 9, no. 3 SE-Articles, pp. 453–461, Sep. 2021, doi: 10.23960/jat.v9i3.5311.
- [36] M. Fathi, S. Allahyari, A. Ahmadi, A. Zahedi, and S. Asiaei, "Enhanced global solar irradiance and temperature forecasting for rooftop PV power generation prediction using

- multi-step LSTM and GRU based hybrid models,” *Energy Convers. Manag. X*, vol. 28, p. 101351, 2025, doi: <https://doi.org/10.1016/j.ecmx.2025.101351>.
- [37] J. Jose, “INTRODUCTION TO TIME SERIES ANALYSIS AND ITS APPLICATIONS,” Aug. 2022.
- [38] S. Allahyari, S. M. Hosseinalipour, and S. Asiaei, “Deep learning approaches for predicting solar radiation and freshwater yield in modified pyramid solar still,” *Sci. Rep.*, vol. 15, no. 1, p. 41322, Nov. 2025, doi: 10.1038/s41598-025-25094-1.
- [39] G. Locations, “ARIMA Models in Solar Radiation Forecasting in Different Geographic Locations,” 2023.
- [40] L. Barancsuk, V. Groma, and B. Kocziha, “Hybrid ultra-short term solar irradiation forecasting using resource-efficient multi-step long-short term memory,” *Renew. Energy*, vol. 247, p. 122962, 2025, doi: <https://doi.org/10.1016/j.renene.2025.122962>.
- [41] C. Voyant *et al.*, “Machine learning methods for solar radiation forecasting: A review,” *Renew. Energy*, vol. 105, pp. 569–582, 2017, doi: <https://doi.org/10.1016/j.renene.2016.12.095>.
- [42] J. Publikasi, I. Keteknikan, T. Elektro, R. Radhiansyah, A. S. Syahrudin, and D. Sahidin, “Pengaruh Intermitensi Radiasi Matahari Terhadap Daya Keluaran pada PLTS Terapung Studi Kasus Pulau Kodingareng , Makassar Sulawesi Selatan Institut Teknologi Bacharuddin Jusuf Habibie , Indonesia Fotovoltaik listrik . Modul fotovoltaik terdiri dari bebera,” 2025.
- [43] H. Zhang, S. Li, Y. Chen, J. Dai, and Y. Yi, “A Novel Encoder-Decoder Model for Multivariate Time Series Forecasting,” *Comput. Intell. Neurosci.*, vol. 2022, pp. 1–17, Apr. 2022, doi: 10.1155/2022/5596676.
- [44] E. Asmawati, Endah and Kartikasari, Fitri Dwi and Tarigan, “Penghitungan Kesalahan Interpolasi Data Radiasi Matahari,” *Semin. Nas. Tah. Mat. Sains dan Teknol.*, 2013.
- [45] A. Syahab and M. S. Achamd, “Solar Radiation Prediction using Long Short-Term Memory with Handling of Missing Values and Outliers,” *J. INFOTEL*, vol. 16, pp. 758–777, Dec. 2024, doi: 10.20895/infotel.v16i4.1225.
- [46] M. W. Nadeem, H. G. Goh, A. Ali, M. Hussain, M. A. Khan, and V. A. Ponnusamy, “Bone Age Assessment Empowered with Deep Learning: A Survey, Open Research Challenges and Future Directions,” *Diagnostics*, vol. 10, no. 10. p. 781, 2020, doi: 10.3390/diagnostics10100781.
- [47] S. Gardoll and O. Boucher, “Classification of tropical cyclone containing images using a convolutional neural network: performance and sensitivity to the learning dataset,”

- Geosci. Model Dev.*, vol. 15, no. 18, pp. 7051–7073, 2022, doi: 10.5194/gmd-15-7051-2022.
- [48] S.-C. Lim, J.-H. Huh, S.-H. Hong, C.-Y. Park, and J.-C. Kim, “Solar Power Forecasting Using CNN-LSTM Hybrid Model,” *Energies*, vol. 15, p. 8233, Nov. 2022, doi: 10.3390/en15218233.
 - [49] H. Kim, S. Park, H. Park, H. Son, and S. Kim, “Solar Radiation Forecasting Based on the Hybrid CNN-CatBoost Model,” *IEEE Access*, vol. 11, no. February, pp. 13492–13500, 2023, doi: 10.1109/ACCESS.2023.3243252.
 - [50] J. Jiang, H. Su, H. Du, and H. Yin, “The application of WUTP-CNN-GRU model in power prediction of desert and floating photovoltaic system,” *Sci. Rep.*, vol. 15, no. 1, p. 42576, 2025, doi: 10.1038/s41598-025-24822-x.
 - [51] K. Cho *et al.*, “Learning Phrase Representations using RNN Encoder-Decoder for Statistical Machine Translation,” Jun. 2014, doi: 10.3115/v1/D14-1179.
 - [52] A. Rolangon, A. Weku, and G. Sandag, “Perbandingan Algoritma LSTM Untuk Analisis Sentimen Pengguna Twitter Terhadap Layanan Rumah Sakit Saat Pandemi Covid-19,” *TelKa*, vol. 13, pp. 31–40, May 2023, doi: 10.36342/teika.v13i01.3063.
 - [53] H. Gholami and A. Mohamadifar, “Novel deep learning hybrid models (CNN-GRU and DLDL-RF) for the susceptibility classification of dust sources in the Middle East – a global source,” *Sci. Rep.*, Nov. 2022, doi: 10.1038/s41598-022-24036-5.
 - [54] F. Karimidehkordi and R. Samizadeh, “Forecasting Solar Radiation in Diverse Climates in Iran Utilizing Deep Learning Methods,” *Res. Ann. Ind. Syst. Eng.*, vol. 2, no. 3 SE-Articles, pp. 170–181, May 2025, doi: 10.22105/raise.vi.67.
 - [55] L. Ait Mouloud *et al.*, “Seasonal quantile forecasting of solar photovoltaic power using Q-CNN-GRU,” *Sci. Rep.*, vol. 15, no. 1, p. 27270, 2025, doi: 10.1038/s41598-025-12797-8.
 - [56] A. Adi Nugroho and M. Haris, “ANALISIS EFEKTIVITAS TEKNIK IMPUTASI PADA LSTM UNTUK MENINGKATKAN KUALITAS DATA PADA PERAMALAN CURAH HUJAN,” *J. Inform. dan Rekayasa Elektron.*, vol. 7, no. 2 SE-Articles, pp. 301–311, Nov. 2024, doi: 10.36595/jire.v7i2.1172.
 - [57] T. Bashir, H. Wang, M. Tahir, and Y. Zhang, “Wind and solar power forecasting based on hybrid CNN-ABiLSTM, CNN-transformer-MLP models,” *Renew. Energy*, vol. 239, p. 122055, 2025, doi: <https://doi.org/10.1016/j.renene.2024.122055>.
 - [58] Y. Choi, J. Suh, and S.-M. Kim, “GIS-Based Solar Radiation Mapping, Site Evaluation, and Potential Assessment: A Review,” *Appl. Sci.*, vol. 9, pp. 1–29, May 2019, doi:

10.3390/app9091960.

- [59] J. A. T. and Á. T. Q. and B. O. and C. Zambrano-Vega, “Solar Radiation Prediction in the UTEQ based on Machine Learning Models,” pp. 1–12, 2023, [Online]. Available: <https://arxiv.org/abs/2312.17659>.
- [60] A. N. Oktaviani, A. S. Atmaja, K. Putri, S. A. Aprianto, and F. Kartiasih, “ANALISIS PREDIKSI RADIASI MATAHARI DENGAN ALGORITMA MACHINE LEARNING DAN IMPLEMENTASI BAYESIAN OPTIMIZATION DI PROVINSI DKI JAKARTA,” *J. Manaj. Inform. dan Sist. Inf.*, vol. 8, no. 1 SE-Articles, pp. 45–58, Jan. 2025, doi: 10.36595/misi.v8i1.1338.
- [61] M. Oh, C. K. Kim, B. Kim, and H.-G. Kim, “A novel model to estimate regional differences in time-series solar and wind forecast predictability across small regions: A case study in South Korea,” *Energy*, vol. 291, p. 130284, 2024, doi: <https://doi.org/10.1016/j.energy.2024.130284>.
- [62] A. Bhatt, W. Ongsakul, N. M. M., and J. G. Singh, “Sliding window approach with first-order differencing for very short-term solar irradiance forecasting using deep learning models,” *Sustain. Energy Technol. Assessments*, vol. 50, p. 101864, 2022, doi: <https://doi.org/10.1016/j.seta.2021.101864>.