Journal of Computer Science and Information Systems,

ISSN 2535-1451

Optimization of IOT and Smart Agriculture Systems Using Deep Learning Algorithms

Nizar M. Soufian, Lima Hongou, Sofia Arkhstan

1. Palestine Polytechnic University, Technology department, Palestine
2. Faculty of Engineering, Computer Technology, UCSI University, Kuala Lumpur 56000, Malaysia
3. Department of Computer System, South Ural State University, 454080 Chelyabinsk, Russia

Abstract:

The integration of Internet of Things (IOT) devices and deep learning algorithms has significantly advanced precision agriculture by enabling real-time monitoring, predictive analytics, and intelligent decision-making. This research explores how deep learning techniques, such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), can analyze vast datasets collected by IOT sensors to optimize crop yields, detect diseases, and manage resources efficiently. It also proposes strategies that combine optimization methods with deep learning architectures to enhance data transmission efficiency and energy utilization in smart farming environments. The findings underscore the transformative potential of integrating IOT and deep learning in agriculture, leading to more sustainable and productive farming practices.

Keywords:

IOT, Smart Agriculture, Deep, Precision Farming, Crop Yield Optimization, Predictive Analytics

ISSN 2535-1451

REFERENCES

[1] El-Kenawy, E. S. M., Ibrahim, A., Mirjalili, S., Eid, M. M., & Hussein, S. E. (2020). Novel feature selection and voting classifier algorithms for COVID-19 classification in CT images. IEEE access, 8, 179317-179335.

[2] El-Kenawy, E. S. M., Eid, M. M., Saber, M., & Ibrahim, A. (2020). MbGWO-SFS: Modified binary grey wolf optimizer based on stochastic fractal search for feature selection. IEEE Access, 8, 107635-107649.

[3] El-Kenawy, E. S., & Eid, M. (2020). Hybrid gray wolf and particle swarm optimization for feature selection. Int. J. Innov. Comput. Inf. Control, 16(3), 831-844.

[4] El-Kenawy, E. S. M., Khodadadi, N., Mirjalili, S., Abdelhamid, A. A., Eid, M. M., & Ibrahim, A. (2024). Greylag goose optimization: nature-inspired optimization algorithm. Expert Systems with Applications, 238, 122147.

[5] El-Kenawy, E. S. M., Mirjalili, S., Ibrahim, A., Alrahmawy, M., El-Said, M., Zaki, R. M., & Eid, M. M. (2021). Advanced meta-heuristics, convolutional neural networks, and feature selectors for efficient COVID-19 X-ray chest image classification. Ieee Access, 9, 36019-36037.

[6] Abdelhamid, A. A., El-Kenawy, E. S. M., Khodadadi, N., Mirjalili, S., Khafaga, D. S., Alharbi, A. H., ... & Saber, M. (2022). Classification of monkeypox images based on transfer learning and the Al-Biruni Earth Radius Optimization algorithm. Mathematics, 10(19), 3614.

[7] Ibrahim, A., Mirjalili, S., El-Said, M., Ghoneim, S. S., Al-Harthi, M. M., Ibrahim, T. F., & El-Kenawy, E. S. M. (2021). Wind speed ensemble forecasting based on deep learning using adaptive dynamic optimization algorithm. IEEE Access, 9, 125787-125804.

[8] El-Kenawy, E. S. M., Mirjalili, S., Alassery, F., Zhang, Y. D., Eid, M. M., El-Mashad, S. Y., ... & Abdelhamid, A. A. (2022). Novel meta-heuristic algorithm for feature selection, unconstrained functions and engineering problems. IEEE Access, 10, 40536-40555.

[9] Abdelhamid, A. A., El-Kenawy, E. S. M., Alotaibi, B., Amer, G. M., Abdelkader, M. Y., Ibrahim, A., & Eid, M. M. (2022). Robust speech emotion recognition using CNN+ LSTM based on stochastic fractal search optimization algorithm. Ieee Access, 10, 49265-49284.

[10] Abdollahzadeh, B., Khodadadi, N., Barshandeh, S., Trojovský, P., Gharehchopogh, F. S., El-kenawy, E. S. M., ... & Mirjalili, S. (2024). Puma optimizer (PO): a novel metaheuristic optimization algorithm and its application in machine learning. Cluster Computing, 27(4), 5235-5283.

[11] Eid, M. M., El-kenawy, E. S. M., & Ibrahim, A. (2021, March). A binary sine cosine-modified whale optimization algorithm for feature selection. In 2021 National Computing Colleges Conference (NCCC) (pp. 1-6). IEEE.

[12] El-Kenawy, E. S. M., Mirjalili, S., Abdelhamid, A. A., Ibrahim, A., Khodadadi, N., & Eid, M. M. (2022). Meta-heuristic optimization and keystroke dynamics for authentication of smartphone users. Mathematics, 10(16), 2912.

[13] Abdelhamid, A. A., Towfek, S. K., Khodadadi, N., Alhussan, A. A., Khafaga, D. S., Eid, M. M., & Ibrahim, A. (2023). Waterwheel plant algorithm: a novel metaheuristic optimization method. Processes, 11(5), 1502.

[14] Alhussan, A. A., Abdelhamid, A. A., El-Kenawy, E. S. M., Ibrahim, A., Eid, M. M., Khafaga, D. S., & Ahmed, A. E. (2023). A binary waterwheel plant optimization algorithm for feature selection. IEEE Access, 11, 94227-94251.

[15] Hassib, E. M., El-Desouky, A. I., Labib, L. M., & El-Kenawy, E. S. M. (2020). WOA+ BRNN: An imbalanced big data classification framework using Whale optimization and deep neural network. soft computing, 24(8), 5573-5592.

[16] El-Kenawy, E. S. M., Abdelhamid, A. A., Ibrahim, A., Mirjalili, S., Khodadad, N., Alduailij, M. A., ... & Khafaga, D. S. (2023). Al-Biruni Earth Radius (BER) Metaheuristic Search Optimization Algorithm. Comput. Syst. Sci. Eng., 45(2), 1917-1934.

[17] Alharbi, A. H., Towfek, S. K., Abdelhamid, A. A., Ibrahim, A., Eid, M. M., & Khafaga, D. S. & Saber, M.(2023). Diagnosis of Monkeypox Disease Using Transfer Learning and Binary Advanced Dipper Throated Optimization Algorithm. Biomimetics, 8(3), 313.

[18] El-Kenawy, E. S. M., Mirjalili, S., Khodadadi, N., Abdelhamid, A. A., Eid, M. M., El-Said, M., & Ibrahim, A. (2023). Feature selection in wind speed forecasting systems based on meta-heuristic optimization. Plos one, 18(2), e0278491.

[19] Khodadadi, N., Abualigah, L., El-Kenawy, E. S. M., Snasel, V., & Mirjalili, S. (2022). An archive-based multi-objective arithmetic optimization algorithm for solving industrial engineering problems. IEEE Access, 10, 106673-106698.

[20] Eid, M. M., El-Kenawy, E. S. M., Khodadadi, N., Mirjalili, S., Khodadadi, E., Abotaleb, M., ... & Khafaga, D. S. (2022). Meta-heuristic optimization of LSTM-based deep network for boosting the prediction of monkeypox cases. Mathematics, 10(20), 3845.

[21] Khodadadi, N., Khodadadi, E., Al-Tashi, Q., El-Kenawy, E. S. M., Abualigah, L., Abdulkadir, S. J., ... & Mirjalili, S. (2023). BAOA: binary arithmetic optimization algorithm with K-nearest neighbor classifier for feature selection. IEEE Access, 11, 94094-94115.

[22] Salamai, A. A., El-kenawy, E. S. M., & Abdelhameed, I. (2021). Dynamic voting classifier for risk identification in supply chain 4.0. Computers, Materials & Continua, 69(3).

[23] Djaafari, A., Ibrahim, A., Bailek, N., Bouchouicha, K., Hassan, M. A., Kuriqi, A., ... & El-Kenawy, E. S. M. (2022). Hourly predictions of direct normal irradiation using an innovative hybrid LSTM model for concentrating solar power projects in hyper-arid regions. Energy Reports, 8, 15548-15562.

Journal of Computer Science and Information Systems,

ISSN 2535-1451