Journal of Computer Science and Information Systems,

ISSN 2535-1451

Biosensors for Virus Detection Optimization Using IoT-Based Machine Learning Algorithms and Techniques

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Abstract:

In the era of global health challenges, the demand for rapid, accurate, and scalable virus detection systems has grown significantly. This study explores the integration of biosensor technologies with Internet of Things (IoT) infrastructure and machine learning (ML) algorithms to optimize virus detection in real-time. The proposed framework leverages advanced ML techniques—such as decision trees, support vector machines (SVM), and deep learning models—to analyze biosensor data transmitted through IoT networks. These methods enhance the detection accuracy, reduce false positives, and enable timely responses to viral outbreaks. Additionally, edge computing is employed to minimize latency and ensure efficient data processing in resource-constrained environments. The system's performance is evaluated across various biosensor platforms and virus datasets, demonstrating high sensitivity, specificity, and adaptability. The integration of intelligent biosensing and IoT-based ML optimization offers a promising direction for next-generation public health monitoring and epidemic management systems.

Keywords:

biosensors, virus detection, Internet of Things, machine learning, smart healthcare, real-time monitoring

ISSN 2535-1451

REFERENCES

[1] 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.

[2] 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.

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] El-Kenawy, E. S. M. T., & SM, E. (2019). A machine learning model for hemoglobin estimation and anemia classification. International Journal of Computer Science and Information Security (IJCSIS), 17(2), 100-108.

[8] El-kenawy, E. S. M. T. (2018). Solar radiation machine learning production depend on training neural networks with ant colony optimization algorithms. International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), 7(5), 1-4.

[9] 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.

[10] Kaveh, A., Talatahari, S., & Khodadadi, N. (2019). The hybrid invasive weed optimization-shuffled frog-leaping algorithm applied to optimal design of frame structures. Periodica Polytechnica Civil Engineering, 63(3), 882-897.

[11] Khodadadi, N., Abualigah, L., & Mirjalili, S. (2022). Multi-objective stochastic paint optimizer (MOSPO). Neural Computing and Applications, 34(20), 18035-18058.

[12] Kaveh, A., Talatahari, S., & Khodadadi, N. (2022). Stochastic paint optimizer: theory and application in civil engineering. Engineering with Computers, 1-32.

[13] Khodadadi, N., & Mirjalili, S. (2022). Truss optimization with natural frequency constraints using generalized normal distribution optimization. Applied Intelligence, 52(9), 10384-10397.

[14] Khodadadi, N., Soleimanian Gharehchopogh, F., & Mirjalili, S. (2022). MOAVOA: a new multi-objective artificial vultures optimization algorithm. Neural Computing and Applications, 34(23), 20791-20829.

[15] Khodadadi, N., Abualigah, L., Al-Tashi, Q., & Mirjalili, S. (2023). Multi-objective chaos game optimization. Neural Computing and Applications, 35(20), 14973-15004.