

lebih lanjut dalam pemilihan parameter *epsilon* dan MinPts. Langkah ini diyakini dapat meningkatkan hasil deteksi yang lebih akurat dan mengurangi *false positive*.

## Daftar Pustaka

- [1] T. Zhang, H. Bai, and S. Sun, “A self-adaptive deep learning algorithm for intelligent natural gas pipeline control,” *Energy Reports*, vol. 7, pp. 3488–3496, Nov. 2021, doi: 10.1016/j.egyr.2021.06.011.
- [2] A. F. Ihsan and W. Astuti, “Deep Learning Based Anomaly Detection on Natural Gas Pipeline Operational Data,” in *2022 2nd International Conference on Intelligent Cybernetics Technology and Applications, ICICyTA 2022*, Institute of Electrical and Electronics Engineers Inc., 2022, pp. 228–233. doi: 10.1109/ICICyTA57421.2022.10037988.
- [3] P. Malhotra, L. Vig, G. Shroff, and P. Agarwal, *Long Short Term Memory Networks for Anomaly Detection in Time Series*. [Online]. Available: <http://www.i6doc.com/en/>.
- [4] D. Deng, “Research on Anomaly Detection Method Based on DBSCAN Clustering Algorithm,” in *Proceedings - 2020 5th International Conference on Information Science, Computer Technology and Transportation, ISCTT 2020*, Institute of Electrical and Electronics Engineers Inc., Nov. 2020, pp. 439–442. doi: 10.1109/ISCTT51595.2020.00083.
- [5] S. S. Aljameel *et al.*, “An Anomaly Detection Model for Oil and Gas Pipelines Using Machine Learning,” *Computation*, vol. 10, no. 8, Aug. 2022, doi: 10.3390/computation10080138.
- [6] S. Ramaswamy, R. Rastogi, and K. Shim KAIST, “Efficient Algorithms for Mining Outliers from Large Data Sets,” 2000. [Online]. Available: [www.bell-labs.com/projects/serendip](http://www.bell-labs.com/projects/serendip)
- [7] L. Martí, N. Sanchez-Pi, J. M. Molina, and A. C. B. Garcia, “Anomaly detection based on sensor data in petroleum industry applications,” *Sensors (Switzerland)*, vol. 15, no. 2, pp. 2774–2797, Jan. 2015, doi: 10.3390/s150202774.
- [8] K. Amoani-Osafo and O. A. A. Nana, “A REVIEW ON: DETECTING ANOMALIES IN OIL PIPELINES USING MACHINE LEARNING,” *Journal of Energy Technologies and Policy*, vol. 14, no. 3, Sep. 2024, doi: 10.7176/JETP/14-3-01.
- [9] T. Ergen and S. S. Kozat, “Unsupervised anomaly detection with LSTM neural networks,” *IEEE Trans Neural Netw Learn Syst*, vol. 31, no. 8, pp. 3127–3141, Aug. 2020, doi: 10.1109/TNNLS.2019.2935975.
- [10] A. F. Ihsam, Darmadi, S. Uttunggadewa, S. D. Rahmawati, I. Giovanni, and S. N. Himawan, “Multi-Layer LSTM Implementation in Operational Condition Forecasting of a Natural Gas Transmission Pipeline Network,” in *ICOIACT 2022 - 5th International Conference on Information and Communications Technology: A New Way to Make AI Useful for Everyone in the New Normal Era, Proceeding*, Institute of Electrical and Electronics Engineers Inc., 2022, pp. 244–249. doi: 10.1109/ICOIACT55506.2022.9971837.
- [11] M. Celik, F. Dadaser-Celik, and A. S. Dokuz, “Anomaly detection in temperature data using DBSCAN algorithm,” in *2011 International Symposium on Innovations in Intelligent Systems and Applications*, IEEE, Jun. 2011, pp. 91–95. doi: 10.1109/INISTA.2011.5946052.
- [12] K. G. Mehrotra, C. K. Mohan, and H. Huang, “Anomaly Detection,” 2017, pp. 21–32. doi: 10.1007/978-3-319-67526-8\_2.
- [13] O. I. Provotar, Y. M. Linder, and M. M. Veres, “Unsupervised Anomaly Detection in Time Series Using LSTM-Based Autoencoders,” in *2019 IEEE International Conference on Advanced Trends in Information Theory, ATIT 2019 - Proceedings*, Institute of Electrical and Electronics Engineers Inc., Dec. 2019, pp. 513–517. doi: 10.1109/ATIT49449.2019.9030505.
- [14] P. Jain, M. S. Bajpai, and R. Pamula, “A Modified DBSCAN Algorithm for Anomaly Detection in Time-series Data with Seasonality,” *International Arab Journal of Information Technology*, vol. 19, no. 1, pp. 23–28, Jan. 2022, doi: 10.34028/iajit/19/1/3.
- [15] Tran Manh Thang and Juntae Kim, “The Anomaly Detection by Using DBSCAN Clustering with Multiple Parameters,” in *2011 International Conference on Information Science and Applications*, IEEE, Apr. 2011, pp. 1–5. doi: 10.1109/ICISA.2011.5772437.
- [16] L. Jiang, Y. Wang, W. Zheng, C. Jin, Z. Li, and S. G. Teo, “LSTMSPLIT: Effective SPLIT Learning based LSTM on Sequential Time-Series Data,” Mar. 2022, [Online]. Available: <http://arxiv.org/abs/2203.04305>
- [17] M. Hasanov, M. Wolter, and E. Glende, *Time Series Data Splitting for Short-Term Load Forecasting*. PEES + PELSS 2022; Power and Energy Student Summit, 2022.
- [18] K. Tenekedjiev, N. Abdussamie, H. An, and N. Nikolova, “Regression diagnostics with predicted residuals of linear model with improved singular value classification applied to forecast the hydrodynamic efficiency of wave energy converters,” *Applied Sciences (Switzerland)*, vol. 11, no. 7, Apr. 2021, doi: 10.3390/app11072990.
- [19] H. Marmolin, “Subjective MSE Measures,” *IEEE Trans Syst Man Cybern*, vol. 16, no. 3, pp. 486–489,

- 1986, doi: 10.1109/TSMC.1986.4308985.
- [20] T. Chai and R. R. Draxler, "Root mean square error (RMSE) or mean absolute error (MAE)?," Feb. 28, 2014. doi: 10.5194/gmdd-7-1525-2014.
- [21] K. R. Shahapure and C. Nicholas, "Cluster quality analysis using silhouette score," in *Proceedings - 2020 IEEE 7th International Conference on Data Science and Advanced Analytics, DSAA 2020*, Institute of Electrical and Electronics Engineers Inc., Oct. 2020, pp. 747–748. doi: 10.1109/DSAA49011.2020.00096.