ISSN(O): 2320-5407 | ISSN(P): 3107-4928

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

REVIEWER'S REPORT

Manuscript No.: **IJAR-58680**

Title: Leakage-Aware Latent-Dimension Selection for Intrusion Detection in Agricultural IoT Networks.

Recommendation:
Accept as it is .....
Accept after minor revision.....
Accept after major revision ...✓.....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity			✓	
Significance			✓	

Reviewer's ID: JPR- **098**

Detailed Reviewer's Report

Decision: Accept after Major Revision

Major Comments

1. **Controlled Ablation Study:**
   The comparison between the selected-latent and full-latent Random Forest models is not fully controlled because the proposed model uses 300 trees, whereas the reference model uses 150 trees. Therefore, the reported differences cannot be attributed solely to IWHO-Lite. An equal-budget ablation using the same Random Forest configuration should be provided.
2. **Comparison with Baseline Feature-Selection Methods:**
   The effectiveness of IWHO-Lite is not sufficiently established against conventional or alternative feature-selection approaches. The authors should include appropriate baseline methods, such as random selection, traditional feature-selection techniques, or other optimization-based selection methods, under comparable computational settings.
3. **Farm-Flow Performance:**
   The proposed method achieves only **0.4724 ± 0.0131 F1** on Farm-Flow, with precision of **0.3143 ± 0.0137** and specificity of **0.3167 ± 0.0560**. Since Farm-Flow is the primary agricultural IoT dataset, this relatively

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high false-positive rate requires deeper analysis and discussion regarding the practical applicability of the proposed IDS.

4. **Dataset Partitioning and Leakage:**
   The manuscript provides a useful leakage-aware protocol, but the potential effects of device-, session-, farm-, and temporal-level dependencies are not fully addressed. The authors should provide clearer details regarding how the datasets were partitioned and discuss whether random partitioning could result in distributional dependence between training and testing data.
5. **Validation of the Very High CICIoT2023 Performance:**
   The reported CICIoT2023 F1-score of approximately **0.9953** is exceptionally high. The authors should provide additional evidence, such as confusion matrices, class-wise/attack-wise results, and false-positive/false-negative analysis, to demonstrate that this performance is not primarily caused by dataset characteristics or class distribution.
6. **Statistical Robustness:**
   The experiments are based on only three independent seeds. While the authors appropriately describe these results as descriptive, additional independent runs would provide stronger evidence regarding the stability of the selected latent dimensions and reported performance.
7. **Justification of CNN-Lite for Tabular Network Features:**
   The rationale for applying Conv1D to the feature-axis representation of network-flow data should be strengthened. An additional comparison with a conventional dense/MLP representation or another dimensionality-reduction approach would help demonstrate the necessity of the CNN-Lite representation.

Minor Revisions

1. **Clarify the terminology** between latent-dimensional compression, feature selection, dimensionality reduction, and overall model compression.
2. **Improve the description of the experimental setup**, including hardware/software versions, inference batch size, warm-up procedure, and the exact components included in latency measurements.
3. **Provide confusion matrices** for all three datasets to complement the reported aggregate metrics.

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4. **Clarify threshold selection**, particularly why F1 maximization is used as the operating criterion and whether other operating points were considered.
5. **Explain the role of calibration more clearly**, since the reported calibration results do not show an improvement in Brier score or ECE.
6. **Improve the related-work comparison** by providing a concise table summarizing existing IDS approaches, datasets, methods, and reported performance.
7. **Improve reproducibility** by providing sufficient preprocessing details, exact dataset versions/partitions, implementation details, and, if possible, source code.
8. **Moderate the practical deployment claims.** The reported results demonstrate software-level compactness and inference characteristics, but they do not establish energy efficiency or direct suitability for agricultural edge hardware.
9. **Improve the presentation of tables and figures**, particularly by ensuring consistent notation for dimensions, compression percentage, F1, and standard deviation.
10. **Proofread the manuscript for language and formatting consistency**, including terminology, abbreviations, equation formatting, references, and capitalization.