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COVER LETTER

[*Zulhipni Reno Saputra Elsi*]
[*Universitas Muhammadiayh Palembang*]
[*Zulhipni_renosaputra@um-palembag.ac.id*]
[*081377852691]*

[*December, 06 2024*]

Dear,
I/We wish to submit an original research article entitled "[***Optimizing Intrusion Detection with Data Balancing and Feature Selection Techniques***]" for consideration by SINERGI.

We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere. We promise not to withdraw this article after it has been processed by the Editorial Team. If there is a withdrawal, we are willing to pay a penalty of USD 150 (IDR 2000K) to the SINERGI Editorial Team.

In this paper, I/we report on / show that:

Field	:	Intrusion Detection in IoT Networks using Machine Learning Techniques
Topic	:	Optimizing intrusion detection systems (IDS) through data balancing and feature selection methods.
Brief Background	:	The rapid proliferation of IoT devices has increased the complexity of network environments, leading to significant security challenges. Intrusion detection systems, particularly those based on machine learning, face difficulties due to imbalanced datasets, where attack data is underrepresented compared to normal data. This imbalance often results in biased models, necessitating effective data preprocessing techniques.
Research Problem	:	How to improve the accuracy and reliability of intrusion detection systems for IoT networks by addressing class imbalance and optimizing feature selection in machine learning models.
Overview of Method	:	The study explored four data balancing techniques—Random Undersampling (RUS), Synthetic Minority Oversampling Technique (SMOTE), Cost-Sensitive Learning (CSL), and Randomized Combination Sampling

		(RCS) and employed feature selection methods like Mutual Information Feature Selection (MIFS) and Correlation-based Feature Selection (CFS). Two classifiers, Decision Tree (DT) and Linear Discriminant Analysis (LDA), were used to evaluate the impact of these methods on an imbalanced dataset from real-world IoT infrastructure.
Significant finding	:	1. SMOTE and RCS demonstrated superior performance in balancing datasets, achieving high accuracy and G-mean. 2. DT consistently outperformed LDA across all metrics, indicating its robustness in handling imbalanced data. 3. Feature selection significantly enhanced model performance, with CFS combined with SMOTE or RCS yielding near-perfect accuracy and G-mean values. 4. The study highlighted LDA's limitations in managing high-dimensional and imbalanced data.

We have no conflicts of interest to disclose.

Thank you for your consideration of this manuscript.

Sincerely,
[*Zulhipni Reno Saputra Elsi*]

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AUTHORSHIP STATEMENT

I/We wish to submit an original research article entitled "[***Optimizing Intrusion Detection with Data Balancing and Feature Selection Techniques***]" for consideration by SINERGI.

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

Author 1		
Name	:	Zulhipni Reno Saputra Elsi
Affiliation	:	Universitas Muhammadiyah Palembang
Email Address	:	zulhipni_renosaputra@um-palembang.ac.id
Author 2		
Name	:	Ahmad Affandi Supli
Affiliation	:	Xiamen University Malaysia, Malaysia
Email Address	:	ahmadaffandi@xmu.edu.my
Author 3		
Name	:	Jimmie
Affiliation	:	Universitas Muhammadiyah Palembang
Email Address	:	jimmie@um-palembang.ac.id
Author 4		
Name	:	M. Ghozi al-faris
Affiliation	:	Universitas Muhammadiyah Palembang
Email Address	:	ghozi alfaris28@gmail.com
Author 5		
Name	:	David Agustianto Rapel
Affiliation	:	Universitas Muhammadiyah Palembang
Email Address	:	agustiantodavid443@gmail.com

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Please submit 3 (three) potential reviewers (*that have not listed in SINERGI*) to speed up the review process that competent for the topic and has a good reputation in that area.

Reviewer 1	:	
Name	:	KURNIABUDI
Affiliation	:	Universitas Dinamika Bangsa
Email Address	:	kurniabudi@unama.ac.id
Scopus url	:	https://www.scopus.com/authid/detail.uri?authorId=56979365500
Google Scholar url	:	https://scholar.google.com/citations?hl=id&user=TFUx_KUAAAAJ
Reviewer 2	:	
Name	:	M. Agus Syamsul Arifin
Affiliation	:	Universitas Bina Insan
Email Address	:	mas.arifin@univbinainsan.ac.id
Scopus url	:	https://www.scopus.com/authid/detail.uri?authorId=57220893571
Google Scholar url	:	https://scholar.google.co.id/citations?hl=id&user=BxDAHS8AAAAJ
Reviewer 3	:	
Name	:	Yesi Novaria Kunang
Affiliation	:	Universitas Binadarma
Email Address	:	yesinovariakunang@binadarma.ac.id
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