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“Mathematics, Computational Sciences and Statistics for Better Future”

MATHEMATICS DEPARTMENT
FACULTY OF SCIENCE AND TECHNOLOGY
UNIVERSITAS Airlangga
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On behalf of the Program Committee, we would like to thank all participants of “The International Conference on Mathematics, Computational Sciences and Statistics (ICoMCoS) 2020” hosted by Department of Mathematics, Universitas Airlangga.

2020 has been a very challenging year due to Covid-19 pandemic, in which for the sake of safety and well-being of all participants, our initial plan to held ICoMCoS 2020 in Surabaya, Indonesia, has been converted to be fully delivered virtually. Nevertheless, while we may all be physically distant, we hope we can still connect intellectually.

The theme of ICoMCoS 2020 is “Mathematics, Computational Sciences and Statistics for a Better Future”. With increasing complexities of our world today, Mathematics, Computational Sciences and Statistics have become powerful tools to elucidate all the complexities as well as provide the solution. ICoMCoS 2020, in a more detail outfit, is designed to provide a multidisciplinary forum for promoting and fostering interactions between mathematics (Analysis and Geometry, Algebra and Combinatoric, Applied Mathematics), computational sciences (algorithm analysis, network security and cryptography, artificial intelligence and machine learning, knowledge discovery and data mining, machine translation, image processing), and statistics (statistical theory, statistics modeling, forecasting methods, multivariate methods, econometrics, biostatistics, actuarial sciences) as well as related methodologies in studying various phenomena in the area.

We would like to say thanks to all authors who have submitted the paper to our proceedings. We also thank the scientific committee members and all of the reviewers for all supports during the conference and the preparation of the proceedings. As the scientific manuscripts of the conference, we provide the AIP Proceedings which contains the high-quality paper selected by a blind review process. We apologize to the authors if this process creates inconvenience.

Last but not least, there have been enormous collective efforts being put to run ICoMCoS 2020, in one form or another, so, on behalf of the Program Committee, let me take this opportunity to express my high appreciation to all of those that have contributed.

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Bootstrap Based $T^2$ Chart with Hybrid James Stein and SDCM for Network Anomaly Detection

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Abstract. The conventional multivariate chart based on Shewhart approach will face a problem when it is utilized in monitoring the multiple outliers. To overcome the situation, the James-Stein estimator and Successive Difference Covariance Matrix can be adopted to improve the estimated mean vector and covariance matrix, respectively. Attacks in the network have a similar nature as the multiple outliers. Therefore, by improving its estimated mean vector and covariance matrix, the multivariate Hotelling’s $T^2$ chart can be exploited for detecting network attacks as an intrusion detection system. In this paper, the performance of the Hotelling’s $T^2$ is updated using the James-Stein estimator and Successive Difference Covariance Matrix estimators in monitoring network anomalies. The bootstrap resampling method is applied in estimating the control limit of the proposed IDS. Further, the reputable NSL-KDD dataset is used as a standard in assessing the proposed chart performance. The proposed IDS demonstrates a good performance for the training dataset with hit rate detection of 0.9175. Meanwhile, for the testing dataset, the proposed method excels the other charts with hit rate detection of 0.8557.

INTRODUCTION

The control chart plays a big role in controlling the quality of an industrial or manufacturing product. This method uses the statistical procedure as the main core to create graphical charts that explain the condition of the monitored process over-time. There are two main types of the control chart according to its monitored variable or quality characteristic. First, the variable control chart [1-3] is used to monitor continuous or metric data. Second, in monitoring the categorical or non-metric data, the attribute control chart [4-6] is developed. The control chart can also be classified by the number of its monitored quality characteristics. The univariate control chart is constructed to monitor one characteristic, meanwhile, the multivariate chart is suggested for multiple quality characteristics. The current development of the multivariate control chart includes Hotelling’s $T^2$ control chart [7-9], MCUSUM control chart [10-12] and MEWMA control chart [13, 14].

The multivariate control chart can also be applied for non-industrial process. This procedure is compatible and powerful to be employed in cyber-security as the alarm from the intruder [15]. An intrusion detection system (IDS) based on the multivariate control chart mechanism can find the sign of abnormality in the network and report it to the administrator [16]. Compared to the other approaches, the multivariate control chart has superiority in computational time. This method also does not need the prior information to detect network anomalies [17]. Based on the literature, the Hotelling’s $T^2$ chart is the most used control chart in IDS [18]. However, the performance of Hotelling’s $T^2$ chart will be reduced when it is used to observe the process that contains the multiple outliers. In
monitoring anomalies in the network, the multiple outliers can be analogous to the attacker that invade the system. Correspondingly, more intrusions are declared as the normal connection due to the masking effect produced by the presence of the outliers [19]. To overcome the situation, the improvement in the mean vector and covariance matrix estimators are needed [18].

A robust estimator can be proposed in decreasing the outcome of multiple outliers by substituting the traditional estimator. The implementation of the robust estimator is effective to improve the performance of the Hotelling’s $T^2$ control chart in monitoring the contaminated process [20]. The robust covariance matrix such as the successive difference covariance matrix (SDCM) is usable for this instance. The $T^2$ control chart performance in detecting shift increases when SDCM is combined with the chart [21, 22]. Also, $T^2$ control chart with SDCM can also be exploited to inspect process with the auto-correlated process [23].

To improve the mean vector estimator, minimum covariance determinant (MCD) can be executed for this case [24]. However, the high computational cost becomes a big obstacle in this matter. The shrinkage estimators can be demonstrated for this issue [25, 26]. The methods have smaller mean squared errors compared to the conventional estimators which can help the control chart to improve its performance in detecting multiple outliers. The James-Stein estimator is one of the enhanced estimators for the mean vector [27]. Its application to Hotelling’s $T^2$ control chart has proven produced better performance in estimating the mean vector. Reference [28] stated that the multivariate control chart performance increases to monitor shift in the mean vector when this estimator is applied.

The new problem arises when the exact distribution of the $T^2$ statistic with SDCM is still debatable. Some scholars such as Sullivan and Woodall [22] and Williams et al. [20] attempt to approximate the distribution of the proposed statistics. The other approaches to overcome the problem is the utilization of the non-parametric approach in calculating the statistic with the unknown distribution. Kernel density estimation (KDE) can be one solution to this problem [29, 31]. Ahsan et al. [32] used the scheme of using KDE to estimate the control limit of $T^2$ with SDCM. The bootstrap approach can also be used in this case. This scheme yields better performance in monitoring network anomalies compared to KDE while applied to Hotelling’s $T^2$ based on SDCM [33].

Therefore, this study is to propose for challenging the KDE based Hotelling’s $T^2$ control chart with hybrid James-Stein and SDCM [18]. Similar to the previous research, the James-Stein estimator is utilized to enhance the mean vector estimator, while the SDCM is adopted as a robust covariance matrix. Performance of the proposed method is opposed with the other multivariate charts in detecting intrusion using NSL-KDD dataset.

The rest of this research is arranged as follows: The proposed idea of $T^2$ control chart with James-Stein and SDCM is detailed. The bootstrap based control limit is described in section 3. Section 4 presents the dataset and algorithm used in this study. Further, the performance comparisons of the proposed IDS with the other multivariate control charts are presented in section 5. In the end, section 6 concludes the obtained results.

**$T^2$ CHART BASED ON HYBRID JAMES STEIN AND SUCCESSIVE DIFFERENCE COVARIANCE MATRIX**

In this section, the procedures of the proposed chart and its control limit calculation method using the bootstrap are presented. The James-Stein and SDCM estimators are employed in order to improve the quality of the estimated mean vector and covariance matrix for the contaminated data.

**Control Chart Procedure**

In this section, the James-Stein and SDCM estimators are integrated with the Hotelling’s $T^2$ chart to improve its performance in estimating the mean vector and covariance matrix. Let $\mathbf{Y} = \left[y_1, y_2, \ldots, y_j, \ldots, y_n^i\right]$, $i = 1, 2, \ldots, n$ represents the number of observations, the statistics of $T^2$ chart is calculated as follows [34]:

$$T_i^2 = (\mathbf{y}_i - \bar{\mathbf{y}})' S^{-1} (\mathbf{y}_i - \bar{\mathbf{y}}).$$

(1)
where \( \mathbf{y}_j \) is a vector with the size of \( 1 \times p \) (\( p \) is the number of variable or quality characteristics) and 
\[
\overline{\mathbf{y}} = \frac{1}{n} \sum_{i=1}^{n} \mathbf{y}_i
\]
and 
\[
\mathbf{S} = \frac{1}{n-1} \sum_{i=1}^{n} (\mathbf{y}_i - \overline{\mathbf{y}})(\mathbf{y}_i - \overline{\mathbf{y}})'.
\]
The control limit of Hotelling’s \( T^2 \) when the multivariate normal assumption is fulfilled can be obtained with the following equation:
\[
CL = \frac{p(n+1)(n-1)}{n^2 - np} F_{(\alpha, p, n-p)},
\]
where \( n \) is the number of observations, \( p \) is the number of variables and \( \alpha \) is false alarm rate.

The \( T^2 \) Chart Based on Hybrid James Stein and Successive Difference Covariance Matrix (SDCM) is constructed by replacing \( \overline{\mathbf{x}} \) and \( \mathbf{S} \) in equation (1) with the James Stein and Successive Difference Covariance Matrix estimators, respectively. The SDCM is calculated using the following equation [35], [36]:
\[
\mathbf{S}_D = \frac{1}{(n-1)} \sum_{i=2}^{n} (\mathbf{y}_i - \mathbf{y}_{i-1})(\mathbf{y}_i - \mathbf{y}_{i-1})'.
\]
Contrarily, the James-Stein estimator is obtained from [28]:
\[
\overline{\mathbf{y}}_D^{JS} = \left( 1 - \frac{p-2}{n(\overline{\mathbf{y}} - \mathbf{v})^T \mathbf{S}^{-1}_D (\overline{\mathbf{y}} - \mathbf{v})} \right)^+ (\overline{\mathbf{y}} - \mathbf{v}) + \mathbf{v},
\]
while the function \( f(x)^+ \) is declared as:
\[
f(x)^+ = \begin{cases} f(x), & \text{if } f(x) > 0 \\ 0, & \text{otherwise.} \end{cases}
\]
Therefore, the proposed Hotelling’s \( T^2 \) control chart based on James-Stein and SDCM can be written as:
\[
T^2_{JSD,i} = (\mathbf{y}_i - \overline{\mathbf{y}}_D^{JS}) \mathbf{S}^{-1}_D (\mathbf{y}_i - \overline{\mathbf{y}}_D^{JS}).
\]
Because the distribution of the proposed chart is still unknown, its control limits are estimated using the bootstrap resampling method. The detailed procedure for this calculation will be presented in the next subsection.

**Bootstrap Control Limit**

When the distribution of a random variable is unknown, the bootstrap resampling, developed by reference [37], can be applied in order to estimate the parameter of the unknown distribution. The algorithm of control limit calculation based on the bootstrap method (see Fig. 1 for illustration) is given as follows:

---

**Algorithm of Bootstrap Control Limit**

---

**Step 1.** Calculate the statistic \( T^2_{JSD,i} \) as in equation (5).

**Step 2.** Generate B times bootstrap samples from \( T^2_{JSD,i} \) for \( N \) observations.

**Step 3.** Calculate percentile \( 100(1-\alpha) \) for each \( T^2_{JSD,i}^{(l)} \), \( l = 1, 2, ..., B \).

**Step 4.** Calculate the bootstrap control limit by taking the mean of each replication using the following formula
\[
CL_{\text{boot}} = \frac{1}{B} \sum_{l=1}^{B} T^2_{JSD,i}^{(100(1-\alpha))}
\]

---

060014-3
**FIGURE 1.** Bootstrap Control Limit Algorithm

**IDS BASED $T^2$ CONTROL CHART WITH JAMES-STEIN AND SDCM ESTIMATORS**

**Algorithm of the Proposed IDS**

In developing the IDS based on $T^2$ James-Stein and SDCM, there are two phases required to be executed. The first phase is creating a normal profile from the in-control or the normal profile. The second phase is monitoring the network traffic using the calculated statistics and control limit from phase 1.

This phase needs to calculate the mean vector, the covariance matrix and bootstrap control. The specified procedures of this phase are presented as follows:

---

**Phase I: Calculating Normal Profile**

---

**Step 1** Create the in-control or normal connection data matrix $Y_{normal}$.

**Step 2** Calculate the James-Stein mean vector $\overline{y}_J$ of the matrix $Y_{normal}$.

**Step 3** Calculate the SDCM matrix of $S_{DN}$ as in equation (3) from $Y_{normal}$.

**Step 4** Calculate statistics $T^2_{JSN,J}$, as in (5) from the normal connection data $Y_{normal}$.

**Step 6** Determine $\alpha$ and calculate the bootstrap control limit $CL_{Boots}$.

---

In phase 2, the estimated normal profile such as: $\overline{y}_J$, $S_{DN}$ and $CL_{Boots}$ are then used. The following algorithm describes the steps of the monitoring phase:
Phase II: Monitoring

**Step 1** Create a new connection data matrix $Y_{test}$.

**Step 2** Calculate statistics $T^2_{JSDT,i}$ from new connection data $Y_{test}$ as follows:

$$T^2_{JSDT,i} = \left( y_i - \bar{y}_i^{JS} \right)^T S^{-1}_{DN} \left( y_i - \bar{y}_i^{JS} \right),$$

**Step 3** The new connection is declared as an anomaly or intrusion if $T^2_{JSDT,i} > CL_{Boots}$, else the new connection is stated as a normal connection if $T^2_{JSDT,i} \leq CL_{Boots}$.

---

**NSL- KDD Dataset and Performance Metric**

The NSL-KDD, which consists of 41 variables, with 34 quantitative and 7 qualitative variables, was applied in this research. However, only uses 32 quantitative variables is used in this research because the value of the rest of the metric data is equal to zero. The summary of NSL-KDD dataset is tabulated in Table 1. The proposed method achievement will be compared with the conventional Hotelling’s $T^2$ chart and $T^3$ based on the SDCM chart, using various control limits, as stated in [18]:

1. **$F$ distribution control limit ($CL_F$)**

$$CL = \frac{p(n+1)(n-1)}{n^2 - np} F_{\left(\alpha, p, n-p\right)},$$

2. **Sullivan and Woodall ($CL_{SW}$) [22] control limit**

$$CL_{SW} = \frac{(n-1)^2}{n} \frac{BETA_{\left(1-\alpha, \frac{p}{2}, \frac{g-p-1}{2}\right)}}{},$$

3. **Mason and Young ($CL_{MY}$) [38] control limit**

$$CL_{MY} = \frac{(f-1)^2}{f} \frac{BETA_{\left(1-\alpha, \frac{p}{2}, \frac{g-p-1}{2}\right)}}{},$$

4. **Chi-square distribution ($CL_{X^2}$) control limit**

$$CL_{X^2} = \chi^2_{\left(1-\alpha\right), u},$$

5. **Kernel Density-based Control Limit**

$$CL_{KDE} = \hat{F}_h(t)^{-1} \left(1 - \alpha\right).$$

where $BETA_{\left(1-\alpha, \frac{p}{2}, \frac{g-p-1}{2}\right)}$ is $[1-\alpha]$-th quantile of Beta distribution, $n$ is the number of samples, $p$ is the number of quality characteristics, $g$ is the shape parameter $g = \frac{2(n-1)^2}{3n-4}$, $\chi^2_{\left(1-\alpha\right), u}$ is $[1-\alpha]$-th quantile of Chi-square distribution with $u$ degree of freedom, and $\hat{F}_h(t)$ is cumulative distribution function calculated from KDE.

Table 2 presents the confusion matrix that will be used in evaluating the performance of the proposed IDS as well as its competitor [33]. The presence of false positive (FP) in the monitored network leads to the false alarm disturbing the user convenient. On the other hand, the presence of false negative (FN) causes the actual attacks to remain undetected.
### TABLE 1. Summary of NSL-KDD dataset

<table>
<thead>
<tr>
<th>Dataset Type</th>
<th>Normal</th>
<th>Intrusion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>67,343</td>
<td>58,630</td>
<td>125,973</td>
</tr>
<tr>
<td></td>
<td>(53.46%)</td>
<td>(46.54%)</td>
<td>(100.00%)</td>
</tr>
<tr>
<td>Testing</td>
<td>9,711</td>
<td>12,832</td>
<td>22,543</td>
</tr>
<tr>
<td></td>
<td>(43.08%)</td>
<td>(56.92%)</td>
<td>(100.00%)</td>
</tr>
</tbody>
</table>

### TABLE 2. Intrusion detection confusion matrix

<table>
<thead>
<tr>
<th>Actual</th>
<th>Intrusion</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TP</td>
<td>FN</td>
</tr>
<tr>
<td></td>
<td>FP</td>
<td>TN</td>
</tr>
</tbody>
</table>

This study uses three performance metrics in assessing the performance of the proposed IDS. To measure the level of accuracy, the hit rate is employed. The formula of the hit rate can be written as follows:

\[
\text{Hit Rate} = \frac{TP + TN}{TP + FN + TP + FN}.
\]

In measuring the level of misdetection, this study employs FP rate and FN rate. The mathematical forms of FP and FN rate are described as follows:

\[
FP \text{ Rate} = \frac{FP}{TN + FP},
\]

\[
FN \text{ Rate} = \frac{FN}{TP + FN}.
\]

### RESULTS AND DISCUSSIONS

In detecting anomalies in the network, the proposed IDS based James-Stein and SDCM chart is compared with some control charts. To simplify the writing, the proposed IDS is written as JS-SDCM_{Boots}, conventional Hotelling’s \( T^2 \) is defined as \( T^2 \), \( T^2 \) based SDCM with \( F \) distribution control limit is written as SDCM_F, \( T^2 \) based SDCM with Sullivan and Woodall control limit is written as SDCM_{SW}, \( T^2 \) based SDCM with Mason and Young control limit is written as SDCM_{MY}, \( T^2 \) based SDCM with chi-square control limit is written as SDCM_{CH}. \( T^2 \) based James-Stein and SDCM with KDE control limit is written as JS-SDCM_{KDE}.

### TABLE 3. Performance of various IDS for training data of NSL-KDD dataset

<table>
<thead>
<tr>
<th>IDS</th>
<th>Hit Rate</th>
<th>FN</th>
<th>FP</th>
<th>FN Rate</th>
<th>FP Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>( T^2 )</td>
<td>0.91330</td>
<td>5428</td>
<td>5494</td>
<td>0.0806</td>
<td>0.0937</td>
</tr>
<tr>
<td>SDCM_F</td>
<td>0.91338</td>
<td>5417</td>
<td>5495</td>
<td>0.0804</td>
<td>0.0937</td>
</tr>
<tr>
<td>SDCM_{SW}</td>
<td>0.91705</td>
<td>4280</td>
<td>6170</td>
<td>0.0636</td>
<td>0.1052</td>
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<tr>
<td>SDCM_{MY}</td>
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<td>5429</td>
<td>5492</td>
<td>0.0806</td>
<td>0.0937</td>
</tr>
<tr>
<td>SDCM_{CH}</td>
<td>0.91332</td>
<td>5427</td>
<td>5492</td>
<td>0.0806</td>
<td>0.0937</td>
</tr>
<tr>
<td>JS-SDCM_{KDE}</td>
<td>0.91751</td>
<td>4115</td>
<td>6277</td>
<td>0.0611</td>
<td>0.1071</td>
</tr>
<tr>
<td>JS-SDCM_{Boots}</td>
<td>0.91750</td>
<td><strong>4113</strong></td>
<td>6280</td>
<td><strong>0.0610</strong></td>
<td><strong>0.1071</strong></td>
</tr>
</tbody>
</table>
Results

In this section, the performance of the proposed IDS, using bootstrap control limit, is compared with the other control charts as stated before. The monitoring results for training dataset of NSL-KDD dataset are exhibited in Table 3 and are visualized in Fig. 2. From the results, it can be considered that two approaches, JS-SDCM_{Boo} and JS-SDCM_{KDE}, have quite similar accuracy. However, for the training data set it can be concluded that the JS-SDCM_{KDE} has superiority in the lower False Negative rate. This makes the JS-SDCM_{KDE} produced a higher accuracy compared to the proposed IDS, even though the False Positive rate is the same. In addition, SDCM_{SW} has a good performance for the training dataset but it produces more false alarm that makes the lower accuracy for the approach.

![Control Chart Methods](image)

**FIGURE 2.** Performance of various IDS in monitoring training dataset for; a) accuracy b) error

Table 4 and Fig. 3 presents the performance comparison of the proposed chart and the other control charts for the testing data of NSL-KDD dataset. Similar to the result from the training dataset, JS-SDCM_{Boo} and JS-SDCM_{KDE}, have a quite similar performance in terms of accuracy detection. However, in the testing dataset, it can be regarded that the proposed IDS has a better performance reflected by the higher accuracy and lower False Negative. For this dataset, the lowest False Positive is owned by JS-SDCM_{KDE}. 

060014-7
### TABLE 4. Performance of various IDS for testing data of NSL-KDD dataset

<table>
<thead>
<tr>
<th>IDS</th>
<th>Hit Rate</th>
<th>FN</th>
<th>FP</th>
<th>FN Rate</th>
<th>FP Rate</th>
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<td>$T^c$</td>
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<td>3584</td>
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<td>SDCM$_{SW}$</td>
<td>0.7911</td>
<td>731</td>
<td>3978</td>
<td>0.0753</td>
<td>0.3100</td>
</tr>
<tr>
<td>SDCM$_{MY}$</td>
<td>0.8049</td>
<td>814</td>
<td>3584</td>
<td>0.0838</td>
<td>0.2793</td>
</tr>
<tr>
<td>SDCM$_{CH}$</td>
<td>0.8049</td>
<td>814</td>
<td>3584</td>
<td>0.0838</td>
<td>0.2793</td>
</tr>
<tr>
<td>JS-SDCM$_{KDE}$</td>
<td>0.8554</td>
<td>1127</td>
<td>2134</td>
<td>0.1160</td>
<td>0.1663</td>
</tr>
<tr>
<td>JS-SDCM$_{Boot}$</td>
<td>0.8557</td>
<td>1113</td>
<td>2139</td>
<td>0.1146</td>
<td>0.1666</td>
</tr>
</tbody>
</table>

**FIGURE 3.** Performance of various IDS in monitoring testing dataset for; a) accuracy b) error
Discussions

In this subsection, some notes and discussions about the performance of the proposed IDS is presented. Based on the monitoring results from the previous subsection, it can be stated that the proposed IDS based on Hotelling’s $T^2$ chart with hybrid James-Stein and SDCM estimators using bootstrap control limit has a good performance for both training and testing datasets. In training dataset, the proposed chart has a drawback in detecting the actual attacks as an intrusion symbolized by the higher FN rate compared to the KDE control limit. Consequently, the lower accuracy yields by the proposed chart. However, the proposed chart along with $T^2$ James-Stein chart with the KDE control limit produces the lowest FP rate compared to the other approaches. Therefore, for the training dataset, it can be said that the proposed chart has better performance in terms of low false alarm but still needs improvement in detecting the real attacks.

Different results come from the testing data of NSL-KDD dataset. For this case, the proposed chart shows its superiority to detect the real outlier compared to the other charts which can be viewed from the lowest FN rate. For this dataset, the proposed chart also produces the highest accuracy. However, the proposed chart still needs enhancement in term of higher FP rate compared to the KDE control limit. The midsection happens due to the in-control or normal connections declared as attacks.

CONCLUSION

In this study, the conventional Hotelling’s $T^2$ chart is enhanced by James-Stein and SDCM estimators to obtain the better mean vector and covariance matrix of the contaminated process. The control limit of the proposed chart is estimated using bootstrap resampling approach due to the unknown distribution of the proposed chart. Further, the proposed chart is applied as the intrusion detection system. Its performance in detecting network attacks is evaluated using the reputable NSL-KDD dataset for training and testing datasets.

Overall, the proposed chart demonstrating a good performance for both training and testing data of NSL-KDD dataset illustrated by the consistently high accuracy. The proposed IDS shows its excellence to the other approach in the testing dataset but has a slightly lower performance in detecting attacks in the training dataset. The multiclass detection for each type of attack with an incremental algorithm can be considered as future research. Also, some robust estimator as presented by reference [24] can be considered to improve the performance of the proposed IDS.

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My university is going to organise a conference in social science on 27-28 Oct 2021. We would like to publish our conference papers in your proceeding as our official proceeding. What are the procedures and publication fees?

Regards.

reply

Melanie Ortiz 1 month ago
Dear Kay,

thank you for contacting us.

We are sorry to tell you that SCImago Journal & Country Rank is not a publication. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus. Unfortunately, we cannot help you with your request, we suggest you visit the homepage or contact the editorial staff, so they could inform you more deeply.

Best Regards, SCImago Team

Ruslan 3 months ago

I have published articles on AIP, but until now I have not received confirmation for my Scopus ID, please explain. thank you

reply

Melanie Ortiz 2 months ago

Dear Ruslan,

thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus support: https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/

Best Regards, SCImago Team

Vikas 6 months ago

currently, the journal is not assigned quartile (Q indexing). When we can expect the assignment.

reply

Melanie Ortiz 6 months ago

Dear Vikas,

Thank you for contacting us. We calculate the SJR data for all the publication’s types, but the Quartile’s data are only calculated for Journals and Book Series.

Best regards, SCImago Team

Siddik 8 months ago

This will come under scopus journal list?

reply
Melanie Ortiz 8 months ago

Dear Siddik,
Thank you very much for your comment.
All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2019 was updated on June 2020. We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day.
Best Regards, SCImago Team

Hassan Yassein 9 months ago

ISSN of this journal different of ISSN in Scopus, although the data of SJR depends on the scopes

reply

Melanie Ortiz 9 months ago

Dear Hassan,
Thank you for contacting us.
SJR is a portal with scientometric indicators of journals indexed in Scopus. All the data (Title, ISSN, etc.) have been provided by Scopus /Elsevier and SCImago doesn’t have the authority over this data which are property of Scopus/Elsevier. SCImago has a signed agreement that limits our performance to the generation of scientometric indicators derived from the metadata sent in the last update (April/May 2020).

The next SCImago update will be made throughout June 2020 with the new update sent by Scopus. We suggest you wait for that date in order to see if there are any changes regarding this matter.

Best Regards, SCImago Team

Khairil 10 months ago

Is this proceeding ranked Q4?

reply

ali mohammed 11 months ago

why this journal dont have any rank yet ?
it is dont belong to Q1,2,3,4 ?

reply
Hi mam/sir,
I want to know whether this AIP conference proceeding is indexed in SCI or not?

Thanks

Khairil 1 year ago
Your IP (036.071.233.236) is blocked.
Block Reason: This IP was identified as infiltrated and is being used by sci-hub as a proxy.

How to unblock this my IP for acess AIP site?

thanks

Melanie Ortiz 1 year ago
Dear Akshya,
Thank you for contacting us. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus. Unfortunately, we cannot help you with your request referring the index status. We suggest you to consult Scopus database (see the current status of the journal) or other databases (like WoS). Best Regards, SCImago Team

Melanie Ortiz 11 months ago
Dear Ali,
Thank you for contacting us. We calculate the SJR data for all the publication types, but the Quartile data are only calculated for Journal type's publications. Best regards,
SCImago Team

Melanie Ortiz 1 year ago
Dear Khairil,
thank you for contacting us.
Sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.
Unfortunately, we cannot help you with your request, we suggest you to contact the journal's editorial staff by e-mail. Best Regards, SCImago Team
Duha Ahmed  1 year ago

dear Admin

about the AIP Conference Proceeding can you see the Scopus site because the date end to 2019
is there any update about this time or change it to 2020 in the near future and you will see it in the
site of Scopus
https://www.scopus.com/sourceid/26916

I hope the AIP Conference Proceeding is still in the Scopus for 2020
with my best wishes
Miss Duha

reply

Melanie Ortiz  1 year ago

Dear Duha,

Thank you for contacting us. Unfortunately, we cannot see what will happen in the future
with this journal. Best Regards, SCImago Team

Mohammed  1 year ago

Is the (AIP Conference Proceeding) out of Scopes because I tried to search for it in Scopes and I
did not find it
Please answer me

reply

Melanie Ortiz  1 year ago

Dear Mohammed,

thank you for contacting us. You can find it in Scopus:
https://www.scopus.com/sourceid/26916

Best Regards, SCImago Team

Thanh Quang Khai Lam  1 year ago

Dear Elena Corera!
Can you tell me “Lecture notes in civil engineering” in Q4?
i don't see in Scimago.
Thank you
Melanie Ortiz 1 year ago

Dear Teo,

thank you very much for your request. You can consult that information in SJR website. Best Regards, SCImago Team
Dear Elena,

Hi

Please can we concede AIP conference proceeding as journal. What I mean, the publication type could be journal of AIP conference proceedings.

Best regards

TArik AlOmran

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Dear Tarik,

Thank you very much for your comment. Unfortunately, we cannot help you with your request, we suggest you contact journal's editorial staff so they could inform you more deeply. You can find contact information in SJR website https://www.scimagojr.com

Best regards,

SCImago Team

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Dear Dunia,

dear

did the AIP conference (TMREES 18) have Thomson roeters or scopus or SJR Rank or not?

reply

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Dear Dunia,

Thank you very much for your comment. SCImago Journal & Country Ranks shows all the journal's available information in Open Access If you do not locate the journal in the search engine, Scopus / Elsevier has not provided us those data.
Budi Adiperdana  3 years ago

Dear Admin,

Could you please add the Quartile Rank for AIP Conference Proceedings

Best regards,
Budi

Elena Corera  3 years ago

Dear Budi, for Conferences and Proceedings the SJR is not calculated. Best Regards,
SCImago Team

Leave a comment

Name

Email
(will not be published)

Submit

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.