International Journal of
Economics Development Research, Volume 4(1), 2023
pp. 102-110

Internal Quality Audit Optimization At University Of Sumatera Utara Using K-Nearest Neighbour

Malinda Sari Sembiring[1], Vicky Rosalia[2]

Abstract:

Internal quality audits play a pivotal role in ensuring the operational success of higher education institutions. Given the complexity and scale of activities within today's colleges and universities, conducting objective and activity-independent internal quality audits becomes essential. These audits aim to add value and enhance the organization's operations by adopting a systematic and disciplined approach to assess and improve risk management, control, and governance processes. In this research, we propose a novel approach to enhance the accuracy and efficiency of internal quality audits. The study focuses on processing internal quality audit data from auditors and the Quality Control Circle (QCC) of Magister of Accounting, utilizing a suitable k-nearest neighbor method. The generated system aims to provide alternative calculation processing for internal quality audit results, enabling auditors to obtain more representative outcomes. Additionally, the system facilitates better documentation practices, making it convenient for internal quality auditors to access and use the data effectively. The research findings demonstrate significant improvements, with the accuracy value reaching an impressive 75.00%, and an AUC value of 0.88 in the Excellent Classification group. These outcomes hold promising implications for the future work of internal quality auditors, empowering them to deliver more reliable and comprehensive audit results.

Keywords: Audit, Higher Education, Accuracy, Classification

1. Introduction

Colleges and universities are complex institutions with a scope and complexity surpassing many business enterprises. To monitor their performance, college management conducts internal audits. The Institute of Internal Auditors (IIA) defines internal audit as an activity-independent and objective consultation and assurance process aimed at adding value and improving the organization's operations. Internal audits in colleges share similar goals with businesses, striving to help the organization achieve its objectives through systematic and disciplined assessment and enhancing risk management, control, and governance effectiveness (Wells et al., 2019).

Auditors conduct system audits by reviewing Internal Quality Assurance System (IQAS) documents, including academic quality-related activities, to assess their

[1]*Accounting Study Program, Faculty of Economics and Business, Universitas Sumatera Utara, Indonesia.* malindasembiring2@usu.ac.id
[2]*Accounting Study Program, Faculty of Economics and Business, Universitas Sumatera Utara, Indonesia.* vickyrosalia@usu.ac.id

adequacy and suitability according to existing standards. The audit process involves inspecting activities through conformity audits using predefined instruments and equipment. Compliance audits are carried out using evaluation check sheets for diagnostic and formative purposes. Auditors also visit the auditee to gather and analyze evidence. These internal audit activities aim to evaluate the performance of study programs and faculty annually (Yudianto et al., 2021). The results of the system audit are presented as scores, reflecting the accuracy of the IQAS preparation.

Currently, conformity audit measurements do not differentiate between auditees who do not complete the data, partially complete the data, or correctly provide complete data. As a result, the internal quality audit practices might not fully capture the distinctions among these different scenarios.

To address the identified problems and enhance the audit risk assessment in internal quality audits, this research proposes an approach using k-nearest neighbors. The utilization of k-nearest neighbors aims to provide a more comprehensive audit overview and a more realistic assessment of the auditees' performance. By optimizing internal audits at the University of North Sumatra through the use of k-nearest neighbors, this study seeks to enhance the identification and understanding of audit risks for improved decision-making.

As the field of internal quality audit continues to evolve, it is essential to explore innovative approaches and techniques, such as k-nearest neighbors, to address the challenges faced by higher education institutions in ensuring quality and effectiveness in their operations. The findings from this study hold promising implications for optimizing internal audits and guiding colleges and universities towards achieving their vision and mission.

2. Theoretical Background

Internal Audit

Dictionary big Indonesian defines audit as inspection and testing to something tools, programs, activities, and procedures for determine effectiveness and performance operating system for ensuring data integrity and security (Zhu et al., 2021). Moment this, the audit has developed very largely including various field activities such as management audits, operational audits, financial audits, marketing audits, environmental audits, media audits, external audits, and internal audits (Buaton et al., 2022).

Internal audit holds a role important in the success of college (University). The Institute of Internal Auditors (IIA) defines an internal audit as activity-independent and objective consultation and assurance designed for adding value and improving operation organization. This thing could help the organization reach its objective with to do approach systematically and discipline for evaluating and improving the effectiveness of managing risk, control, and governance (Zamzami, 2015).

Based on the definition, an internal audit is now looked at not only as one that supervises but also helps give an outlook required technical organization for planning, managing risks, and improving governance. Another development that can be observed is an approach more audit planning focus on an appraisal based on risk so that internal auditors when planning an annual audit, participating in the identification and analysis of risk, analyze the risk business faced organization.

Internal Quality Audit

Internal quality audit is a systematic, objective, and documented process of measurement and evaluation by the company's internal auditors to ensure that activity management quality is following Settings or system that has been developed and the results are consistent with planned quality or set good commitments, policies, goals, and objectives (Samira & Nurmammad (2018).

According to Susilo (2003), the assessment of internal quality can be explained as activity measurement or evaluation, that is evaluation is a process of collecting factual, meaningful, and related data and information. Quality audit is done to verify the effectiveness of application system management quality, which means that the audit not only focuses on aspects of obedience to principles and achievements standards but also on evaluating the effectiveness of achievement standard of the planned target. The auditor's assessment and recommendations are intended to help complete problem quality, the good moment this nor in the future, which means that the auditor sees problem organization from the perspective of quality and deep three dimensions, limit time, evaluate past performance, monitor activity moment this, and support achievement goal.

Overview Internal quality is a systematic, independent, and documented inspection process for ensuring that performance activities at college are appropriate with procedures and results to fulfill standards for reaching objective organization. Evaluation this not evaluation but suitability Among implementation and planning something activities/programs.

The University of Sumatera Utara (USU) has had to do what's next called Internal Quality Audit since 2005. Practice this was developed under Design Comprehensive and Integrated (IQAS) on April 25, 2007. The quality of the internal quality audit is carried out by an internal quality auditor who has attended seminars and earned internal quality auditor certification as part of the course training internal quality auditor certification. Evaluation of internal quality is carried out in 4,444 academic units including academic and faculty programs, as well as in non-academic units such as the rector's bureau, library, and System Center Information.

Internal Quality Audit Objectives

Quality internal audit in the business world, for ensuring that activity system management quality done in accordance with condition normative and that intent and purpose truly achieved, planned to in commitments and policies, which are outlined in target quality company. Expected results of internal quality audit could give a contribution in solve problems faced company specifically from aspect quality and satisfaction customers, as well as could Upgrade performance company in general.

To do study internal quality to ensure that IQAS has in accordance with standards/regulations, implement IQAS according to standards/goals/objectives, evaluate the effective implementation of IQAS, and identify opportunity increase in IQAS. Whereas college tall could be concluded that the internal quality audit aims to Upgrade the quality of college tall by planned and sustainable.

Benefits of Internal Quality Audit

Internal quality audit required can help an organization to achieve objective use method evaluate & encourage enhancement through the evidentiary process college's goal, Standard Dikti which set college, & values which already set implemented sync regulation. Auditors monitor suitability achievement purpose/application use standard, claim accountability according to application standard, and find room for restoration of the frame to reduce college risk consisting of risk quality, risk law, risk finance, risk strategy, risk compliance, risk operational, & risk reputation.

Data & coverage obtained through an internal quality audit can work for many very needs, for example, reference to creating policy, do change or restoration, set target, be base taking decision, make check position performance, communicate the feud of the parties related, & choose priority on tackling the problem.

K - Nearest Neighbor

K-NN is groups that have an instances-based learning system, in do search group with to do value of k object to in trial with mark closest with mark from other data. KNN uses mark distance closest to the tested dataset to carry out the classification process. Approach the done in look for a problem in calculation on distance closest between new problem with the previous one with to do weights with method equalized with total existing features. (Dhany, 2021).

In the K-NN method there are features in it there are vectors and a data group from sample data to training data. First-features have a classification data process that does not know because the distance between the other vectors with the training vector taken into account based on k is the closest that will be taken.

3. Methodology

The research process comprises several key stages to enhance the internal quality audit through the utilization of the k-nearest neighbor method. Initially, data processing with the k-nearest neighbor algorithm is conducted to preprocess and clean the collected internal quality audit data from auditors and auditees, ensuring its accuracy and consistency.

Subsequently, a systematic design planning of the internal quality audit system is carried out in the second stage, incorporating the k-nearest neighbor approach. This step involves careful consideration of how the system will process and analyze the internal quality audit data effectively.

Moving forward, the third stage focuses on implementing the designed system, which processes the internal quality audit results produced by internal quality auditors during the audit implementation cycle. The system's performance is evaluated, and the results are presented in terms of accuracy measures and a confusion matrix, providing valuable insights into the system's predictive capabilities.

The coding design system follows in the fourth stage, where researchers proceed to implement the planned system based on the k-nearest neighbor method. This stage ensures that the system is constructed accurately and aligned with the research objectives, enabling it to process internal quality audit data efficiently.

In the fifth stage, the system processes the actual internal quality audit results generated by internal quality auditors during the audit implementation cycle, utilizing the k-nearest neighbor method for analysis and evaluation. This step aims to validate the effectiveness of the system in producing reliable and representative audit outcomes.

Finally, the sixth stage involves the real-world implementation and testing of the designed system. Rigorous testing is conducted to assess the system's functionality, performance, and effectiveness in enhancing the internal quality audit process. By rigorously following these stages, the research endeavors to showcase the significant contributions of the k-nearest neighbor method in optimizing the internal quality audit process, ultimately fostering efficiency and reliability for higher education institutions

4. Empirical Findings/Result

The results of the k-nearest neighbor test will be done on the data of the Master of Science Study Program Expected accounting could become a recommendation for future internal quality audits. As for the results of the program carried out are as following:

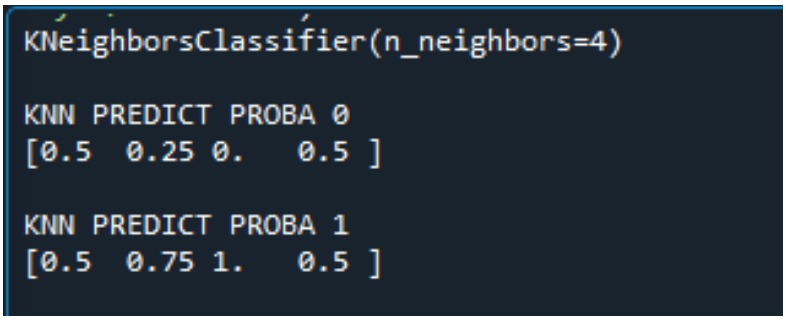

Figure 2. KNN Predict Probability

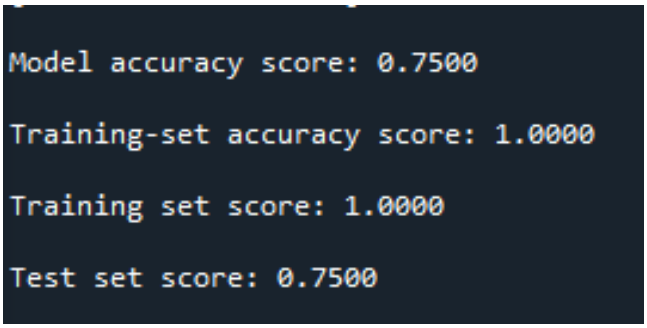

Figure 3. Accuracy Result

The picture shows that the results data accuracy reaches 75% with the value of k=4 with the training set reaching 100%.

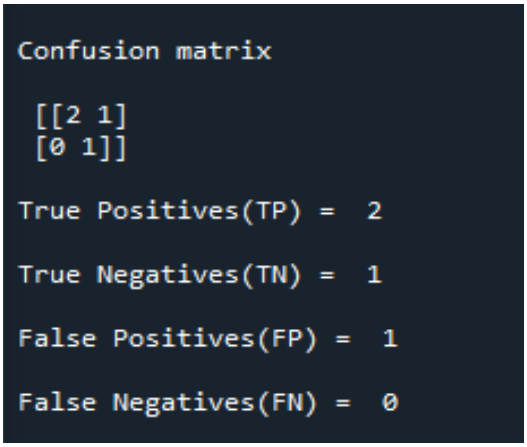

Figure 4. Confusion Matrix Result

On the picture on produce positive true value (TP) = 2, True Negatives (TN) =1, False Positives (FP) =1, and False Negatives (FN)= 0. As for results the calculation is as following:

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN} = \frac{2+1}{2+1+1+0} = \frac{3}{4} = 0{,}75*100\% = 75\%$$

Following is a diagram of the results program classification :

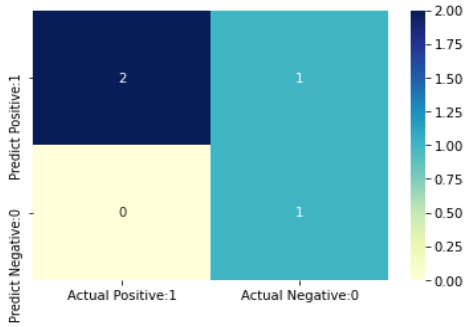

Figure 5. Prediction Diagram

Following are program output results in precision, recall, f1-score, and support:

Classification =

	precision	recall	f1-score	support
0	1.00	0.67	0.80	3
1	0.50	1.00	0.67	1
accuracy			0.75	4
macro avg	0.75	0.83	0.73	4
weighted avg	0.88	0.75	0.77	4

Figure 6. Classification Result

resulting area under the curve (AUC) is 0.88 where classifier accuracy in research this including in Excellent classifier. Following is an AUC image of the resulting program :

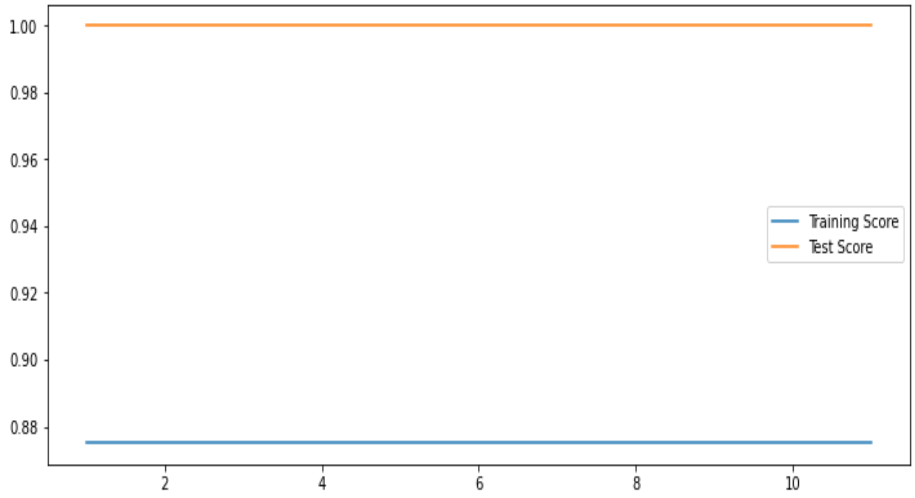

Figure 7. Area Under Curve (AUC)

5. Conclusions

In this study, we focused on enhancing the internal quality audit process by employing the k-nearest neighbor method to process data from both auditors and auditees. The primary objective was to improve the accuracy and effectiveness of internal quality audits and provide valuable support for the work of internal quality auditors.

The results obtained from our research were highly promising, revealing an impressive accuracy value of 75.00% and an AUC value of 0.88, placing the approach in the "Very Fine" classification group. These findings clearly demonstrate the effectiveness of the k-nearest neighbor method in processing internal quality audit data and its substantial potential to enhance the overall audit process.

By integrating the k-nearest neighbor method into internal quality audits, auditors can achieve more representative and reliable audit outcomes. This approach not only enhances accuracy but also promotes better documentation practices, facilitating convenient access and utilization of the data for internal quality auditors.

The successful implementation of the k-nearest neighbor method holds significant implications for the field of internal quality audits within higher education institutions. It sets the stage for future advancements in audit methodologies, empowering auditors to deliver comprehensive and precise audit results, ultimately contributing to the ongoing improvement and success of our institution.

As with any research, certain limitations should be acknowledged. Further studies could explore additional machine learning techniques and encompass a broader range of data sources to continually strengthen the internal quality audit process. Despite these limitations, our current research serves as a robust foundation for optimizing internal quality audits through the application of the k-nearest neighbor method.

In conclusion, this study underscores the significance of adopting innovative approaches in internal quality audits. The utilization of the k-nearest neighbor method has proven to be a valuable enhancement in the audit process, demonstrating its potential to drive positive change and uphold the standards of excellence within our higher education institution

References:

Buaton, R., Muhammad, Z., & Dilham, A. (2022). Optimization of Higher Education Internal Quality Audits Based on Artificial Intelligence. *Journal of Artificial Intelligence and Engineering Applications (JAIEA)*, *1*(2), 158-161.

Dhany, Hanna Willa. (2021). K-Nearest Neighbor Algorithm Performance in Predict Disease heart. *Proceedings of SENATIKA* 2021.

Eko Prasetyo. (2014), *Data Mining- Managing Data Mining becomes Information use Matlab*. Andi Publisher.

Gou, J., Yi. Z., Du. L. & Xiong, T. (2012). *A Local Mean-Based k-Nearest Centroid Neighbor Classifier*. *The Computer Journal* 55(6):1058-1071.

Kristin Lourensi node. (2019). *Improved Accuracy on Method Classification Neural Networks Backpropagation Using Principal Components analysis.* University of Sumatra North

Pan, Z., Wang, Y. & Ku, W. (2017). *A New General Nearest Neighbor Classification Based On The Mutual Neighborhood Information*. Knowledge Based Systems 121:142-152.

Rokach , L. (2008). *Data mining with decision trees: Theory and applications*.

Samira, A., & Nurmammad, M. (2018). Multi-disciplinary energy auditing of educational buildings in Azerbaijan: case study at a university campus. *IFAC-PapersOnLine*, *51*(30), 311-315.

Susilo, W. (2003). *Internal Quality Audit.* Jakarta: Vorqista.

Toto, Puspito Andri. (2017). *Determine Choice School in the Reception Participant Educate New With Use Naive Bayes and K-Nearest Neighbor Methods (Study Case: PPDB Online for Junior High School in Metro City).* Journal Informatics, Volumes. 17, No.1pp.49-59.

Turban, E. et al. (2005). *Decision Support and Intelligent Systems.* Upper Saddle River, NJ: Prentice Hall.

Wells, SC (2009). *Internal Audit at Institutions of Higher Education.* Kentucky: Emerald.

Yudianto, I., Mulyani, S., Fahmi, M., & Winarningsih, S. (2021). The influence of enterprise risk management implementation and internal audit quality on universities' performance in Indonesia. *Journal of Southwest Jiaotong University*, *56*(2).

Zamzami, F. (2015). *Internal Audit Concepts and Practices.* Yogyakarta : Gadjah Mada University Press

Zhu, J., Xu, L., Liu, Y., Zhu, D., & Chen, L. (2021). The Defects and Improvements of the Internal Control Audit in Chinese Universities with respect to the Probabilistic Hesitant Fuzzy Environment. *Complexity*, *2021*, 1-8.