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Article

Prediction of Dental Prosthesis Material Stock Using the K-Means Algorithm (Case Study: Hijrah Dental Lab)

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A B S T R A C T

Issues of excess and shortage of denture materials at Hijrah Dental Lab still occur frequently due to manual inventory management, leading to delays in denture production services. This study aims to analyze usage patterns and predict stock requirements using the K-means algorithm based on 180 order data records from 2022–2024. The clustering process produced three groups: C1 (high demand, 75 records) dominated by Acrylic and Vertex Thermosens materials; C2 (medium demand, 33 records) including Valplast and Acrylic Retainer; and C3 (low demand, 72 records) dominated by Crown materials such as PFM, Emax, and Zirconia The prediction results show that materials in the high cluster have low monthly usage, making their stock relatively stable. The medium cluster can be managed based on actual needs, while the low cluster requires closer monitoring due to higher usage. The K-Means algorithm helps make stock managementmore effective and timely.

1. Introduction

Teeth are very important for human life, especially in helping to chew food to facilitate good digestion. In addition to its digestive function, teeth are also important for aesthetics, chewing, and speaking. The number of teeth in the mouth can affect a person's quality of life. Tooth loss is a common dental problem, especially among the elderly. According to the 2018 Basic Health Research (Riskesdas) in Indonesia, 19% of the population experienced tooth loss. Among those aged 45-54 years, the prevalence was 23.6%; for those aged 55-64 years, it was 29%; and for those aged 65 years and above, the number increased to 30.6% (Surbakti, 2021). Artificial teeth are a commonly used solution, replacing one or more missing teeth in the upper or lower jaw, and can be easily replaced by the wearer.

Removable Partial Dentures (RPDs) are a common treatment option chosen by dentists for patients with multiple missing teeth. This approach offers a cost-effective alternative compared to other dental treatments. The effectiveness of RPDs depends on various factors, including maintaining good oral hygiene while wearing the dentures. Good hygiene helps prevent additional tooth loss, gum inflammation, bacterial and fungal infections, and unpleasant odors associated with dentures (Teguh et al., 2023).

In the modern era, the demand for dental services, including the fabrication of dentures, is increasingly rising. Hijrah Dental Lab, located in Kabun Village, Rokan Hulu Regency, Riau Province, Indonesia, is among the laboratories that offer custom denture fabrication services. Currently, the ordering and production of dentures are processed manually at this laboratory, which makes it difficult for staff to manage and estimate the required dental material supplies. Consequently, this leads to delays in the denture fabrication process due to frequent supply shortages. These issues often cause delays in the production of denture molds, as some materials require a long time to produce the molds. In the denture fabrication process at this laboratory, 7 types of dental materials are used: Acrylic material, Vertex thermosens, Crown, PFM crown, Emax crown, Zirconia crown, Acrylic retainer, and Valplast.

To address this issue, data processing is conducted to predict the stock of denture materials at Hijrah Dental Lab. In this study, 252 raw data points from denture orders in 2022–2024 will be processed. After obtaining the data, the Knowledge Discovery in Databases (KDD) process is carried out, beginning with Data Selection. In this stage, variables such as the type of denture material, material stock, order quantity, and remaining stock will be selected.

Then proceed with the pre-processing stage, which will discard incomplete or duplicate data. The next stage is data transformation, where non-numerical data will be converted into numerical data to facilitate the calculation process of the K-means algorithm. Next is the data mining stage, where the data will be processed using the K-means algorithm with four steps: first, determining the number of clusters, which are divided into three parts: C1 (highest), C2 (medium), and C3 (low). Second, determining the initial centroid results. Third, determining the centroid center values and calculating the distances between centroids. The final step is performing iterations to produce consistent results; if the results are not yet consistent, the iteration will continue until consistent results are achieved. After obtaining the clustering results and testing them with RapidMiner, the next stage is calculating the prediction for artificial tooth material stock based on the average order results.

After the clustering process is carried out to group dental materials based on the characteristics of stock quantity, usage, and remaining stock, the clustering results are then used as the basis for the prediction stage using the multiple linear regression method. Multiple linear regression is used to determine the relationship between several independent variables, such as initial stock quantity, management stock, and K-means cluster results, on the dependent variable, which is the remaining stock or the stock requirement for the next period. This regression analysis is processed using the SPSS application to obtain regression parameter values, significance tests, and an accurate prediction model. Thus, the clustering results not only provide an overview of material grouping patterns but also serve as important input in generating a more accurate stock requirement prediction model, which can be used as a basis for material procurement decision-making at Hijrah Dental Lab.

To simplify the management of dental prosthetic material inventory and predict stock levels, this study proposes a system design that can serve as a reference for developing data processing systems to forecast future stock needs. This design is based on a needs analysis conducted using the PIECES method to identify problems in the existing system. It was then developed using the Waterfall method, which follows a structured development process including analysis, design, implementation, and testing. Through this approach, the proposed

system aims to manage stock levels automatically, accurately, and efficiently, in line with the operational needs of Hijrah Dental Lab.

In short, this research was conducted because Hijrah Dental Lab continues to face issues of stock shortages and overstock, primarily due to inefficient manual recording procedures. Consequently, a system is needed that can effectively categorize the usage patterns of dental prosthetic materials and predict stock requirements with higher accuracy. By implementing the Knowledge Discovery in Databases (KDD) process, utilizing the K-Means clustering algorithm, performing predictive analysis through multiple linear regression using SPSS, and designing a system based on the Waterfall model, this research aims to develop an improved inventory management system. The goal is to facilitate smoother service delivery and reduce future material shortages.

2. Literature Riview

2.1 Knowledge Discovery in Database (KDD)

Knowledge Discovery in Databases (KDD) is a technique for discovering knowledge within a dataset. KDD is the process of extracting or identifying patterns, knowledge, and information from large collections of data. The KDD process is innovative, easy to understand, and beneficial for data users. The algorithm used is Knowledge Discovery in Database (KDD), which includes data collection, preprocessing, transformation, analysis using simple linear regression, and model evaluation (Fadriyanti et al., 2022).

2.2 Clustering

Clustering is one of the techniques in data mining that is unsupervised or guidance-free in nature. Two common methods used in this process are hierarchical clustering and non-hierarchical clustering (Surbakti, 2021). The main purpose of this method is to group data or objects into clusters based on the similarity of characteristics, so that each cluster contains similar data. Since the process does not require data labels and only depends on the similarity between objects, clustering is classified as an unsupervised learning method (Rusnedy et al., 2021).

2.3 K-Means Method

The K-means algorithm is a method used to cluster data based on iteratively finding cluster centers, where the cluster for each data point is determined by the minimum distance from the data point to a cluster center. The K-means algorithm falls under non-hierarchical methods that partition data into one or more clusters, so that data with similar characteristics are grouped into the same cluster, and data with different characteristics are grouped into other clusters (Sitinjak et al., 2022).

2.4 Rapid Miner

Rapid Miner is an open-source information science tool for performing data mining, text mining, and prediction analysis. Rapid Miner is one of the tools used in data mining. Rapid Miner has approximately 500 data mining operators, including input, output, data preprocessing, and visualization operators. RapidMiner is a standalone application for information analysis and as an information mining machine that can be integrated into its own products (Hamsiah, 2025).

2.5 Dental prosthesis

Removable dentures are artificial teeth that replace one, several, or even all missing teeth in the upper or lower jaw. Dentures must be designed to reduce this risk, but high standards of oral and denture hygiene are still required. One advantage of removable denture treatment is that it makes it easier for patients to maintain oral hygiene. The use of these dentures allows patients to clean their remaining natural teeth and the dentures themselves, as the dentures can be removed from the mouth. However, one disadvantage of using removable dentures is that they can damage the remaining oral tissues. This is related to the accumulation of plaque on the remaining natural teeth and on the dentures due to certain parts of the dentures being difficult to reach during cleaning (Johni et al., 2023).

2.6 Artificial tooth material

There are two groups of materials used to make the base of dental prosthetics, namely metal and non-metal. The metal material that can be used as a base of dental prosthetics consists of gold alloy, cobalt chromium, aluminum, and stainless steel. Non-metal dental prosthetic bases can be classified into two, namely thermoset and thermoplastic materials. Thermoset materials such as phenol-formaldehyde, vulcanite, and acrylic resin (polymethyl methacrylate). Meanwhile, thermoplastic materials such as celluloid, cellulose nitrate, vinyl resin, nylon, polycarbonate, polyethylene, and polystyrene. The most widely used base material for dental prosthetics is acrylic resin. The ideal base material for dental prosthetics should have adequate physical properties. Some of these properties include biocompatibility, good aesthetics, radiopacity, and ease of repair. Dental prosthetic bases must be able to withstand maximum masticatory loads (Wulandari, 2023).

2.7 Hijrah Dental Lab

Based on the observation results with Hijrah Dental Lab, this laboratory is located in Kabun Village, Rokan Hulu Regency, Riau Province, and has been operating in the field of making and

providing various types of artificial teeth such as acrylic, vertex thermosens, PFM crown, Emax crown, zirconia crown, acrylic retainer, and valplast. One of the important aspects of dental health services is the availability of high-quality artificial teeth. Hijrah Dental Lab is one of the dental laboratories committed to providing high-quality artificial teeth products. With the experience and expertise they possess, Hijrah Dental Lab has become the primary choice for dentists and patients to meet their prosthetic tooth needs.

2.8 Unified Modeling Languange (UML)

Unified Modeling Language (UML) is a standard language used to create visual diagrams that describe software systems. Simply put, UML is like a 'map' or 'blueprint' that helps us understand and design a system, whether it's an information system, mobile application, or other software. UML is a very valuable tool for software developers and systems analysts. By understanding the basic concepts of UML and its various types of diagrams, we can design systems that are better, easier to understand, and easier to maintain (Ramadani, 2025).

2.9 Use Case Diagram

Use Case Diagram is a modeling for the behavior of an information system to be built. Use Cases are used to determine what functions are available in the system and who is entitled to use them. The Use Case diagram describes the expected functionality of a system. The emphasis is on "what" the system does, not "how". A Use Case represents an interaction between an actor and the system. A Use Case is a specific task, such as logging in to the system, creating a shopping list, etc. An actor is a human or machine entity that interacts with the system to perform specific tasks.

2.10 Activity Diagram

An Activity Diagram is a diagram that illustrates the flow of activities from one activity to another within a system. This diagram is crucial for modeling system functions and focuses on the flow of control between objects. The Activity Diagram functions to visualize the system flow or the functional flow involving the interaction of various activities within the system. This diagram provides an overview of the various activities occurring in the running system, as well as the sequence of work for business mechanisms, operations, or menus in the developed software (Hadi et al., 2025).

2.11 Class Diagram

The class diagram represents the relationships between classes in the design of a system, as well as shows the rules and responsibilities of each entity that affects the behavior of the system. The elements contained in the Class diagram include classes, attributes, operations (methods), relationships such as association, generalization, and aggregation, and access levels (visibility) that determine how far external objects can access certain attributes or operations. Each relationship between classes is usually accompanied by information on the number of object involvement known as multiplicity or cardinality (Kurniawansyah et al., 2023).

2.12 Waterfall Method

This research employs the Waterfall methodology as an approach in developing a web-based land certificate processing tracking information system. The Waterfall method was chosen due to its systematic and sequential nature, allowing the development process to be carried out in a structured and controlled manner. By utilizing the Waterfall methodology, this research aims to ensure the development of a system that is systematic, well-documented, and scientifically accountable (Hadi et al., 2025).

2.13 Method PIECES

The PIECES Framework method is a framework used to analyze problems, opportunities, and directives within the scope definition when conducting system analysis and design (Rizki et al., 2022). The PIECES Framework method encompasses six main variables: Performance, Information, Economics, Control, Efficiency, and Service (Meilia et al., 2025).

2.14 Multiple Linear Regression

Multiple linear regression is an analysis method used to examine the relationship between one dependent variable and several independent variables. This technique aims to determine whether each independent variable contributes positively or negatively to the dependent variable, while also helping to predict the impact of changes in the independent variables on the value of the dependent variable (Damayanti et al., 2025).

2.15 Statistical Product and Service Solution (SPSS)

Statistical Product and Service Solution (SPSS) is an application program with high statistical analysis capabilities and a data management system in a graphical environment, using descriptive menus and simple dialog boxes, making it easy to understand how to operate. SPSS is utilized to enable users to perform complex data analysis in a more effective and efficient manner. However, despite its many benefits in usage, there are still gaps in understanding and skills in using SPSS.

3. Research Methodology

3.1 Research design

Research design is a research plan used as a guide in conducting the research process. The purpose of research design is to provide a structured framework for the researcher in carrying out their study. This research uses a quantitative method

3.2 Research Location

This research was conducted at Hijrah Dental Lab in Kabun Village, Rokan Hulu Regency, Riau Province, Indonesia to obtain data on the stock of dental materials required.

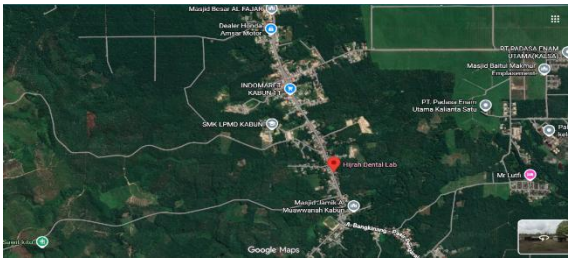


Figure 1. Maps Hijeah Dental Lab

3.3 Research Instrument

In this research, the researcher used the K-means algorithm method for data grouping on the available dental material stock in 2022-2024, and covering the type of dental material, remaining dental material stock, and the number of orders. The instrument in this research used observation, which aimed to cluster the stock of dental materials that can be used as a reference in predicting dental material stock at Hijrah Dental Lab. Using the K-means algorithm. During the observation, the dental material stock always experienced shortages or surpluses due to the lack of data management on dental material stock. This will help the laboratory in planning stock needs more accurately.

3.4 Research procedure

The research procedure began with the planning stage which includes identifying the problem and the research objectives. The research found that Hijrah Dental Lab faced challenges in dental prosthetic material inventory data. Therefore, the objective of this research is to group dental prosthetic materials, where the results of this grouping can be used to predict the need for dental prosthetic material stock.

3.5 Data Analysis

Data analysis begins with the collection of data to be processed using the K-means algorithm. After data collection, the next step is the KDD stage, starting with Data Selection. In this stage, variables such as dental material type, dental material stock, order quantity, and remaining stock are selected. Following that, the pre-processing stage is carried out to identify incomplete or duplicate data, such as when orders for acrylic dental materials in January are missing or zero. The next stage is Data Transformation, where letters or sentences are converted into numerical values; for example, the dental material type variable will be assigned the number 1. Next is the data mining stage, where this stage will be processed using the K-means algorithm, and within this K-means stage, there are four steps: first, determining the number of clusters, which consists of three clusters: highest, medium, and low. Second, determining the initial centroid results. Third, determining the centroid center values and calculating the distances between centroids. The final step is performing iterations to produce the same results; if the results are not the same between iterations, the iteration process will continue until identical results are obtained.

After obtaining clusters using RapidMiner, the next step is to perform a stock requirement prediction using SPSS with multiple linear regression method. Each high, medium, and low cluster is used as a basis to see the pattern of material consumption, so that regression can calculate the relationship between the number of orders, monthly consumption, processing inventory, and remaining stock against the next stock requirements. This analysis is performed after the data has gone through the KDD stages such as Selection, pre-processing, transformation, and normalization to be ready for statistical processing. The predicted results are then evaluated using the PIECES method, which helps to find weaknesses in the old system and serves as a basis for designing a new system using the Waterfall method.

In addition, the predictions generated through this multiple linear regression provide a more accurate picture of the stock requirements for each type of material, making inventory management easier, more organized, and avoiding the risks of both shortages and surpluses. With this prediction, Hijrah Dental Lab can prepare stock more timely, reduce production delays, and enhance the smoothness of service to customers.

4. Results and Discussion

The analysis and design phase is an effort or action to design or build something to produce a specific goal. The Analysis Stage is used in this study to understand the needs required in the research. This stage is the process of studying and deeply understanding the solution to the problems that exist in a research, the stage discussed in this research process is data analysis with the Knowledge Discovery in Database (KDD) process and data analysis using the K-means Algorithm.

4.1 Data Analysis with the KDD Process

The data management process used to cluster dental prosthetics materials at Hijrah Dental Lab used 252 raw data for dental prosthetics orders from 2022-2024, which were analyzed through the stages of Knowledge Discovery in Database (KDD).

Based on the data on dental laboratory material management from January 2022 to December 2024, material usage varied significantly among different types of materials. Acrylic and Vertex Thermosens were the most frequently and consistently used materials throughout the observation period, corresponding to the high number of orders for removable dentures and orthodontic appliances. This indicates that these materials play a central role in the daily operational activities of the dental laboratory.

In contrast, PFM crowns, Emax crowns, and zirconia crowns showed relatively low and irregular usage. During several months, these materials were not used at all, resulting in unchanged stock levels. This condition suggests that demand for crown-based services is incidental rather than routine, which may lead to stock accumulation if procurement planning is not aligned with actual service demand.

4.2 System Analysis Using the PIECES Method

The PIECES (Performance, Information, Economics, Control, Efficiency, Service) method is used as a diagnostic tool to evaluate problems in the dental material inventory management system running at Hijrah Dental Lab.

Table 1. PIECES Method for dental prosthetic material Inventory

Aspect	Existing System	Proposed System
Performance	The existing system has low performance because denture material stock recording is carried out manually, resulting in longer processing time for data retrieval and report preparation.	The proposed system utilizes digital technology with a computerized recording and stock data processing mechanism, enabling faster and more accurate work processes.
Information	The existing system produces stock information that is less accurate and difficult to trace when needed.	The proposed system is capable of presenting complete, accurate, and real-time denture material stock information, making it easier for laboratory staff to monitor stock conditions and support decision-making.
Economics	The existing system has the potential to cause financial losses due to excess or shortage of denture materials, resulting from the lack of proper inventory planning.	Improved stock management helps reduce material waste and increases the efficiency of operational costs.
Control	The existing system has a low level of control because there is no access restriction or structured recording of user activities.	The proposed system provides control mechanisms through access restrictions and systematic data recording, ensuring better data security and accuracy.
Efficiency	The existing system is inefficient because it requires more manpower and time for manual recording and stock management processes.	The proposed system improves work efficiency by reducing manual activities and automating denture material inventory management processes.

Service	The existing system is not able to provide optimal services due to limited availability of stock information.	The proposed system improves service quality by providing fast and accurate stock information, enabling smoother and more timely denture production processes.

4.3 Waterfall method system design

System design is carried out using the Waterfall method, which is a systematic, structured, and sequential system development method. Each stage in this method must be completed first before proceeding to the next stage to ensure the system development process runs smoothly and is controlled. The Waterfall method consists of several main stages, including Requirement Analysis (requirement analysis) which focuses on collecting data and identifying problems, System Design (system design) aimed at designing workflow and system structure, Implementation (implementation) is the application of the design results in the form of a program, Testing (testing) to ensure the system runs according to user needs, and Maintenance (maintenance) which is done to repair or update the system to continue functioning properly. Using the Waterfall method, the development of stock prediction systems for artificial teeth can be done in a step-by-step, directed, and resulting in a system that meets the research objectives.

Table 2. Waterfall Method

Aspect	System Output
Requirement Analysis	Functional and non-functional requirements of the system are identified, along with the initial data to be used for the analysis and clustering process.
Sysitem Design	The system design is produced in the form of the K-Means process flow, input–output design, and data structure design.
Implementation	The system performs clustering and prediction of dental material stock based on the processed data.
Testing	The system operates according to requirements, and the manual calculation results are consistent with the results from RapidMiner.
Maintenance	The system remains well-maintained and can be used continuously by Hijrah Dental Lab to predict dental material stock.

5. Conclusion

Based on the results of processing the stock data for dental prosthetic materials at Hijrah Dental Lab using the K-means algorithm, the following conclusions can be drawn:

1. Research results show that the K-Means algorithm successfully grouped the dental prosthetics stock needs at Hijrah Dental Lab into three main clusters, namely Cluster 1 (high needs) with 75 data dominated by Acrilik and Vertex Thermosens materials, Cluster 2 (medium needs) with 33 data consisting of Valplast and Acrilik Retainer materials, and Cluster 3 (low needs) with 72 data containing crown materials such as PFM, Emax, and Zirconia. This cluster division provides a clear picture of material usage patterns, making it a reliable basis for predicting stock needs and supporting more efficient material procurement decisions.
2. This research also demonstrates that stock demand forecasting can be performed more accurately by using multiple linear regression in the SPSS application, based on the data clustering results from the K-Means algorithm. After each type of material is grouped into high, medium, and low demand clusters, variables such as monthly usage, initial stock, and remaining stock are analyzed through SPSS to develop a regression model capable of projecting material needs for the next period. SPSS helps accelerate the calculation of coefficients, significance testing, and model interpretation, making the resulting predictions more statistically valid. Thus, the use of multiple linear regression facilitates the determination of procurement quantities for each cluster, allowing the laboratory to anticipate high demand while avoiding overstocking for materials with low usage levels.
3. The research successfully designed a system that can be used to group and predict data on dental prosthetic materials at Hijrah Dental Lab.

References

Apriliansah, I., Saputri, D. N., & Sutabri, T. (2024). Evaluasi Kinerja Sistem Aplikasi SeaBank Menggunakan Metode PIECES. 59 Jurti, 8(1), 2579–8790.

Damayanti, A., Marleny, F. D., & Ningrum, A. A. (2025). Implementasi Regresi Linear Berganda Untuk Prediksi Penjualan Pada Pt Trimandiri Sarana Propetindo Banjarmasin. Jurnal Informatika Dan Teknik Elektro Terapan, 13(3). https://doi.org/10.23960/jitet.v13i3.6679

Fadriyanti, O., Alamsyah, Y., & Rabianti, D. (2022). Evaluasi Pemakaian Denture Adhesive Pada Gigi Tiruan Lengkap Resin Akrilik: Scoping Review. Menara Ilmu, 16(2), 55–62. https://doi.org/10.31869/mi.v16i2.3289

Hadi, Harry, Setya, Yahyan, Wahyuni, Sabriani, & Mutia. (2025). Penerapan UML dan Metode Waterfall pada Sistem Pelacakan Sertifikat Tanah Berbasis Web. Journal of Informatics Management and Information Technology, 5(3), 292–301. https://doi.org/10.47065/jimat.v5i3.648

Hamsiah. (2025). Implementasi Data Mining Dalam Penerapan Clustering Algoritma K-Medoid Sebaran Mahasiswa Baru Pada STIE-SAK. 8(1), 16–24.

Jawara, I. R., Fatah, Z., Ibrahimy, U., Timur, S. J., Ibrahimy, U., & Timur, S. J. (2025). PENGGUNAAN DATA MINING UNTUK MEMPREDIKSI PENJUALAN PADA TOKO. 2(1), 52–60.

Johni, Halim, Rachmani, & Ratu. (2023). Hubungan antara Kebiasaan Pemeliharaan Gigi Tiruan Lengkap Akrilik dan Penumpukan Plak. E-GiGi, 12(1), 147–152. https://doi.org/10.35790/eg.v12i1.51432

Kurniawansyah, Deni, Devitra, & Joni. (2023). Sistem Informasi Persediaan Barang Habis Pakai Pada Dinas Lingkungan Hidup. Jurnal Manajemen Sistem Informasi, 8(4), 568–581.

Lubis, A. I. (2023). Rancang Bangun Sistem Informasi Organisasi Berbasis Website Menerapkan Metode Waterfall. Media Online), 5(3), 182–192. https://doi.org/10.47065/bulletincsr.v5i3.495

Meilia, Intan, Sabila, Prita, Dellia, Rizka, Alfinatul, Umam, Zahroh, Fatimatus, Hariri, Naila, Firmansyah, Moch, Ersa, & Noer. (2025). Analisis Kepuasan Pengguna Capcut Dengan Metode Pieces Framework. STORAGE: Jurnal Ilmiah Teknik Dan Ilmu Komputer, 4(2), 102–110. https://doi.org/10.55123/storage.v4i2.5208

Nur Aziziah, A., Irma Purnamasari, A., & Ali, I. (2024). Penerapan Algoritma C4.5 Untuk Prediksi Stok Bahan Minuman Di Cafe Semanis. JATI (Jurnal Mahasiswa Teknik Informatika), 8(1), 292–295. https://doi.org/10.36040/jati.v8i1.8347

Oetami, Sri, Handayani, & Mia. (2021). Gigi Tiruan Lengkap Resin Akrilik pada Kasus Full Edentulous. Jurnal Ilmu Kedokteran Gigi, 4(2), 53–57. https://journals.ums.ac.id/index.php/jikg/article/view/15967

Ramadani, A. (2025). Sistem Informasi Cuti Kepegawaian pada Rumah Sakit Umum Daerah Kabupaten Batu Bara. Modem : Jurnal Informatika Dan Sains Teknologi., 3(1), 67–75. https://doi.org/10.62951/modem.v3i1.350

Ramdani, R., Suarna, N., Ali, I., & Efendi, D. I. (2025). PENERAPAN ALGORITMA K-MEANS DALAM ANALISIS DATA KEPENDUDUKAN UNTUK OPTIMALISASI. 13(1), 439–445.

Rusnedy, H., Marwa, S., Musrodho, R. J., & Priyatno, A. M. (2024). Sistem Informasi Potensi Pertanian Kelompok Tani Desa Laboy Jaya. Indonesian Journal of Multidisciplinary on Social and Technology, 2(2), 54–58. https://doi.org/10.69693/ijmst.v2i2.335