TEXT PROCESSING APPLICATION ON IMAGES USING MODIFICATION METHOD LSB AND ROT13

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Abstract: This research aims to develop an application that can hide text messages within images using steganography techniques. The methods employed in this study are Least Significant Bit (LSB) for embedding messages into image pixels, and ROT13 for encrypting the message before embedding. By utilizing these two methods, it is expected that the hidden messages can be protected from unauthorized parties. The results of this research indicate that the developed application is capable of storing and retrieving messages effectively, while providing a higher level of security for the stored information. This research is expected to contribute to the fields of cryptography and steganography, and serve as a reference for future studies.

Keywords: Least Significant Bit (LSB), Text Processing, ROT13, Application

Introduction

Text that is composed into a message that is a valuable asset should be protected to be safe. Because the message is the result of data processing into a form that is more useful for the recipient which describes a fact that is used as a tool for making a decision. The importance of a message so that the message can only be accessed by certain people. If an important message that is confidential is stolen by an unauthorized party, it will be dangerous for the owner of the message. A stolen message can be redeveloped into a more useful form. Therefore, a technique is needed for an important message that is confidential so that unauthorized parties cannot find out the contents of the stolen message.

There are several techniques that can keep a message secret so that it cannot be easily stolen by unauthorized people, including cryptography and steganography. Therefore, researchers take both techniques so that the processed text can be kept secret better.

The use of cryptography requires a method that can convert the original message into a secret message properly. There are many methods available in cryptography techniques such as caesar cipher, vigenere cipher, ROT13, and so on. This study uses the ROT13 method to keep the text secret because it is easy to use and many references are available for this study. However, the original message that has become a secret message can also be suspicious of message thieves, so that message thieves will also try to break the secret message, therefore additional techniques are needed that can provide better security, namely steganography. There are many methods available in steganography techniques such as LSB, MSB, spread spectrum, and so on. This study uses the least significant bit (LSB) method because it is easy to use, namely by storing the message in the right bit of the image so as not to damage the image. The simplest and most popular steganography technique is the LSB (Least Significant Bit) technique, namely the

position of the bit in a binary number that provides a unit value, namely determining whether the number is even or odd. This technique replaces the last bit of the steganography media with the bit from the message. In order not to cause major changes, this bit replacement should only be done on information that is redundant and has a tolerance for small changes. (A. Muh. Ramadhani & Tasrif Hasanuddin, 2021). By encoding the message and then the encrypted message is inserted into an image, the secret message will not be easily known by unwanted parties.

Literature Review

Least Significant Bit (LSB) Method

LSB method: It replaces the least significant bit of the covering object with the secret message. It is the most popular and simple technique when dealing with images. It has low computational complexity and high embedding capacity. Modulating the LSB does not produce any human-perceivable difference because the amplitude of the change is small. Therefore, to the human eye, the resulting stego image will look identical to the covering image. (Putra Rape Tupen et al., 2020).

ROT13 Method

ROT13 (Rotate 13) is a substitution cipher encryption commonly used in UNIX operating systems. In the ROT13 encryption system, a letter is replaced by a letter that is located 13 positions above it. (Rizky & Hts, 2023).

Cryptography

Cryptography is the science that studies the secure transmission of messages or data from one sender to another without being harmed by a third party is called cryptography. The science and art of keeping messages secure as they travel from one location to another is known as cryptography. (Anggara, 2023).

Text

Text is a unit of language used as an expression in social activities, both verbally and in writing, with a complete thought structure. Text is also a realization of a value system, social norms, social processes with their social goals. So it can be said that text is a written work that arises from a social process involving social norms and value systems for certain social goals in the context of certain situations. Text is a language that functions to convey information in a certain context. Text is also classified into two types, namely, single micro genre texts and macro compound texts. The texts that are included in the single micro genre are fairy tales, myths, fables, personal stories, historical stories, history and so on. The types of texts that are included in the macro compound genre are academic manuscript texts such as research proposal texts (proposals), theses, dissertations, articles and abstracts. (Aldifron et al., 2022).

Method

Research Methods

The methods used to obtain secret messages and insert secret messages into images are the ROT13 and LSB methods.

Data Collection

The data collection conducted by the researcher is divided into several stages as follows:

1. Observation
   The researcher observes several images that will be used as trials on the application to be created.
2. Data Samples
   The researcher collects several samples that can be used as examples for this study, namely image data.
3. Literature
   The literature research conducted by the researcher aims to collect references used for this study.

Result and Discussion

Result Display

The result display of the LSB Method Modification Application for Text Processing on Images using the ROT13 Method can be seen as follows:

Initially, the user opens the application and logs in by entering the username and password shown in Figure 1.

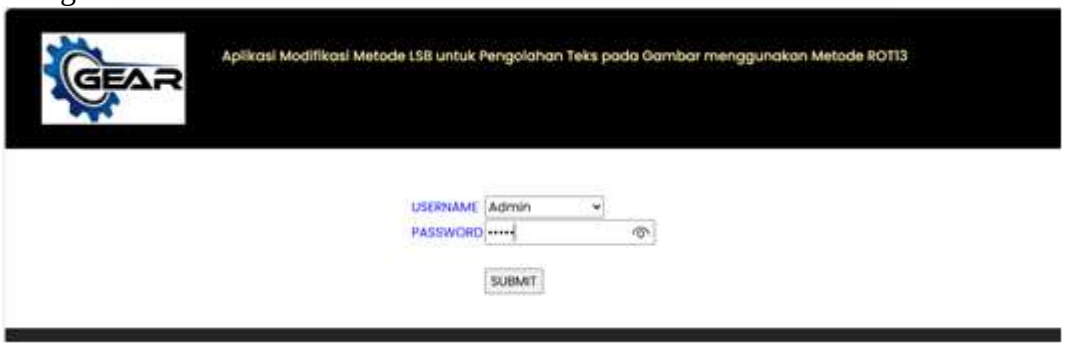

Figure 1 : Tampilan Form Login

Then if the password is wrong, an error message will appear and if the password is correct, the application displays a menu and can be seen in Figure 2.

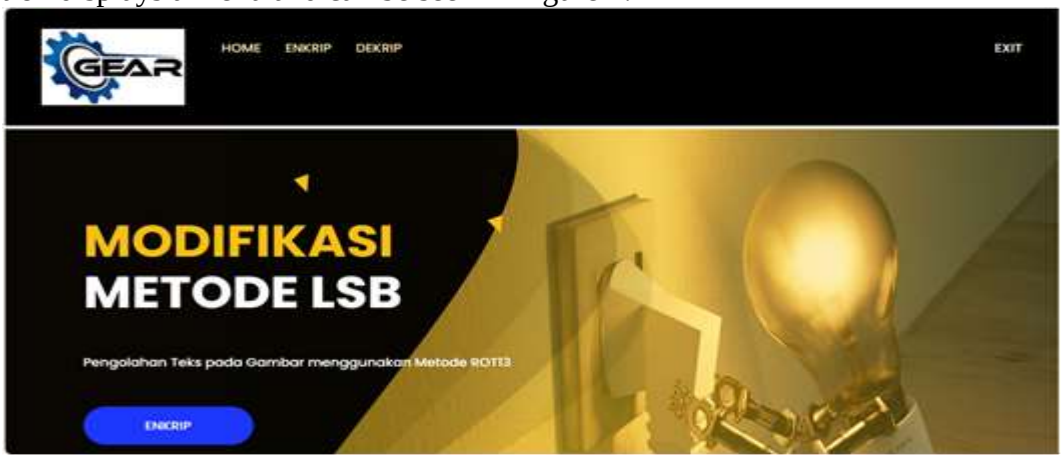

Figure 2 : Tampilan Form Menu

Then the user can select the available menus, namely encrypt and decrypt. If the user clicks encrypt, an encrypt form will appear as in Figure 3.

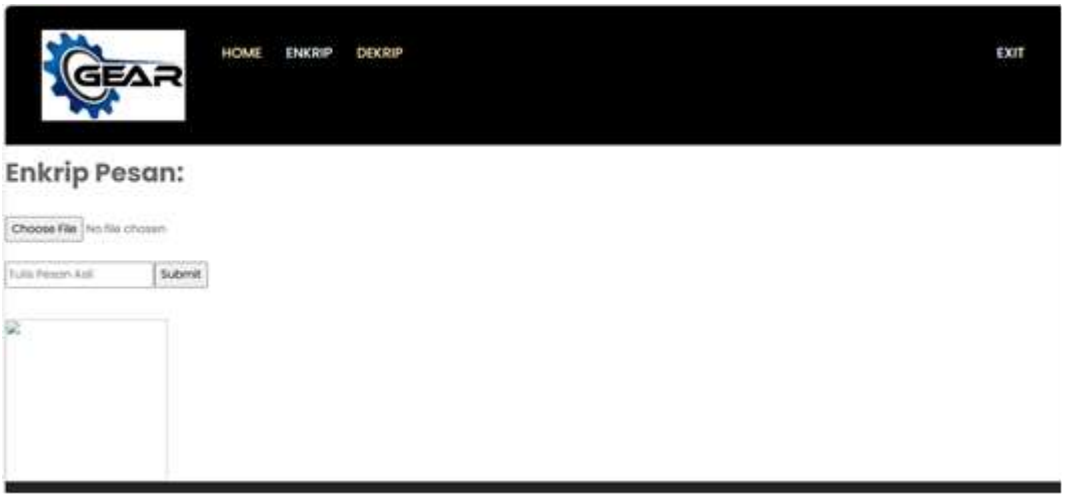

Figure 3 : Encryption Form View

First, the user selects an image available on the computer device and writes the message to be inserted, which can be seen in Figure 4.

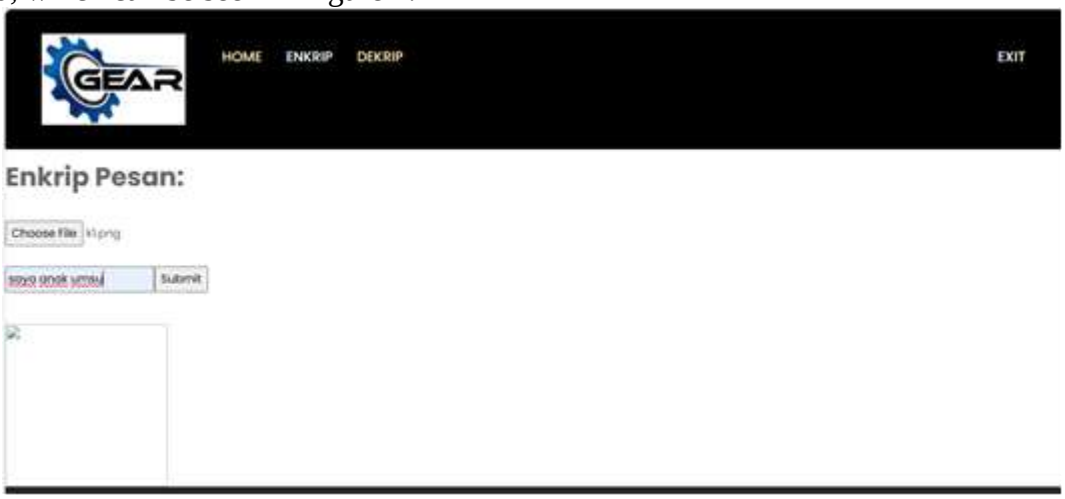

Figure 4 : Image Upload Encryption Form View

Then the user can click the submit button so that the message can be inserted and saved in the image as follows:

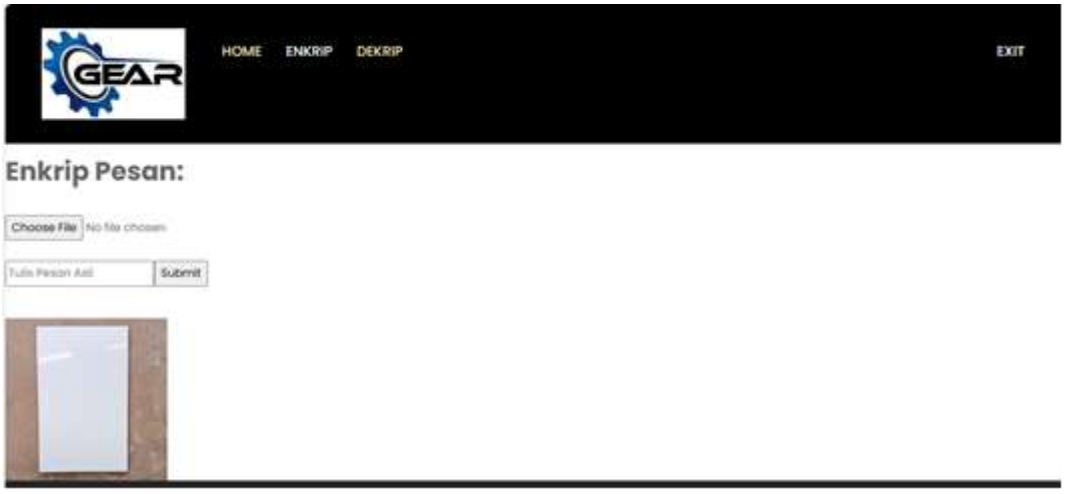

Figure 5 : View Insert Result Encryption Form

Users can extract messages and decrypt them by selecting the decrypt menu as shown in Figure 6.

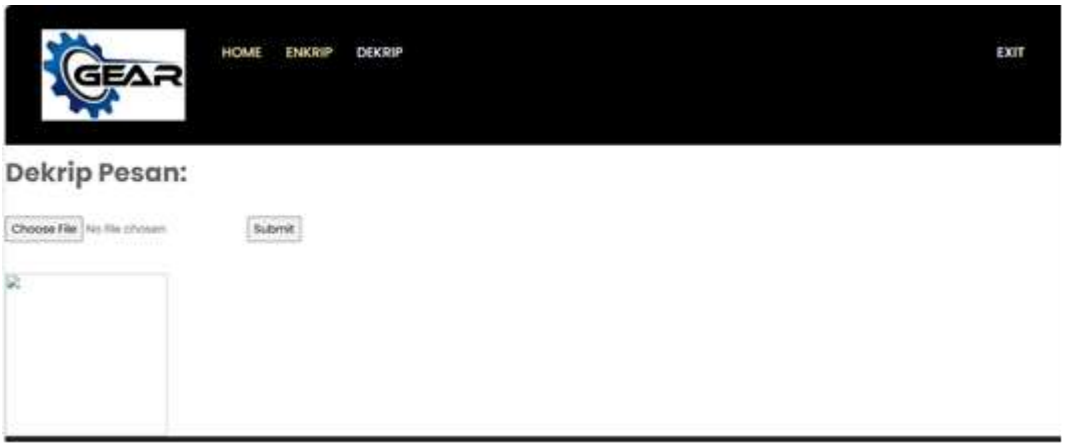

Figure 6 : Description Form View

First, the user selects an image that has a message inserted and can be seen in Figure 7.

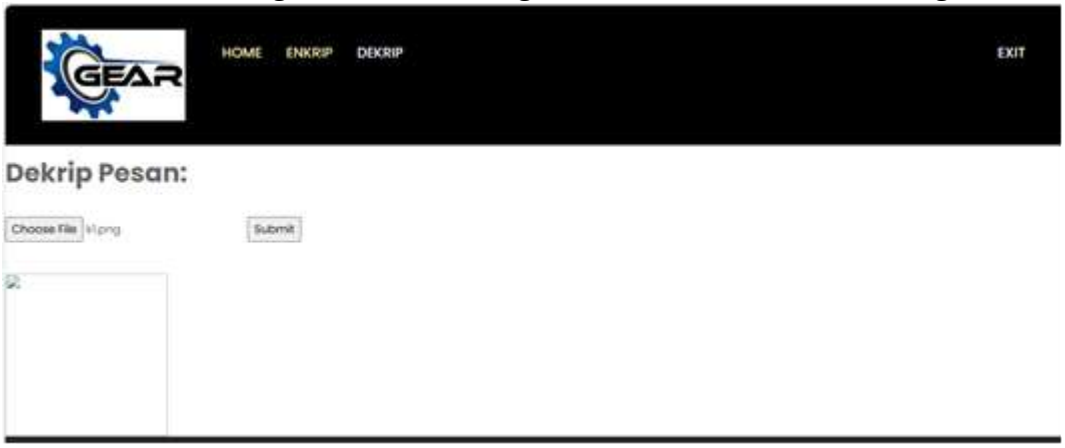

Figure 7: Image Upload Description Form View

Then the user clicks the submit button and it can be seen in Figure 8.

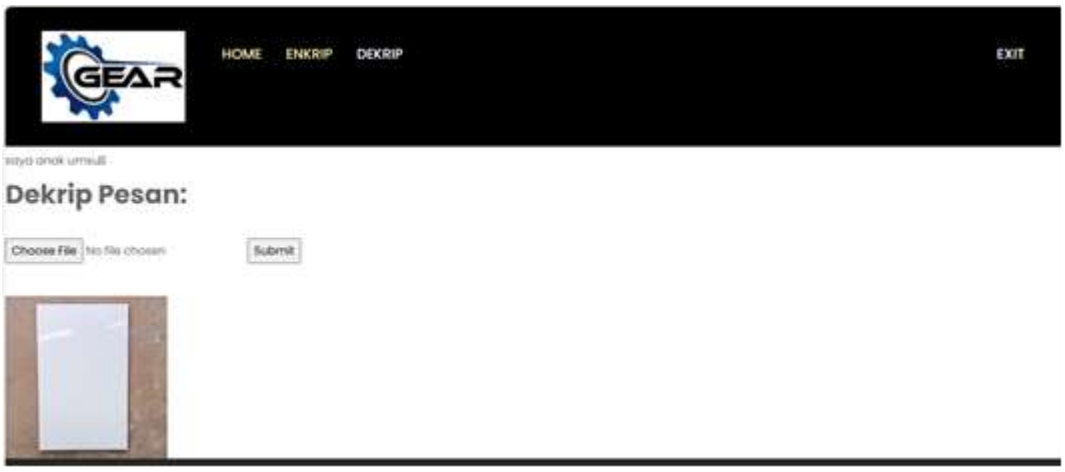

Figure 8 : Form View Description opens Message

Program Testing

The system testing aims to ensure that the system is ready to use. The instrument used to conduct this test is by using Blackbox Testing.

Table 1 : Blackbox Testing Form Encryption

No	Form Encryption	Description	Validity
1	Click the Upload Image Button	The application displays the image file selection	Valid
2	Click the Submit button	The application performs encryption and insertion	Valid

Table 2 : Blackbox Testing Form Description

No	Form Encryption	Description	Validity
1	Click the Upload Image Button	The application displays the image file selection	Valid
2	Click the Submit button	The application performs extract and decryption	Valid

Trial Results

After conducting a trial on the system, it can be concluded that the results obtained are:

1. The design interface is in accordance with the resulting interface.
2. The LSB and ROT13 methods have been applied to the application created.
3. The application interface is user friendly so that users can use it easily.
4. The application that has been created runs well.
5. The application that has been created has no logical errors.

Conclusion of Test Results

The conclusion of the application test results on images to determine similarities and differences are:

1. The application that has been created uses the LSB and ROT13 methods for message insertion and extraction.
2. The application that has been created can combine two methods.
3. The execution process does not take a long time.

Conclusion

Based on the discussion of the previous chapters that have been carried out, several conclusions can be drawn as follows: With the LSB Method Modification Application for Text Processing in Images using the ROT13 Method, important texts get better data confidentiality. By using the entered text and using the steps and formulas of the ROT13 method, the ROT13 method can be applied for text confidentiality. By using images and the ROT13 method, the LSB can be modified. By using web programming, the LSB Method Modification Application for Text Processing in Images using the ROT13 Method can be produced.

References

Sari, I.P., Jannah, A., Meuraxa, A.M., Syahfitri, A., & Omar, R. (2022). Perancangan Sistem Informasi Penginputan Database Mahasiswa Berbasis Web. Hello World Jurnal Ilmu Komputer 1 (2), 106-110

Satria, A., Ramadhani, F., & Sari, I.P. (2023). Rancang Bangun Sistem Informasi Penerimaan Peserta Didik Baru (PPDB) Sekolah Menengah Kejuruan Telkom 2 Medan Menggunakan Codeigniter. Wahana Jurnal Pengabdian kepada Masyarakat 2 (1), 23-31

Sari, I.P., Azzahrah, A., Qathrunada, I.F., Lubis, N., & Anggraini, T. (2022). Perancangan sistem absensi pegawai kantoran secara online pada website berbasis HTML dan CSS. Blend sains jurnal teknik 1 (1), 8-15

Hariani, P.P., Sari, I.P., & Batubara, I.H. (2021). Android-Based Financial Statement Presentation Model. JURNAL TARBIYAH 28 (2), 1-16

Sari, I.P., Syahputra, A., Zaky, N., Sibuea, R.U., & Zakhir, Z. (2022). Perancangan sistem aplikasi penjualan dan layanan jasa laundry sepatu berbasis website. Blend sains jurnal teknik 1 (1), 31-37

Sari, I.P., Al-Khowarizmi, A., & Batubara, I.H. (2021). Cluster Analysis Using K-Means Algorithm and Fuzzy C-Means Clustering For Grouping Students' Abilities In Online Learning Process. Journal of Computer Science, Information Technology and Telecommunication Engineering 2 (1), 139-144

Hutasuhut, B.K., Sari, I.P., & Al-Khowarizmi, A. (2023). Analysis the Effect of Digitalization and Technology on Web-Based Entrepreneurship. Journal of Computer Science, Information Technology and Telecommunication Engineering 4 (1), 350-354

Sari, I.P., Batubara, I. H., & Al-Khowarizmi, A. (2021). Sensitivity Of Obtaining Errors In The Combination Of Fuzzy And Neural Networks For Conducting Student Assessment On E-Learning. International Journal of Economic, Technology and Social Sciences (Injects) 2 (1), 331-338

Sari, I.P., Fahroza, M.F., Mufit, M.I., & Qathrunad, I.F. (2021). Implementation of Dijkstra's Algorithm to Determine the Shortest Route in a City. Journal of Computer Science, Information Technology and Telecommunication Engineering 2 (1), 134-138

Manurung, A.A., Nasution, M.D., & Sari, I.P. (2023). Implementation of Fuzzy K-Nearest Neighbor Method in Dengue Disease Classification. 2023 11th International Conference on Cyber and IT Service Management (CITSM), 1-4

Sari, I.P., Batubara, I.H., Al-Khowarizmi, A., & Hariani, P.P. (2022). Perancangan Sistem Informasi Pengelolaan Arsip Digital Berbasis Web untuk Mengatur Sistem Kearsipan di SMK Tri Karya. Wahana Jurnal Pengabdian kepada Masyarakat 1 (1), 18-24

Sari, I.P., & Batubara, I.H. (2021). Perancangan Sistem Informasi Laporan Keuangan Pada Apotek Menggunakan Algoritma K-NN. Seminar Nasional Teknologi Edukasi dan Humaniora (SiNTESa) (1).

Ramadhani, F., Satria, A., & Sari, I.P. (2023). Implementasi Metode Fuzzy K-Nearest Neighbor dalam Klasifikasi Penyakit Demam Berdarah. Hello World Jurnal Ilmu Komputer 2 (2), 58-62

Sari, I.P., Batubara, I.H., & Basri, M. (2022). Implementasi Internet of Things Berbasis Website dalam Pemesanan Jasa Rumah Service Teknisi Komputer dan Jaringan Komputer. Blend Sains Jurnal Teknik 1 (2), 157-163

Sari, I.P., & Ramadhani, F. (2021). Pengaruh Teknologi Informasi Terhadap Kewirausahaan Pada Aplikasi Perancangan Jual Beli Jamu Berbasis WEB. Prosiding Seminar Nasional Kewirausahaan 2 (1), 874-878

Sari, I.P., Al-Khowarizmi, A., Ramadhani, F., & Sulaiman, O.K. (2023). Implementation of the Selection Sort Algorithm to Sort Data in PHP Programming Language. Journal of

Computer Science, Information Technology and Telecommunication Engineering 4 (1), 377-381
Ichsan, A., Al-Khowarizmi, A., & Azhari, M. (2024). Implementation of The Sales and Purchase Program Application Using the Rapid Application Development Model Web Based. Tsabit Journal of Computer Science 1 (1), 27-34
Sari, I.P., & Batubara, I.H. (2021). User Interface Information System for Using Account Services (Joint Account) WEB-Based. International Journal of Economic, Technology and Social Sciences (Injects) 2 (2), 462-469
Ramadhani, F., & Sari, I.P. (2021). Pemanfaatan Aplikasi Online dalam Digitalisasi Pasar Tradisional di Medan. Prosiding Seminar Nasional Kewirausahaan 2 (1), 806-811
Sari, I.P., & Alfarisi, F. (2024). Perancangan Sistem Aplikasi Pendataan Membership Gym Menggunakan Metode Unified Software Development Process (USDP) Berbasis Web. Hello World Jurnal Ilmu Komputer 3 (1), 37-48
Sari, I.P. (2020). Implementasi Pembayaran SPP Berbasis WEB Pada Sekolah Menengah Pertama (SMP) Muhammadiyah Kota Medan. Jurnal Pengabdian Barelang 2 (03), 11-14
Habib, T.A., Azly, R., Irza, M.A., & Prasetya, I. (2024). User Interface Design for the Orca Music Player Mobile Application. Tsabit Journal of Computer Science 1 (1), 18-26
Sari, I.P., Batubara, I.H., Ramadhani, F., & Wardani, S. (2022). Perancangan Sistem Antrian pada Wahana Hiburan dengan Metode First In First Out (FIFO). Sudo Jurnal Teknik Informatika 1 (3), 116-123
Ramadhani, F., Satria, A., & Sari, I.P. (2022). Aplikasi internet berbasis website sebagai E-Commerce penjualan komponen sport car. Blend Sains Jurnal Teknik 1 (2), 69-75
Sari, I.P., Ramadhani, F., Satria, A., Apdilah, D., & Basri, M. (2023). Rancangan UI/UX Aplikasi Analytics pada Toko Online Wao Sneakers Menggunakan Figma Berbasis Mobile. Factory Jurnal Industri, Manajemen dan Rekayasa Sistem Industri 1 (3), 93-101
Sari, I.P., Al-Khowarizmi, A., & Batubara, I.H. (2021). Implementasi Aplikasi Mobile Learning Sistem Manajemen Soal dan Ujian Berbasis Web Pada Platform Android. IHSAN: JURNAL PENGABDIAN MASYARAKAT 3 (2), 178-183
Sari, I.P., & Ramadhani, F. (2021). User Interface Prototype Using User Centered System Design Method in Motorvice Information System. 2021 International Conference on Computer Science and Engineering (IC2SE) 1, 1-6
Ramadhani, F., Sari, I.P., & Satria, A. (2024). Perancangan UI/UX Surat Keterangan Waris dalam Pengembalian Dana Haji Berbasis Web. Blend Sains Jurnal Teknik 2 (3), 198-203
Sari, I.P., Hariani, P.P., Satria, A., & Manurung, A.A. (2023). Rancang Bangun Sistem Informasi Pengelolaan Arsip Materi Ajar Berbasis Web untuk Guru MAS Darul Falah. Wahana Jurnal Pengabdian kepada Masyarakat 2 (2), 59-65
Sari, I.P., Syafii, R., Lubis, D.F.,, Setyadi, A., & Nasution, P. (2022). Pemanfaatan fasilitas google dalam perkuliahan di fakultas teknologi informasi. Blend Sains Jurnal Teknik 1 (2), 107-113
Ramadhani, F., & Sari, I.P. (2021). Improving the Performance of Naïve Bayes Algorithm by Reducing the Attributes of Dataset Using Gain Ratio and Adaboost. 2021 International Conference on Computer Science and Engineering (IC2SE) 1, 1-5
Sari, I.P., Sulaiman, O.K., Al-Khowarizmi, A., & Azhari, M. (2023). Perancangan Sistem Informasi Pelayanan Masyarakat pada Kelurahan Sipagimbar dengan Metode Prototype Berbasis Web. Blend Sains Jurnal Teknik 2 (2), 125-134
Sitompul, D.N., Rahmatika, A., & Sari, I.P. (2023). Application of The Sales and Purchase Program Using The Rapid Application Development Model. Al'adzkiya International of Computer Science and Information Technology (AIoCSIT) Journal 4 (1), 6-16

Sari, I.P., Ramadhani, F., Satria, A., & Apdilah, D. (2023). Implementasi Pengolahan Citra Digital dalam Pengenalan Wajah menggunakan Algoritma PCA dan Viola Jones. Hello World Jurnal Ilmu Komputer 2 (3), 146-157

Sari, I.P., Sulaiman, O.K., Ramadhani, F., & Satria, A. (2023). Perancangan Sistem Manajemen Surat Berbasis Web Pada Kantor Camat Tano Tombangan Angkola. INCODING: Journal of Informatics and Computer Science Engineering 3 (2), 61-76

Guntur, S., Ichsan, A., & Sari, I.P. (2024). Designing a Web-Based Mail Management System at the Beringin Helvetia Sub-district Office. Altafani: Jurnal Pengabdian Masyarakat 1 (1)

Sari, I.P., Al-Khowarizmi, A., Jannah, A., Meuraxa, A.M., & Tanjung, M.I. (2023). Web-Based Offline Game Suit Design: A Model Overview. Journal of Computer Science, Information Technology and Telecommunication Engineering 4 (2), 389-394

Sari, I.P., Al-Khowarizmi, A., Sulaiman, O.K., & Apdilah, D. (2024). System Design for Ordering and Digitizing Website-Based Bus Tickets. Journal of Computer Science, Information Technology and Telecommunication Engineering 5 (1), 543-549

Indah Purnama Sari. Algoritma dan Pemrograman. Medan: UMSU Press, 2023, pp. 290.

Janner Simarmata Arsan Kumala Jaya, Syarifah Fitrah Ramadhani, Niel Ananto, Abdul Karim, Betrisandi, Muhammad Ilham Alhari, Cucut Susanto, Suardinata, Indah Purnama Sari, Edson Yahuda Putra. Komputer dan Masyarakat. Medan: Yayasan Kita Menulis, 2024, pp.162.

Mahdianta Pandia, Indah Purnama Sari, Alexander Wirapraja Fergie Joanda Kaunang, Syarifah Fitrah Ramadhani Stenly Richard Pungus, Sudirman, Suardinata Jimmy Herawan Moedjahedy, Elly Warni, Debby Erce Sondakh. Pengantar Bahasa Pemrograman Python. Medan : Yayasan Kita Menulis, 2024, pp.180

Zelvi Gustiana Arif Dwinanto, Indah Purnama Sari, Janner Simarmata Mahdianta Pandia, Supriadi Syam, Semmy Wellem Taju Fitrah Eka Susilawati, Asmah Akhriana, Rolly Junius Lontaan Fergie Joanda Kaunang. Perkembangan Teknologi Informatika. Medan: Yayasan Kita Menulis, 2024, pp.158

Indah Purnama Sari. Buku Ajar Pemrograman Internet Dasar. Medan: UMSU Press, 2022, pp. 300.

Indah Purnama Sari. Buku Ajar Rekayasa Perangkat Lunak. Medan: UMSU Press, 2021, pp. 228.