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FOREWORD

We express our deepest gratitude to God Almighty for His abundant grace upon us, who has given us the resources and ability to publish Jurnal JITU Volume 10, No. 1 right in May 2026. This achievement would not have been possible without the dedicated commitment of the editors and reviewers.

This issue features 16 scientific articles contributed by 16 college in Indonesia. The editors would like to thank all authors who have chosen Jurnal JITU as a platform to disseminate their thoughts. Your contributions have enriched not only our publications, but also the wider scientific community, especially in the ever-growing field of information technology. While we celebrate our achievements, we acknowledge that the journey to becoming a leading journal is still very long. We invite and appreciate your constructive criticism and suggestions, as they give us the opportunity to further improve the quality and reach of Jurnal JITU.

Thank you for your continued support and readership. May the articles in this and future volumes become invaluable resources that contribute to the development of scientific knowledge.



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<https://doi.org/10.36596/jitu.v10i1.2184>

Abstract:

Judging objectivity in the traditional game of Gobak Sodor remains constrained by its reliance on visual observation. This conventional system is prone to subjectivity and human error. This research aims to design and evaluate a player re-identification system. This study is specifically positioned as foundational research. It aims to provide a technical basis for developing future objective judging systems. A state-of-the-art approach combining You Only Look Once version 8 (YOLOv8) for multi-object detection and ResNet50 for feature extraction was applied in this domain. System testing demonstrated perfect performance. The model achieved 100% accuracy for Cumulative Match Characteristic (CMC) Rank-1 and Rank-5. Furthermore, the mean Average Precision (mAP) score reached 1.00. These results confirm that the proposed method combination is highly suitable for the traditional game domain. The system proved capable of performing deep feature extraction for each player. It was not limited to simple attributes like costume color. This research successfully provides a solid technical framework for modernizing judging systems in similar traditional games.

Teori Graf Diskrit untuk Deteksi Intrusi dan Optimasi Firewall: Systematic Literature Review
Andhika Adnan, Fransiskus Mario Hartono T., Ricky Imanuel N., Yohanis Malelak 11-21
<https://doi.org/10.36596/jitu.v10i1.2306>

Abstract:

The escalating complexity of computer networks and cybersecurity threats demand analytical approaches capable of systematically and measurably representing network structure. Discrete mathematical graph theory offers a formal framework for modeling network topology as nodes and edges, thus potentially supporting more effective intrusion detection and firewall placement optimization. This research aims to conduct a Systematic Literature Review of publications from 2022–2026 to identify graph theory applications in intrusion detection, evaluate the most effective graph-based firewall optimization methods, and map research gaps and future development trends. The methodology employed follows the SLR protocol with stages of systematic search across reputable databases, selection based on inclusion-exclusion criteria, and analysis through descriptive-comparative meta-analysis, thematic meta-synthesis, and content analysis. Results show the dominance of weighted graphs and structure-based learning approaches for network anomaly detection, as well as firewall optimization modeling through integer linear programming and graph heuristics. This research contributes to presenting an integrated synthesis between intrusion detection and firewall optimization within discrete graph framework, and provides conceptual foundation for developing adaptive network security models based on mathematical structure.

Analisis Efektivitas Teknik File Carving pada Pemulihan Data Digital Menggunakan PhotoRec
Susanto, Irfan Hanafi, Narisa, Fardani, Irfan Nur 22-33
<https://doi.org/10.36596/jitu.v10i1.2245>

Abstract:

Data loss is a critical issue in the digital era, both in everyday computing and in forensic investigations. This study aims to evaluate the effectiveness of PhotoRec, an open-source file carving tool, in recovering lost files from a FAT32 storage medium. A strict digital forensic approach was applied by performing disk imaging, preserving evidence integrity, and documenting each stage in detail. Data loss was simulated through logical deletion and by scanning unallocated sectors to closely replicate real-case conditions. PhotoRec was then utilized to select the target media, identify partitions, determine the file system type, and scan free space to extract files based on signature recognition. The findings show that PhotoRec successfully recovered a total of 50 files, including all primary files deleted during the experiment. In addition, several system-related files such as ELF

were also recovered, illustrating the aggressive nature of carving techniques that extract any recognizable data structure. These results confirm that PhotoRec can operate effectively in data loss scenarios on FAT32 media, even when file metadata is no longer available. This study contributes to a deeper understanding of PhotoRec's performance within the context of digital forensics and highlights its relevance as an investigative tool that prioritizes accuracy, integrity, and procedural traceability.

Penerapan Blockchain untuk Transparansi RKAT dan KAK di SIPIM UNISR

Moenawar Kholil, Arif Sutikno, Rina Robiulana Fathona

34-46

<https://doi.org/10.36596/jitu.v10i1.2250>

Abstract:

Budget management in higher education requires transparency, accountability, and reliable audit mechanisms to prevent undocumented changes and ensure traceability of financial decisions. This study proposes and implements a permissioned blockchain event ledger integrated with the Leadership Information System (SIPIM) at Universitas Slamet Riyadi Surakarta to enhance the integrity of RKAT and KAK processes. The research adopts a design science research approach by designing a sidecar architecture that preserves the existing relational database while adding an append-only cryptographic audit layer. Document integrity is ensured through SHA-256 hashing and hash-chaining mechanisms, while chain validity is evaluated using quantitative integrity metrics. Experimental testing was conducted under transaction loads of 100, 300, and 500 blocks, including controlled manipulation scenarios. Results show that the system maintains 100% chain validity under normal conditions and successfully detects inconsistencies after unauthorized modifications. Performance evaluation indicates that block formation time remains below 7 milliseconds, demonstrating minimal computational overhead. The findings confirm that integrating a permissioned blockchain as an audit layer can strengthen transparency and tamper-evident control without disrupting operational systems in higher education institutions.

Sistem Informasi Kasir Terintegrasi Perangkat Jaringan Mikrotik pada Angkringan Kula Kita

Nina Mia A., M.Najamudin Ridha, Aidil Fajar Z., Eny Novita N., Billy Sabella

47-58

<https://doi.org/10.36596/jitu.v10i1.2173>

Abstract:

Angkringan Kula Kita, located in Tanah Laut, provides free Wi-Fi for its customers. However, in practice, Wi-Fi access is still provided without an integrated management system. Wi-Fi usernames and passwords are shared publicly without maximum time or connected devices limit, so it is often used by customers who are not making transactions, which has an impact on reducing internet connection speeds for other customers who are enjoying the service on site. A Web-Based Cashier Information System Integrated with Mikrotik Network Devices is designed to address these needs, especially in managing sales transactions and customer Wi-Fi network access automatically. This system was built with the aim of simplifying the process of recording transactions, managing network access based on transaction values, and preparing structured sales reports. The system development method uses the waterfall model. The database design is carried out using ERD, while system modeling uses UML. This system was developed with the CodeIgniter 4 Framework using the PHP programming language and MySQL database. There are three types of user access rights, namely Admin, Owner, and Employee.. Testing was carried out using Black Box Testing and User Acceptance Testing with a test result percentage of 99% stating that the system functionality was running well.

Analisis Kuantitatif Eksploitasi Akun Google Pasca Phishing Berbasis Konsistensi Jaringan

Muhammad Syahrul Haq, Heribertus Yulianton

59-70

<https://doi.org/10.36596/jitu.v10i1.2246>

Abstract:

Phishing attacks experienced a significant increase during the COVID-19 pandemic, with over 160,000 phishing domains identified quarterly in 2020. This research analyzes login success using phishing-derived data through residential proxies to identify critical factors affecting attack effectiveness against Google authentication systems. Quantitative methodology with controlled experiments utilized 150 Gmail accounts created specifically for this research, with a maximum of 15 login attempts per account. Results demonstrate a 90.7% success rate (136 of 150 cases), with three

dominant factors: IP address accuracy (100% match = 97.8% success rate), tier-1 Malaysia ISP/ASN matching (AS4818 DiGi 92.3%, AS9534 Maxis 91.9%, AS4788 TM 90.3%), and geographic location consistency (Kuala Lumpur 59.3% with 91% success rate). Critical findings reveal systemic vulnerabilities in Google's 7-day old password validity policy, creating a window of vulnerability where 22.1% of attacks succeeded on days 3-6 post-password change. This research contributes to cybersecurity literature by providing a quantitative framework for measuring residential proxy effectiveness in post-phishing exploitation and recommending mandatory 2FA implementation and reduction of old password validity period to maximum 48 hours.

Analisis Sentimen Komentar Film Merah Putih One For All Metode Naïve Bayes

Bintang Syahputra, Budi Hartono

71-81

<https://doi.org/10.36596/jitu.v10i1.2253>

Abstract:

Social media Twitter (X) has become a platform for expressing public opinion, including reactions to the animated film "Merah Putih: One For All." The film has garnered various criticisms regarding its graphic quality and the use of digital assets deemed unoriginal. Sentiment analysis of this public response is essential to provide an objective evaluation of society's reception of local animated works, identify specific aspects of audience concern, and offer valuable insights for the Indonesian animation industry to improve production quality. Automated sentiment classification using machine learning is an efficient solution for understanding patterns of public perception with large volumes of data, which is difficult to accomplish manually. This study classifies comments on the X platform into positive and negative sentiment categories using the Naïve Bayes method. Data collection was conducted by scraping posts from the account @tanyakanrl in August 2025, totaling 302 comments. The data underwent preprocessing stages, including cleaning, case folding, normalization, tokenizing, stopword removal, and stemming. Feature extraction utilized the TF-IDF (Term Frequency-Inverse Document Frequency) method to convert text data into numerical representation. Classification employed the Naïve Bayes algorithm with an 80:20 data split ratio for training and testing. Evaluation results indicate that the model achieved an Accuracy of 82%, Precision of 79%, Recall of 82%, and an F1-Score of 80%.

Implementasi Secure Tunnel pada Peering BGP untuk Mitigasi Serangan Man-in-the-Middle di Jaringan TCP/IP

Surono, Krida Pandu G,

82-91

<https://doi.org/10.36596/jitu.v10i1.2284>

Abstract:

The Border Gateway Protocol (BGP), as the core internet routing protocol, lacks built-in security mechanisms, making it vulnerable to Man-in-the-Middle (MITM) attacks and sniffing. This research aims to test the effectiveness of an OpenVPN-based secure tunnel in enhancing the security of BGP peering sessions while analyzing its impact on network performance. The method used is an experiment with a pre-test and post-test design, comparing conditions before and after OpenVPN implementation between two routers on different platforms (Linux/FRRouting and MikroTik RouterOS). Test results show that OpenVPN successfully secures BGP communication by encrypting all traffic, thereby eliminating the risk of plaintext reading and passive MITM attacks. However, this implementation introduces a performance trade-off: latency increases by 2.6 ms (50%), throughput decreases by 289 Mbps (30.6%), and CPU utilization surges up to 60% due to encryption overhead. Nonetheless, BGP session stability is maintained with 99.95% uptime. The research concludes that OpenVPN is an effective solution for securing BGP in high-risk environments, with the caveat that hardware capacity and bandwidth requirements must be evaluated to minimize performance overhead impact.

Integrasi Metode SAW dalam Sistem Informasi Inventaris untuk Mitigasi Risiko Stockout pada Industri Jasa Hiburan

Aris Setia Hermawan, Donna Setiawati, Ari Pantjarani, Fera Tri Wulandari

92-103

<https://doi.org/10.36596/jitu.v10i1.280>

Abstract:

Operational management in the entertainment industry, such as Kingstar Family Karaoke, faces complex challenges in determining procurement priorities due to uncertain operational fluctuations.

This uncertainty often creates the risk of stockpiling or, conversely, stockouts, which directly impact the quality of customer service. This study aims to optimize the procurement decision-making process by integrating the Simple Additive Weighting (SAW) algorithm into an inventory information system. The research methodology follows the Systems Development Life Cycle (SDLC) framework with a Rapid Application Design (RAD) approach, which includes requirements analysis, system design, and software-based implementation. The SAW algorithm is applied to objectively balance the parameters of ending stock, sales level, and purchase price through a process of normalization and preference weighting. The test results show that the integration of the SAW method is able to provide accurate procurement priority recommendations, thereby assisting management in making more measured managerial decisions and mitigating the risk of operational losses.

Rancang Bangun Sistem Digital Twin Menara Pendingin Dengan Monitoring Kualitas Air dan Analisis Efisiensi Energi Berbasis PLC-HMI

Rio Pratama, Luki Utomo

104-115

<https://doi.org/10.36596/jitu.v10i1.2213>

Abstract:

The high cost of ICT investment is often an obstacle to ICT implementation, especially for educational institutions with limited budgets. Without analysis, the risk of budget waste and incompatibility with the real needs of the institution becomes higher. This study aims to assess the readiness of information and communication technology (ICT) investment using an integrative approach that combines Cost-Benefit Analysis (CBA), Technology-Organisation-Environment (TOE) Framework, and OODA Loop. This approach is designed to provide a comprehensive evaluation of economic, technological, organisational, and decision-making dynamics in ICT investment. The research method uses a qualitative approach with data collection through observation, interviews, and documentation studies. The analysis is carried out by integrating the results of CBA to assess the feasibility of investment, the TOE Framework to identify factors influencing technology adoption, and the OODA Loop to understand the iterative and adaptive decision-making process. The research findings indicate that based on the CBA analysis, the ICT investment in the form of developing and implementing an e-learning system at SMAN 01 Sanggau is highly feasible to execute. However, from the TOE Framework perspective, the organisation's readiness to adopt the e-learning system is still partial with some shortcomings. From the OODA Loop perspective, the investment is deemed feasible after considering: financial calculations showing benefits through metrics such as NPV, ROI, and PP, non-financial benefits such as improved access to learning and educational quality, and proactive risk mitigation against technical, financial, and operational challenges.

Penerapan RAG pada Chatbot Edukasi dan Deteksi Dini Penyakit THT

Khairina Eka Setyaputri, David Fitrianto, Wicaksono Yuli Sulistyono

116-125

<https://doi.org/10.36596/jitu.v10i1.2251>

Abstract:

Limited access to fast and accurate medical information is often a major constraint in the early detection of Ear, Nose, and Throat (ENT) diseases. This study proposes the development of an intelligent chatbot using the Retrieval-Augmented Generation (RAG) architecture to minimize hallucinations in Large Language Models (LLMs). The system is built using the n8n low-code automation platform, integrated with the WhatsApp API as the user interface and the gpt-4o-mini model as the inference engine. The system's knowledge base is sourced from external databases, including clinical references and visit data, processed through a vector store to ensure that responses remain within the context of valid data. Testing results indicate that the implementation of RAG increases information accuracy compared to the standard model. Furthermore, the use of n8n has proven to provide operational cost efficiency and accelerate the deployment cycle. The system successfully achieved an average latency of under 5 seconds with a Success Rate of 95%. This study concludes that the integration of RAG on a no-code platform is an effective solution for providing precise and economical health informatics services.

Implementasi Hierarchical Clustering untuk Analisis FDMC Narrative Crypto Berbasis Web

M. Fathir Adha, Hendrik Fery Herdiatmoko

126-137

<https://doi.org/10.36596/jitu.v10i1.2255>

Abstract:

This study implements the Hierarchical Clustering algorithm with Ward linkage and Euclidean distance methods to analyze 26 crypto narratives based on the Fully Diluted Market Cap (FDMC) metric. Using a hybrid method that integrates Waterfall, Cross-Industry Standard Process for Data Mining (CRISP-DM), and Knowledge Discovery in Databases (KDD), data was obtained from the CoinGecko API, manually clustered, and aggregated per narrative. Pre-processing involved logarithmic transformation (\log_{10}) and Z-Score normalization to address power-law distributions and outliers, resulting in a more stable cluster structure. The clustering results mapped the market into five clusters: Bluechip (L1 with FDMC \$2.76T), Growth (PAY, MEME, CEX, DEX, DeFi totaling \$468.22B), Growth (AI, DePIN, DAO, L2, RWA, ORC, GameFi, XCH, DID, PRC, LST with \$192.91B), Speculative (NFT, MET, SocialFi, BTC Eco, W3I with \$17.55B), and Speculative (LPD, GambleFi, FTO, SEC with \$2.34B). The model was validated with a Silhouette Score of 0.650 and a Cophenetic Correlation Coefficient of 0.647, indicating cohesive and representative clusters. A web-based implementation using Django, D3.js, and Chart.js provides interactive visualizations and portfolio recommendations. Contributions include a novel fundamental valuation approach, an adaptive clustering model, and practical analytical tools for investors, with potential expansion to multidimensional metrics in the future.

Perancangan Electronic Nose (E-Nose) untuk Analisis dan Klasifikasi Aroma Daging Menggunakan PCA dan LDA

Muhammad Rizki Setyawan, Abdul Fadlil, Anton Yudhana

138-149

<https://doi.org/10.36596/jitu.v10i1.2254>

Abstract:

Meat is a vital food commodity prone to adulteration through species mixing or chemical contamination such as formalin and borax. This study aimed to design and test an Electronic Nose (E-Nose) system for aroma pattern analysis and meat classification using Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA). Samples included pure meat (beef, chicken, pork), mixed meat, and chemically contaminated meat. Aroma data were captured using an array of gas sensors sensitive to Volatile Organic Compounds (VOCs) and standardized prior to analysis. PCA reduced eight sensor features into three principal components explaining a total variance of 79.63%. PC1, PC2, and PC3 accounted for 46.10%, 20.58%, and 12.96% of variance, respectively, showing clustering patterns among samples with minor overlap. LDA provided clearer class separation with three discriminant components LD1, LD2, and LD3 explaining 77.13%, 16.63%, and 4.59% of between-class variance, totaling 98.34%. LD1 separated pure, mixed, and contaminated meat, LD2 distinguished variations due to contaminant type and species, and LD3 refined separation of similar classes. Classification evaluation achieved an overall accuracy of 82%. Most classes were well classified, while classes 1 and 10 experienced misclassification due to similar aroma patterns. The findings confirm that E-Nose combined with PCA and LDA is a rapid, non-destructive, and efficient method for detecting meat authenticity and adulteration, showing strong potential for food quality monitoring in the field.

Optimasi Deteksi Hama Tanaman Melon Berbasis YOLOv9

Muhammad Immawan Aulia, Anton Yudhana, Sunardi

150-161

<https://doi.org/10.36596/jitu.v10i1.2265>

Abstract:

Pest attacks are one of the main problems in melon cultivation, significantly impacting productivity and crop quality. Manual pest identification has limitations in terms of objectivity, consistency, and efficiency, especially in medium to large-scale agricultural fields. This study developed a computer vision-based visual detection system for melon pests by utilizing the YOLOv9 architecture and public datasets obtained from the Roboflow platform. The dataset used consisted of 1,198 images, divided into 879 training images, 131 validation images, and 188 test images. The model training process employed data augmentation techniques, generating three outputs per training example and adding noise up to 2.52% of pixels to enhance the model's resilience to visual variations. The research methodology included system architecture design, data preprocessing, model training, and performance evaluation using precision, recall, and mean Average Precision (mAP) metrics. The test results showed that the system achieved mAP@50 of 61.6%, with 56.9% precision and 58.8% recall, indicating adequate detection capability with good inference efficiency. Thus, the developed system

has the potential to be used as an early detection mechanism for melon plant pests to support decision-making in precision agriculture.

Meningkatkan Efisiensi Energi Perangkat Edge melalui Optimasi Pruning dan Kuantisasi Model
Nambi Sembilu, Iqbal Ramadhani Mukhlis, Iswanda Fauzan Satibi 162-171
<https://doi.org/10.36596/jitu.v10i1.2324>

Abstract:

Edge computing devices are increasingly tasked with performing artificial intelligence inference under strict constraints on processing capacity and power consumption. This study evaluates magnitude-based weight pruning and dynamic quantization as practical model compression techniques for energy-efficient edge AI deployment. MobileNetV2, pretrained on ImageNet, was adapted to the CIFAR-10 classification task and compressed under three configurations: 40% L1 unstructured pruning followed by recovery fine-tuning (Prune40), dynamic INT8 post-training quantization (QuantINT8), and a sequential combination of both (Prune+Quant). All experiments were executed on a physical Intel N150 mini PC with a thermal design power of 6 watts, using PyTorch 2.1 in CPU-only inference mode. Results show that Prune40 reduced inference latency by 17.9% while simultaneously improving classification accuracy by 1.04 percentage points, attributed to the implicit regularisation effect of sparse weight removal and recovery fine-tuning. QuantINT8 yielded moderate latency savings (6.6%) with negligible accuracy loss. The combined pipeline achieved the lowest absolute latency at a marginal energy overhead. These findings establish magnitude pruning with recovery training as the most effective single-step compression strategy for low-power x86 edge platforms.

Integrasi Moodle API dan LLM dalam Otomasi Monitoring Capaian Pembelajaran Lulusan Berbasis OBE
Wicaksono Yuli Sulistyono, Joko Supriyanto 172-182
<https://doi.org/10.36596/jitu.v10i1.2307>

Abstract:

The implementation of Outcome-Based Education (OBE) necessitates transparency and accountability in mapping Program Learning Outcomes (PLO). Nevertheless, the manual mapping process from an extensive array of courses (60 Course Learning Outcomes/CLO) to 10 PLOs frequently encounters administrative constraints and a high risk of human error. This study aims to design and develop an integrated OBE monitoring system utilizing the Moodle API for grade synchronization and the OpenAI API for academic documentation assistance. Adopting the Design Science Research (DSR) methodology, the system was implemented using native PHP. The findings demonstrate that Moodle API integration facilitates the real-time automation of grade retrieval per sub-CLO. Simultaneously, the application of Mermaid.js effectively transforms these data into dynamic traceability visualizations. Moreover, the implementation of the OpenAI API (GPT) provides significant cognitive assistance for faculty members in drafting Semester Learning Plans (RPS) aligned with competency standards. This system establishes a robust data infrastructure for institutions to perform accurate and transparent curriculum evaluations.