IEIT 2022

The 2nd International Conference on Electrical and Information Technology

CERTIFICATE

No: 21115/PL2/DL/2022

this certificate is presented to

Lusia Rakhmawati

for participating as a PRESENTER for the paper entitled

Block-Based Image Reversible Data Hiding Based on the Visual Feature and Edge Entropy

in IEIT 2022

The 2nd International Conference on Electrical and Information Technology

"Science, Technology, Innovative Academic and Vocational Research Towards Product Development Through Industrial and Educational Cooperation"

September 15th-16th, 2022

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Supriatna Adhisuwignjo, ST., MT.

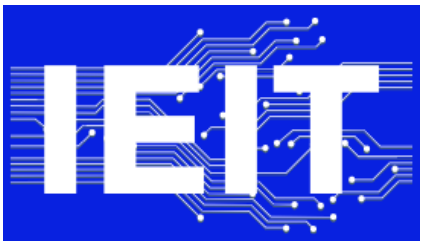
NIP. 19710108199031001

Conference Chair

Dr. Eng. Rosa Andrie Asmara, ST., MT.

NIP. 198010102005011001

Book of Program



The 2nd International Conference on Electrical and Information Technology

(IEIT 2022)

15th -16th September 2022

PREFACE

Good morning, Ladies and Gentlemen, Dear Colleagues,

It gives me great pleasure to extend to you all a very warm welcome on behalf of Politeknik Negeri Malang and to say how grateful I am to all guests and presenters of the three conferences, namely:

1. The 4th Annual Technology, Applied Science and Engineering Conference (ATASEC 2022)
2. The 2nd International Conference on Electrical and Information Technology (IEIT 2022).
3. The 13th Joint National Seminar on Engineering / Seminar Nasional Gabungan Bidang Rekayasa (SNGBR) 2022.

I also would like to convey my special appreciation to all the committee member, reviewer, advisory board, keynote speakers, and whoever involves and makes this conferences held smoothly.

We are very grateful to be able to continue to hold this conference, despite of the limitations due to covid19 pandemic. Our plan was, to welcome all participants of conference to visit our beautiful city Malang. However, even though we cannot meet face to face we can still carry out this conference virtually with enthusiasm and joy.

The three conferences have their respective themes, namely:

1. The 4rd ATASEC 2022 and 2nd IEIT 2022 has a theme “Science, Technology, Innovative Academic and Vocational Research Towards Product Development Through Industrial and Educational Cooperation”.
2. As for the 13th SNGBR 2022 theme “IPTEK, Riset Akademik dan Vokasi yang Inovatif Menuju Pengembangan Produk Melalui Kerjasama Industri dan Pendidikan”

These theme will be a media for sharing knowledge from researchers and industry from all fields of advanced technology and science. The ATASEC and IEIT conferences will be attended by 3 distinguish keynote speakers, namely:

1. Richard Dwight, Ph.D., Associate Professor School of Mechanical, Materials & Mechatronics Engineering University of Wollongong, Australia.

2. Prof. Tsukasa Hirashima, Professor at Graduate School of Advanced Science and Engineering, Hiroshima University, Japan.

3. Ferdian Ronilaya, Ph.D, Associate Professor of State Polytechnic of Malang, Indonesia.

And the SNGBR conferences will be attended by 2 keynote speakers, namely:

1. Nugroho Wibisono, from PT Telkomsat Indonesia

2. Ratih Indri Hapsari ST., MT., PhD., from State Polytechnic of Malang, Indonesia

Please accept my high appreciation to all 5 keynote speakers for joining here with us today.

Ladies and Gentlemen,
Such a conference is an extraordinary opportunity, as a good time to share knowledge from a variety of affiliates and also a variety of concentrations in the scope of the field of Advanced Technology, Science and Vocational Engineering Education.
Thank you also to all experts, researchers, lecturers who come to share their knowledge today.

I assure you that we will have fruitful and rewarding exchanges today. I wish you all a very success with this important conference and I look forward to learning about the outcome.

So, let me now open these conferences officially by wishing you a delightful and vibrant day.

Bismillahirrahmannirrahiim.

Thank you.

Malang, 15th September 2022

Director of State Polytechnic of Malang

Supriatna Adhisuwignjo ST., MT.

About Conference

The 2nd International Conference on Electrical and Information Technology 2022 (IEIT 2022) was held online cause of Covid-19 Pandemic by using ZOOM platform on 15th -16th September 2022. IEIT 2022 theme is Science, Technology, Innovative Academic and Vocational Research Towards Product Development Through Industrial and Educational Cooperation. The conference will be enriched with renowned keynote speakers.

1. Prof. Tsukasa Hirashima
2. Richard Dwight, Ph.D.
3. Ferdian Ronilaya, Ph.D.

Aim and Scope

IEIT 2022 aims to provide a platform for academicians, researchers, students and practitioners to promote and to share ideas and knowledge and to create international networks for sustaining development of the science and technology in the future.

The scope of the conference will cover but not be limited to:

- Electronic And Embedded System
- Applied Mathematics, Computational Methods And Algorithm, Data And Signal Processing
- Communication And Networking
- Information Technology And Computer Science
- Big Data
- Machine Learning
- Artificial Intelligence, Automation And Control

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ORAL PRESENTATION

- Make sure that you have downloaded the Zoom application before the D-day
- Please prepare and join the conference or parallel session at least 10 minutes before it's started
- Please ensure your Zoom ID name is formatted **IEIT_(breakout room number)_name**
- We encourage every participant to activate their videos during the conference, so please ensure you wear a formal outfit and keep your good manners during the conference
- Please mute your microphone during conference or parallel sessions, you should only unmute the microphone during your presentation time
- Any questions should be submitted through chat box to the moderator (privately) at any time during the conference
- Considering the limited time of the QA session, only some chosen questions will be asked by moderator and answered by the presenter
- All the participants are required to fill up the online attendance form. The attendance taking will be done 2 times, first in the keynote speaker session and the second in the parallel session of the conference. The link will be provided during the conference through chat box
- The certificate will be given to the participant that attend the conference from beginning until the end, and filled up the both attendance sheets
- The participant that experience technical problem and need some assistance can contact the committee through email ieit@polinema.ac.id.

- Please note that the time allocated to each oral presentation is 10 minutes including questions and answers (10 minutes presentation and 5 minutes Q&A).
- The presentation file that has been prepared by author will be present by each author using their own device.

PUBLICATION

The papers accepted and registered by IEIT 2022 must be presented on the conference's date, and presented papers in line with IEEE's scope will be submitted to the IEEE Xplore digital library after the conference.

SCHEDULE

15th September 2022

Note: The time is in Waktu Indonesia Barat (WIB GMT+7)

Time		Agenda	Venue
07:30-08:00	30’	***Conference registration*** Zoom room is created, participants join the room	Zoom Room 1 https://bit.ly/polinemaconf22
08:00-08:05		Director of Polinema, keynote speaker, moderator, and chairman of IEIT, ATASEC and SNGBR join the Zoom room	
08:05-08:30		The opening session is led by MC Sing National Anthem Indonesia Raya Playing Polinema Profile Video	
08:30-08:40		Welcoming speech and event opening by the director of State Polytechnic of Malang Supriatna Adisuwignjo, ST., MT.	
08:40-08:50		***Opening ceremony and greetings*** IEIT, ATASEC and SNGBR 2022 short report by the chairman Dr. Eng. Rosa Andrie Asmara, S.T.,M.T. – Politeknik Negeri Malang, ID	
08:50-09:00		***Video of Malang City Introduction***	
		Keynote speaker session is led by Moderator Dr. Eng. Banni Satria Andoko	
09:00-09:30	30’	***Presentation by keynote speaker 1*** Keynote speech by Richard Dwight, PhD	
09:30-10:00	30’	***Presentation by keynote speaker 2*** Keynote speech by Prof. Tsukasa Hirashima	
10:00-11:00	30’	***Presentation by keynote speaker 3*** Keynote speech by Dr. Ferdian Ronilaya	
	30’	Question and answer session (The QA session is held after all keynote speakers have delivered their speeches)	
11:00-12:00	60’	***Parallel presentation: Session 1-7*** 10-15 presenter for each room	Format name IEIT_(breakout room number)_name Example: IEIT_1_Joko Tingkir
12:00-13:00		Break	
13.00-15.00	120’	***Parallel presentation: Session 1-7*** 10-15 presenter for each room	Format name

			IEIT_(breakout room number)_name Example: IEIT_1_Joko Tingkir

PARALLEL SESSIONS

Breakout Room : 1
Date/Time : Thursday, 15th September 2022

No	Title	Paper topics	Authors with affiliation and country
1	Harmonic Fault Study and Analysis Procedures Using Portable Power Analyzer an Solutions Using Active Harmonic Filters	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing	Felix Ridwan Mas Noor (Indonesia)
2	Planning and Analysis of Medium Voltage Chamber as Protection of Mobile Stations	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing	Roy Hidayat Noor (Indonesia)
3	Integration of Fuzzy Logic Algorithms with Failure Mode and Effect Analysis for Decision Support Systems in Product Quality Improvement of Piano Cabinets	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing	Nazaruddin Nazaruddin, Muhammad Rizki, Muhammad Luthfi Hamzah, Muhammad Isnaini Hadiyul Umam and Sarbaini Sarbaini (Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia)
4	Detection of Potato Leaf Disease Using Multi-Class Support Vector Machine Based on Texture, Color, and Shape Features	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing	Esti Suryani (University of Sebelas Maret, Indonesia); Muh. Syahabuddin Hylmi and Wiharto Wiharto (Universitas Sebelas Maret, Indonesia)
5	Investigation Learning Rate Parameter for Keypoint-Based UAV Object Detection	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing	Suryo Adhi Wibowo (Telkom University, Indonesia); Thomhert Suprapto Siadari (DDH Inc., Korea (South))
6	Performance Analysis of the Effect Euler Regression on Complex YOLOv4 Model for Autonomous Driving	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing	Suryo Adhi Wibowo (Telkom University, Indonesia)
7	Development of a Two-Factor Authentication System for Enhanced Security of Vehicles at a Car Park	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing	Ezilaan Irraivan and Swee King Phang (Taylor's University, Malaysia)
8	Catfish Seed Quality Determination Using Phase Only Correlation (POC) and Naive Bayes Methods	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing; Artificial Intelligence, Automation and Control	Ulla Delfana Rosiani and Oktaviano Andy Suryadi (Politeknik Negeri Malang, Indonesia); Mungki Astiningrum (State Polytechnic of Malang, Indonesia); Dwi Puspitasari (Politeknik Negeri Malang & Polinema, Indonesia); Falah Ahmad Sabila and Husnul Hotimah (Politeknik Negeri Malang, Indonesia)
9	Comparison of Image Extraction Model for Cocoa Disease Fruits Attack in Super Vector Machine Classification	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing; Artificial Intelligence, Automation and Control; Machine Learning	Basri Basri (Hasanuddin University, Indonesia & Universitas Al Asyariah Mandar, Indonesia); Indrabayu Indrabayu, Andani Achmad and Intan Sari Areni (Hasanuddin University, Indonesia)
10	Comparing User Rating-Based Similarity to User Behavior Based-Similarity in Movie Recommendation Systems	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing; Big Data; Machine Learning	Triyanna Widiyaningtyas (Universitas Negeri Malang, Indonesia); Teguh Bharata Adji and Indriana Hidayah (Universitas Gadjah Mada, Indonesia)
11	Implementation of Automatic Watering System and Monitoring of Nutrients for Grape Cultivation	Applied Mathematics, Computational Methods and Algorithm, Data and Signal Processing; Information Technology and Computer Science	Erlita P Wahyu, Ummi Rizki Stania, Reva Asih, Elsa Firmaniar, Alfina Novianti, Moechammad Sarosa and Mila Kusumawardani (State Polytechnic of Malang, Indonesia)

PARALLEL SESSIONS

Breakout Room : 2
Date/Time : Thursday, 15th September 2022

No	Title	Paper topics	Authors with affiliation and country
1	Design Monitoring Power System for Parallel Synchronization of Generators Set	Electronic and Embedded System	Aftariswan Aftariswan (Politeknik Negeri Malang, Indonesia); Ika Noer and Mohammad Hidayat (State Polytechnic of Malang, Indonesia)
2	AI-Enabled Conversational Agents in Service of Mild Cognitive Impairment Patients	Artificial Intelligence, Automation and Control; Communication and Networking; Machine Learning	Ioannis - Aris Kostis, Konstantinos Karamitsios and Konstantinos Kotrotsios (My Company Projects O. E., Greece); Magda Tsolaki (First Department of Neurology, Medical School, Aristotle University of Thessaloniki); Anthoula Tsolaki (Aristotle University of Thessaloniki, Greece)
3	ID Card Storage System Using Optical Character Recognition (OCR) on Android-Based Smartphone	Artificial Intelligence, Automation and Control; Information Technology and Computer Science; Machine Learning	Jeklin Harefa, Alexander Alexander, Andry Chowanda, Emir Haikal, Fedrick Fedrick and Stendy Wiranata (Bina Nusantara University, Indonesia)
4	Optimization of Binary Tournament and Reciprocal Exchange in the Genetic Algorithm for Flexible Teaching Problem	Artificial Intelligence, Automation and Control; Information Technology and Computer Science; Machine Learning	Irawan Dwi Wahyono (Universitas Negeri Malang, Indonesia)
5	Automatic Question Generation from Indonesian Texts Using Text-To-Text Transformers	Artificial Intelligence, Automation and Control; Machine Learning	Mukhlish Fuadi (Institute of Technology Sepuluh Nopember & Universitas Islam Negeri Maulana Malik Ibrahim Malang, Indonesia); Adhi Dharma Wibawa (Institut Teknologi Sepuluh Nopember, Indonesia)
6	The Naïve Bayes Algorithm for the Stride Length Classification	Artificial Intelligence, Automation and Control; Machine Learning	Ilham Ari Elbaith Zaeni and Wahyu Primadi (Universitas Negeri Malang, Indonesia); Dessy Rif'a Anzani (UIN Maulana Malik Ibrahim, Indonesia); Dyah Lestari and Anik Nur Handayani (Universitas Negeri Malang, Indonesia)
7	Vehicle Detection and Classification Using Deep Neural Networks	Artificial Intelligence, Automation and Control; Machine Learning	Shuva Chowdhury, Shithi Chowdhury and Jeba Tahsin Ifty (North South University, Bangladesh); Riasat Khan (North South University, Bangladesh & New Mexico State University, USA)
8	Crowd Counting During a Pandemic to Find Out Community Response to Activity Restriction Policy Using Deep Learning	Artificial Intelligence, Automation and Control; Machine Learning	Mustika Mentari, Wilda Imama Sabilla, Kadek Suarjuna Batubulan, Atmayanti Atmayanti, Aliza Rizqi Fitriana and Abdul Latif (Politeknik Negeri Malang, Indonesia)
9	Analysis and Design of Data Warehousing and Business Intelligence Guidelines Using DAMA-DMBOKv2	Big Data	Zahabia Zahabia, Tien Fabrianti Kusumasari and Rokhman Fauzi (Telkom University, Indonesia)
10	Real Time Sensor Monitoring Using Local Database Cache Method	Big Data; Information Technology and Computer Science	Mohammad Hidayat, Riyant Budi Setiawan and Ferdian Ronilaya (State Polytechnic of Malang, Indonesia)
11	Challenges and Opportunities of Mobile Cloud Computing	Big Data; Information Technology and Computer Science	Grace Kwagalakwe (Makerere University, Uganda); Samson Otieno Ooko (African Center of Excellence in Internet of Things & University of Rwanda, Rwanda); Rosemary Nalwanga (University of Rwanda, Rwanda)

PARALLEL SESSIONS

Breakout Room : 3
Date/Time : Thursday, 15th September 2022

No	Title	Paper topics	Authors with affiliation and country
1	Evaluation of Order Preserving Triclustering (OPTricluster) in 3 Dimensional Gene Expression Data Analysis Using Gene Ontology	Big Data; Machine Learning	Ghea Dwi Apriliana and Titin Siswantining (Universitas Indonesia, Indonesia); Setia Pramana (Politeknik Statistika STIS, Indonesia); Prasnurzaki Anki (Universitas Indonesia, Indonesia)
2	COVID-19 Pandemic Vis-à-Vis Zamboanga Peninsula Aviation: A Predictive Analysis	Big Data; Machine Learning	Urbano B Patayon (Jose Rizal Memorial State University, Philippines)
3	RSSI and Packet Loss Analysis of LoRa on the Ground Surface Application	Communication and Networking	Muladi Muladi (State University of Malang & Universitas Negeri Malang, Indonesia); Mokh Sholihul Hadi and Made Radikia Prasanta (Universitas Negeri Malang, Indonesia)
4	Internet of Things (IoT) Based Garbage Incinerator Monitoring System	Communication and Networking	Septriandi Wirayoga (Politeknik Negeri Malang, Indonesia)
5	Energy Consumption Comparison of Some WSN OOK Transmitters Through Minimum Energy Coding	Communication and Networking	Nukhet Sazak (Sakarya University, Turkey)
6	A Systematic Literature Review of Privacy, Security, and Challenges on Applying IoT to Create Smart Home	Communication and Networking; Electronic and Embedded System	Intan Saliya Utomo, Celine Pranoto, Daniel Daniel, Jurike Moniaga and Bakti Amirul Jabar (Bina Nusantara University, Indonesia)
7	Wireless Sensor Network for Energy Monitoring Based on Hybrid Power Plants AH Buildings	Communication and Networking; Electronic and Embedded System	Septriandi Wirayoga (Politeknik Negeri Malang, Indonesia)
8	NFC (near Field Communication)-Based Canteen Self Service Application in SMA Pomosda Nganjuk	Communication and Networking; Information Technology and Computer Science	Reva R Asih, Tania Sholikhah, Nabila Ulhaq, Annisa Permataning T Rachman, Mil'atuttoyyibah M, Moechammad Sarosa and Putri Mas'udia (State Polytechnic of Malang, Indonesia)
9	Custom Communication Channel to Handling Application Management Services: Using Salesforce	Communication and Networking; Information Technology and Computer Science	Kurniati Bunga Rindu, Muhardi Saputra and Warih Puspitasari (Telkom University, Indonesia)
10	A Development of Multi-Platform Based Forestry Wildfire Prevention System Using Incremental Model (Case Study: A Peatland Area in Siak Regency)	Communication and Networking; Information Technology and Computer Science	Diki Arisandi (Universitas Abdurrab & Multimedia University, Indonesia); Amir Syamsuadi and Liza Trisnawati (Universitas Abdurrab, Indonesia); Seri Hartati (Univeritas Abdurrab, Indonesia)
11	Integration of the Weather Station Monitoring System in the Wind Power Plant Prototype	Electronic and Embedded System	Mohammad Hidayat, Ferdian Ronilaya and Irwan Eryk (State Polytechnic of Malang, Indonesia)

PARALLEL SESSIONS

Breakout Room : 4
Date/Time : Thursday, 15th September 2022

No	Title	Paper topics	Authors with affiliation and country
1	Impact of Changes in the Number and Capacity of Wind Power Plant on Short Circuit Current Level in Distribution Network	Electronic and Embedded System	Langlang Gumilar (Universitas Negeri Malang, Indonesia)
2	Monitoring of Protection System for Overvoltage Faults in Distribution Networks	Electronic and Embedded System	Muhammad Nafis Hibatullah, Langlang Gumilar and Khalimatus Anisa Zain Anisa Zain (Universitas Negeri Malang, Indonesia)
3	Performance Optimization of Solar Powered Pump for Irrigation in Tanjung Raja, Indonesia	Electronic and Embedded System	Mustika Alam, Tresna Dewi and Rusdianasari Rusdianasari (Politeknik Negeri Sriwijaya, Indonesia)
4	Solar Energy as an Alternative Energy Source in Hydroponic Agriculture: A Pilot Study	Electronic and Embedded System	Elvis Novaldo, Tresna Dewi and Rusdianasari Rusdianasari (Politeknik Negeri Sriwijaya, Indonesia)
5	PV System Design, Economic Feasibility, and Environmental Impact as an Alternative Power Source for Hospital Application	Electronic and Embedded System	Andri Riyana, Tresna Dewi and Yohandri Bow (Politeknik Negeri Sriwijaya, Indonesia)
6	The Solar Panel Passive Cooling Using Circular Pipe Heatsink Filled with Water	Electronic and Embedded System	Arif Susilo (Politeknik Negeri Malang, Indonesia); Mohammad Hidayat (State Polytechnic of Malang, Indonesia); Ratna Ika Putri (Politeknik Negeri Malang, Indonesia)
7	Implementation of Automatic Transfer Switch on DC System	Electronic and Embedded System	Mohammad Hidayat and Wildan Surya Wijaya (State Polytechnic of Malang, Indonesia); Ratna Ika Putri (Politeknik Negeri Malang, Indonesia)
8	Modeling and Simulation of Smart Bidirectional DC Watt-Hour Meter for DC House	Electronic and Embedded System	Mohammad Hidayat, Muhammad Ikhwanul Khair and Ika Noer Syamsiana (State Polytechnic of Malang, Indonesia)
9	Hybrid Solar Heat Accumulator Control for Egg Hatcher Applying Power Hysteresis Method	Electronic and Embedded System	Budhy Setiawan, Eka Mandayatma, Widjanarko Widjanarko, Azis Isrofi and Virna Audiana (State Polytechnic of Malang, Indonesia)
10	Optimization of Output Power and Photovoltaic Efficiency with Adding Chromel Alumel Elements	Electronic and Embedded System	m. Irfan Isnaeni (Politeknik Negeri Sriwijaya & Home, Indonesia); Rd Kusmanto and Abu Hasan (Politeknik Negeri Sriwijaya, Indonesia)
11	Design and Build of the Mist Sprayer Powered by Solar Panels for Cultivating Oyster Mushrooms	Electronic and Embedded System	Muhammad Afnan Habibi, Widodo Laksono, A. Aripriharta, Quota Alief Sias and Langlang Gumilar (Universitas Negeri Malang, Indonesia); Adi Izhar Che Ani (Universiti Teknologi MARA, Malaysia)

PARALLEL SESSIONS

Breakout Room : 5
Date/Time : Thursday, 15th September 2022

No	Title	Paper topics	Authors with affiliation and country
1	Review of Perpetual Motion Machine Using Pendulum Force Method as DC Power Generation	Electronic and Embedded System	Mohammad Hidayat (State Polytechnic of Malang, Indonesia); Afif Nuril Musthofa (Politeknik Negeri Malang, Indonesia); Budhy Setiawan (State Polytechnic of Malang, Indonesia)
2	Motion Detection for Children with Cerebral Palsy Using K-Nearest Neighbor	Artificial Intelligence, Automation and Control; Big Data; Machine Learning	Anik Nur Handayani, Ilham Ari Elbaith Zaeni and DIka Laistulloh (Universitas Negeri Malang, Indonesia); Rosa Andrie Asmara (Politeknik Negeri Malang, Indonesia); Osamu Fukuda (Saga University, Japan)
3	An Effective Approach of Speed Estimation Using Position Detector on Six Step Inverter for Trapezoidal PMSM Drive	Electronic and Embedded System	Gigih Prabowo (Electronic Engineering Polytechnic Institute Of Surabaya, Indonesia); Indra Ferdiansyah (Politeknik Elektronika Negeri Surabaya, Indonesia); Era Purwanto (Electronic Engineering Polytechnic Institute Of Surabaya, Indonesia); Moh. Budiono (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)
4	Prevention of Battery Life Reduction Using Fuzzy Logic Controller-SEPIC Converter for Automatic Battery Charging	Electronic and Embedded System	Fifi Hesty (Politeknik Elektronika Negeri Surabaya, Indonesia)
5	Applying Demand Side Response Model on Mitigating Electrical Energy Cost for Residential Styrofoam Wall	Electronic and Embedded System	Marwan Marwan (Polytechnic State of Ujung Pandang Makassar, Indonesia); Andi Muhammad Subhan (Polytechnic State of Ujung Pandang, Indonesia); Muhammad Anshar (State Polytechnic of Ujung Pandang, Indonesia); Abdul Halim (The state Polytechnic of Samarinda, Indonesia); Jamal Jamal (Polytechnic State of Ujung Pandang, Indonesia)
6	Load Flow Analysis Due to Reconfiguration of AC to DC Electrical Distribution System on Trailing Suction Hopper Dredger (TSHD) Vessel	Electronic and Embedded System	Adi Kurniawan (Institut Teknologi Sepuluh Nopember, Indonesia)
7	Switching Time and Spurious Reduction Techniques Using PLL in Frequency Synthesizer	Electronic and Embedded System	Sindu Gr (BEL, India); Jayasheela C s (Bharat Electronics, India); Harikrishna M V (Bharat Electronics Ltd, India)
8	Cognitive Function Tools/Robot Design for Elderly Using Image-Processing	Electronic and Embedded System; Machine Learning	Anik Nur Handayani and Dyah Lestari (Universitas Negeri Malang, Indonesia); Muladi Muladi (State University of Malang & Universitas Negeri Malang, Indonesia); Rosa Andrie Asmara (Politeknik Negeri Malang, Indonesia); Osamu Fukuda (Saga University, Japan)
9	Usability Testing of MOOC Prototype Using SUS (System Usability Scale) Method	Information Technology and Computer Science	Asep Syaiful Hidayat, Paulus Insap Santosa and Indriana Hidayah (Universitas Gadjah Mada, Indonesia)
10	Jupyter Lab Platform-Based Interactive Learning	Information Technology and Computer Science	Noprianto Noprianto (Politeknik Negeri Malang, Indonesia); Vivi Nur Wijayaningrum (Politeknik Negeri Malang, Indonesia & Department of Information Technology, Indonesia); Vivin Ayu Lestari (Politeknik Negeri Malang, Indonesia)
11	Systematic Literature Review: Blockchain Security in NFT Ownership	Information Technology and Computer Science	Reyhan Mochram, Charles Makawowor, Kent Tanujaya, Jurike Moniaga and Bakti Amirul Jabar (Bina Nusantara University, Indonesia)

PARALLEL SESSIONS

Breakout Room : 6
Date/Time : Thursday, 15th September 2022

No	Title	Paper topics	Authors with affiliation and country
1	Implementing A Star Algorithm for Bicycle Route Finding System Using OSM and GraphHopper. Case Study: Batu, Indonesia	Information Technology and Computer Science	Rudy Ariyanto (State Polytechnic of Malang, Indonesia); Erfan Rohadi (Politeknik Negeri Malang, Indonesia); Annisa Puspa Kirana (State Polytechnic of Malang, Indonesia)
2	Block-Based Image Reversible Data Hiding Based on the Visual Feature and Edge Entropy	Information Technology and Computer Science	Lusia Rakhmawati, Hapsari Peni Agustin Tjahyaningtijas and Wiyli Yustanti (Universitas Negeri Surabaya)
3	Measurement of Engagement Rate on Instagram for Business Marketing (Case Study: MSME of Dowry in Jember)	Information Technology and Computer Science	Hermawan Arief Putranto, Taufiq Rizaldi, Hendra Yufit Riskiawan and Dwi Putro Sarwo Setyohadi (Politeknik Negeri Jember, Indonesia); Ery Setiyawan Jullev Atmadji (State Politechnic Of Jember, Indonesia)
4	An Implementation of Automatic Dart Code Verification for Mobile Application Programming Learning Assistance System Using Flutter	Information Technology and Computer Science	Yan Watequlis Syaifudin and Agus Salim Hadjrianto (State Polytechnic of Malang, Indonesia); Nobuo Funabiki (Okayama University, Japan); Dewi Yanti Liliana (State Polytechnic of Jakarta, Indonesia); Andi Baso Kaswar (State University of Makassar, Indonesia); Usman Nurhasan (State Polytechnic of Malang, Indonesia)
5	Preliminary Analysis of Result and Log Data on Viat-Map in English Reading Comprehension	Information Technology and Computer Science	Banni Satria Andoko, Atiqah Asri and Putra Prima Arhandi (State Polytechnic of Malang, Indonesia); Budi Harijanto (Politeknik Negeri Malang, Indonesia); Tsukasa Hirashima (Hiroshima University, Japan); Bening Sukmaningrum (State Polytechnic of Malang, Indonesia)
6	Development of Hotspots Ground Check Module in the Mobile Application for Prevention Patrol of Forest and Land Fires	Information Technology and Computer Science	Ali Naufal Ammarullah (IPB University, Indonesia); Imas Sukaesih Sitanggang (Bogor Agricultural University, Indonesia)
7	Criticism of the Risk Management Process in Scrum Methodology	Information Technology and Computer Science	Marzuki Pilliang, Munawar Munawar, Budi Tjahjono and Puteri Sejati (Esa Unggul University, Indonesia); Habibullah Akbar (Universitas Esa Unggul, Indonesia); Gerry Firmansyah (Esa Unggul University, Indonesia)
8	Usability Testing of Forest and Land Fire Prevention Patrol Information System in Sumatera	Information Technology and Computer Science	Yuda Baskara and Imas Sukaesih Sitanggang (Bogor Agricultural University, Indonesia); Hendra Rahmawan and Rina Trisminingsih (IPB University, Indonesia)
9	Systematic Literature Review: Machine Learning in Education to Predict Student Performance	Machine Learning	Sebastianus Radhya and Muhammad Anka Syahfiera Tasik (BINUS University, Indonesia); Farhan Muhammad Sabran (Binus University, Indonesia); Alexander Agung Santoso Gunawan (Bina Nusantara University & University of Indonesia, Indonesia); Anderies Anderies (BINUS University, Indonesia)
10	The Improvement of Personal Service in the MSMEs Marketplace Using a Rank-Based Collaborative Filtering Approach	Machine Learning	Sri Lestari and Yulmaini Yulmaini (Institut Informatika dan Bisnis Darmajaya, Indonesia); Aswin Aswin (IIB Darmajaya, Indonesia); Sulyono Sulyono, Ruki Fikri and Yan Aditiya Pratama (Institut Informatika dan Bisnis Darmajaya, Indonesia)
11	Classification of Infectious Diseases in Chickens Based on Feces Images Using Deep Learning	Machine Learning	Moch. Kholil, Heri Waspada and Rafika Akhsani (Akademi Komunitas Negeri Putra Sang Fajar Blitar, Indonesia)

PARALLEL SESSIONS

Breakout Room : 7
Date/Time : Thursday, 15th September 2022

No	Title	Paper topics	Authors with affiliation and country
1	Prediction of Student Academic Performance in Practicum Courses Based on Activity Logs and Student Background	Machine Learning	Vivi Nur Wijayaningrum (Politeknik Negeri Malang, Indonesia & Department of Information Technology, Indonesia); Ika Kusumaning Putri (Politeknik Negeri Malang, Indonesia); Annisa Puspa Kirana (State Polytechnic of Malang, Indonesia); Titis Octary Satrio (Politeknik Negeri Malang, Indonesia)
2	Emotion Detection in Text Using Convolutional Neural Network	Machine Learning	Denis Eka Cahyani (Universitas Negeri Malang, Indonesia); Aji P Wibawa (Indonesia & Universitas Negeri Malang, Indonesia); Didik Dwi Prasetya, Langlang Gumilar, Fadhilah Akhbar and Egi Rehani Triyulinar (Universitas Negeri Malang, Indonesia)
3	Black Flight Identification Using Radar Cross Section (RCS), Speed, and Altitude from RADAR Data Using Supervised Machine Learning	Machine Learning	Arwin Datumaya Wahyudi Sumari (State Polytechnic of Malang & Indonesian Air Force, Indonesia); Rosa Andrie Asmara (Politeknik Negeri Malang, Indonesia); Helda Risman (Indonesia Defense University, Indonesia); Ika Noer (State Polytechnic of Malang, Indonesia); Anik Nur Handayani (Universitas Negeri Malang, Indonesia); Kohei Arai (Saga University, Japan)
4	LRFM Model Analysis for Customer Segmentation Using K-Means Clustering	Machine Learning	Muhammad Rasyid Kafif Ibrahim and Raras Tyasnurita (Institut Teknologi Sepuluh Nopember, Indonesia)
5	Gum Rosin Price Forecasting Using A Hybrid ARIMA - LSTM Model	Machine Learning	Muhammad Naufal Rasyad and Raras Tyasnurita (Institut Teknologi Sepuluh Nopember, Indonesia)
6	Graph Attention Network on Extracting Feature from Simplified Molecular-Input Line-Entry System for HIV Classification	Machine Learning	Gregory Hugo, Vincentius Loanka Sinaga, Ignatius Michael Dinata, Felix Indra Kurniadi and Maria Anggreainy (Bina Nusantara University, Indonesia)
7	Human Gender Detection from Facial Image Using Global and Local Feature	Machine Learning	Lusiana D Ningrum and Bima Sena Bayu Dewantara (Politeknik Elektronika Negeri Surabaya, Indonesia); Dewi Mutiara Sari (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)
8	Comparison of EEG-Based Biometrics System Using Naive Bayes, Neural Network, and Support Vector Machine		Andrew Prasetyo (Institut Teknologi Sepuluh Nopember & ITS, Indonesia); Adhi Dharma Wibawa, Bima Satria Yudha Mohammad, Fasha Amellia Nuraini and Mohammad Azis Khoirul Fata (Institut Teknologi Sepuluh Nopember, Indonesia); Yuri Pamungkas (ITS Surabaya, Indonesia)
9	A Bayesian Game of Multisource Energy Harvesting for Batteryless IoT Devices		Matteo Caligiuri, Daniele Galizio, Federico Lincetto and Elvina Gindullina (University of Padova, Italy); Leonardo Badia (Università degli Studi di Padova, Italy)
10	System for Determining the Rate of Roasting on Coffee Beans Using Fuzzy Logic		Septriandi Wirayoga (Politeknik Negeri Malang, Indonesia)

Block-Based Image Reversible Data Hiding Based on the Visual Feature and Edge Entropy

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***Abstract*—Due to the widespread usage of the Internet, electronic information can be quickly altered, duplicated, and shared across interconnection. As a result, the unauthorized reproduction of digital material became a severe issue. Reversible data hiding (RDH) was a practical way of protecting digital media's copyright. This research presents an enhanced DCT-based RDH method that considers human visual features. A less uniform block was used for the information embedding to achieve high imperceptibility for a block based RDH technique. The testing findings of the suggested technique shown a better increase in robustness and non - repudiation under various kinds of image alteration procedures.**

Keywords—Reversible data hiding, block selection, Discrete Cosine Transformation, visual entropy, edge entropy

I. INTRODUCTION

The simplicity of creating and distributing digital material has significantly grown because of the enormous rise of online and smart technology in recent years. The issue has made it simpler than ever to use multimedia items illegally and erratically. It becomes critical to safeguarding digital product ownership while enabling full use of Internet resources. One technology strategy to protect intellectual property rights for digital products is data hiding. Reversible data hiding (RDH) [1][2] is a form of data hiding that allows the host sequence and embedded data from the tagged pattern to be restored without resulting in any information leakage. In fields where the original signal is so priceless that it cannot be corrupted, such as medicine, the military, and legal forensics, this crucial approach is frequently applied. By using the reverse procedure and the right keys, it is possible to extract the secret information [3].

Most RDH techniques used in early research are based on lossless compression [4],[5].[6] The general idea is to space out reversible data embedding by lossless compressing some aspects of the original image. These first techniques frequently have a low embedding capacity and may seriously impair image quality. To improve performance in this context, more effective RDH approaches have been suggested, such as difference expansion (DE) [1][7] and histogram shifting (HS) [3][8].

Most RDH methods are designed to work with uncompressed images, and in recent years, Visual quality and embedding capability have seen substantial improvements. They are not always instantly applicable to Joint Photographic Experts Group (JPEG) images[5][2].

RDH in a JPEG image has a variety of applications including archive management [3][5] and image authentication [5]. Even if most users will not notice the distortion, an image source might not want actual content modified in multimedia archives since it would cost too much storage space to keep both the real and the modified copies. A minor change to a picture may not be what the image's creator desires for image authentication. RDH should be the best solution in these cases since it can both detect tampered regions and retrieve the original image content.

Because JPEG is a compressed format, the packet size of the uncompressed deformation approach is severely limited. Additionally, this approach could result in a material increase in file size and poor visual quality. Another approach is based on modified JPEG quantization tables that were initially proposed in [9] and later improved by Wang et al. [1]. The concept is quite straightforward and useful. By dividing some entries of the quantization table by the same integer and multiplying the associated quantized DCT coefficients by the same integer, space for information embedding may be created (additionally adding an adjustment flag if necessary). This approach makes it simple to achieve high quality and a sizable capacity.

In this study, we provide an improved DCT-based RDH approach that uses a block-based RDH method and considers HVS features. To attain high imperceptibility for a block based RDH system, a less uniform block was employed for data embedding. To achieve the appropriate performance level for the recommended RDH technique, an entropy is helpful when it comes to coding images since it sets a lower limit on the average bit length per pixel that can be achieved by the best coding technique without losing any data. The visual feature and edge entropy are two elements that support the selection of the data embedding areas. The DCT is then applied to the selected image blocks. By changing the entries in each selected DCT coefficient with the least degree of distortion, the information is embedded into the selected blocks while maintaining the visual quality of the data-concealed images and boosting its durability. The strategy can meet the RDH system's imperceptibility and resilience requirements.

The substance of this article is formatted as follows. Section 2 presents the proposed RDH strategy. In Section 3, simulations of our approach against attacks are carried out. Finally, Section IV concluded this paper.

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II. The Proposed Method

The suggested data hiding scheme is described in detail in this section. Fig. 1 depicts the embedding processes.

A. Data on images

Two opposing needs must be satisfied when constructing a data concealing method: (1) the hidden message must be undetectable, and (2) the secret message must be robust and challenging to remove. The payload should be included into the host medium's perceptually most important elements to create more reliable RDH techniques [11]. Several well-known research projects use HVS characteristics to build a more reliable payload. In addition to measuring and controlling marked perceptibility after embedding, the HVS model may also be applied while embedding. As a result, we selected the best locations for data embedding based on edge entropy and visual entropy, which are also used by [5].

A important technique for describing an image region is to quantify its texture content. A common statistic for characterizing the texture of a picture is the visual entropy. The standard mathematical formula for calculating visual entropy is shown in Eq. 1. According to Shannon's definition, an n-state system's entropy is

$$H_1 = -\sum_{k=1}^{n} p_k \log p_k \qquad (1)$$

p_k is the probability that the event will happen "k" with $0 \le p_k \le 1$ and $\sum_{k=1}^{n} p_k = 1$. The cooccurrence of the pixel values is not considered; The probability distribution of the pixel intensities is the only factor influencing the result. Therefore, the H_1 is thought of as an image-wide measurement.

The pixel intensities of a picture do, however, have some dependency. To determine the entropy, consider the dimensional relationship between the grayscale elements of certain pixels in an area. The edge of an image can be regarded as a crucial component of the picture since it can be identified by comparing the pixel values for local characteristics recorded in pairs of non-overlapping areas bordering the pixel. As a result, in addition to visual entropy, edge entropy of an image block is taken into account while picking embedding regions. Eq. 2 gives the definition of edge entropy.

$$H_2 = \sum_{k=1}^{n} p_k exp^{1-p_k} \qquad (2)$$

The key measures taken to combine block selection for data embedding with the HVS model are as follows: (1) In the first stage, a cover picture is separated into n non-overlapping blocks. Each block's edge and visual entropies are determined using equations (1) and (2), respectively. (2) Each block's two entropy measurements are then added up, and the values that result are arranged in ascending order according to their magnitude. The block with the lowest value is picked to insert the data until the number of selected blocks equals the size of the payload.

B. The embedding procedure

An adjustable scale factor was used to construct the process for embedding resilient RDH systems utilizing DCT. Fig. 1 depicts the block diagram of the embedding system used in this investigation.

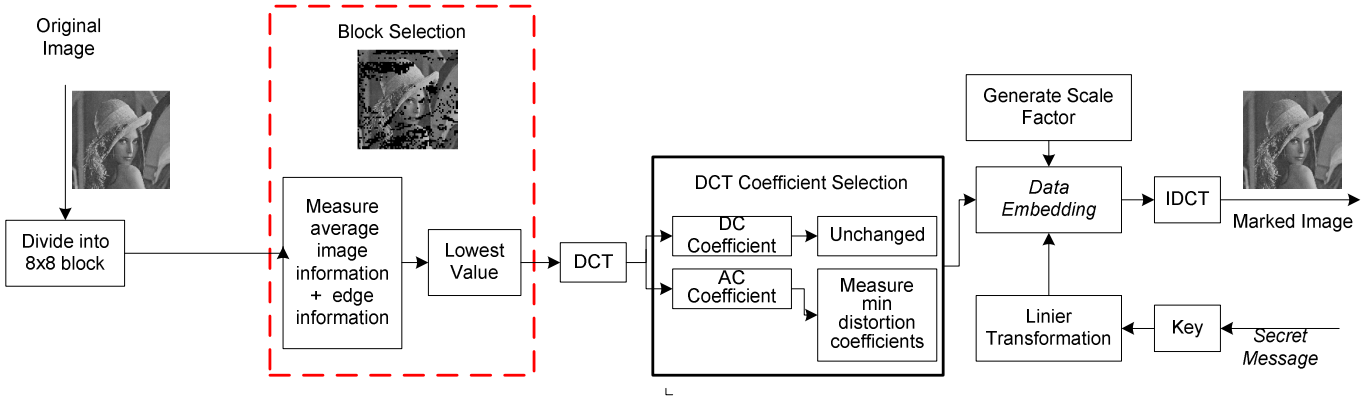


Fig. 1. The Proposed Embedding Procedure

Step 1: The cover picture is initially segmented into 8 x 8-pixel non-overlapping parts.

Step 2: Using the HVS characteristics as Eq. 1 and Eq. 2, choose the relevant blocks for embedding the data payload.

Step 3: To generate the DCT domain frequency bands, implement the DCT process to the selected blocks.

Step 4: Apply coefficient selection by considering the quantized DCT coefficient values' distribution properties, specifically by choosing the component with the least distortion as used by [12].

Assuming that a block's embedding capacity is T_k and its shifting capacity is U_k, the technique for choosing the insertion point in each block is then established. If a coefficient selection technique has a large insertion capacity but a modest displacement capacity, it is said to be

successful. The insertion capacity may be estimated by counting the coefficients "1" and "-1" in each, whereas the total displacement capacity can be computed by adding together all the coefficients that are not zero. is the outcome of each k-DCT block's transformation, and B is the quantizer's output, which is the quantized DCT coefficient on the k-block.

For the embedding of a secret message that considers the number of sub-channels, the effective frequency selection, F, where each pixel has the coordinates of the quantized AC coefficient that is the position of the sub-channel s, $s \in 1, 2, 3, \ldots 63$. The AC coefficient of embedding and shift capacity that produces the minimum distortion value is calculated through the effective frequency using Eq.3

$$F = \sum_{k=1}^{\frac{MxM}{64}} \frac{\left(\left(\frac{1}{2}T_k + U_k\right) \times MSE(B_k - A_k)\right)}{T_k} \quad (3)$$

Step 5: Generate Scale factor to represents the location of the best coefficients because of the experiment at intermediate frequencies. The scale factor is more than zero which used in [13].

Step 6: Data embedding is done by first randomizing the position of the secret message using a linear transformation. Before further processing, block mapping is performed A→B→C→D→⋯→A to encrypt secret data information. The feature intensity of block A will be attached to block B and Using the 1-D transformation technique developed in [7], the feature intensity of block B will be connected to block C, and so on to produce a one-to-one mapping series in this study using Eq. 4. The steps to get a random block mapping are as follows and the pseudo code for this mapping can be seen in algorithm 1.

$$B' = [f(B) = (K \times B) mod\ N] + 1 \quad (4)$$

Notation B, B' [1, N], K represents a private key, and N represents the total number of blocks in the image.

Algorithm 1. Random Block Mapping

INPUT: Block row B_b with index number b, $1 \le b \le N$, K_1

1 : **Procedure** Mapping series generation

2 : $B'_c \leftarrow [f(B_b) = (K_1 \times b) mod\ N] + 1$ ▷ K_1 is a primary number

3 : **End**

OUTPUT: Mapping block array B'_c with index number c

Step 7: Apply inverse DCT procedures to each of the chosen blocks will produce the marked image.

C. The extraction procedure

The following steps make up the data hiding extraction sequence:

Step 1: 8 × 8-pixel non-overlapping blocks are first created from the marked image.

Step 2: To identify the block in which the data is embedded, each block's visual and edge entropies are calculated.

Step 3: To obtain DCT domain frequency bands, apply DCT to the chosen blocks.

Step 4: The data payload is removed. A positive difference denotes the extraction of a bit 1, whereas a negative difference suggests the extraction of a bit 0. The recovered bit values are then used to produce the extracted bit.

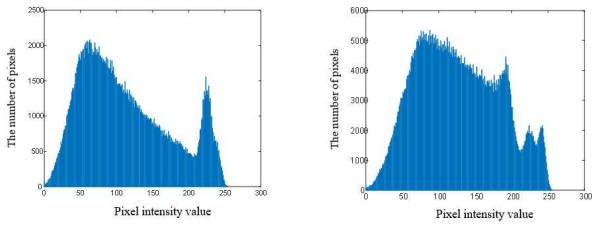
III. Experimental Results

Fig. 2 illustrates how the secret message bits are generated at random in all our experiments using the test images Lena, Lake, and Baboon. The average amount of message bits that may be placed in images. The suggested method's visual quality and file size were compared to three state-of-the-art techniques [3, 14] to determine its effectiveness. The visual quality of the marked JPEG image is evaluated using the PSNR, which is calculated between the marked JPEG image and the original JPEG image. A file's size is calculated in terms of bytes. Take note that QF=50 was used for all trials.

Fig. 3 displays an example of the outcomes of data embedding for Baboon image. Since the human eye perceives these findings as having the same appearance, histogram results are added for each image to help explain the variations. In this case, the marked picture of the initial Baboon image and the consequences of the input images are differentiated from one another.

(a) (b) (c)

Fig. 2. Test Images: a. Lena. b. F16 Airplane. c. Baboon



(a) (b)

Fig. 3. Baboon image histogram. (a) Original image. (b) Marked Image

A. Marked Image Quality

The PSNR is created in order to measure the visual quality of the original and annotated JPEG images. To address the visual appeal of the cover picture and preserve the key statistical characteristics of the image after embedding, researchers developed a distortion function [3]. It is shown in Table I. However, as the payload increases, it eventually converges to [14], despite the experiment showing that the suggested technique has the highest PSNR of all the

preceding research. This is because choosing the location of the AC coefficient has no effect when employing all of the AC coefficients for embedding.

The PSNR values for the three photos described in Table I are presented numerically. The recommended method performs the best based on the tables. Given that the AC coefficient selection approach involves only a tiny amount of additional calculation when compared to [14], the proposed method's results seem to be highly impressive.

B. File Size Preservation

It is obvious that while hiding JPEG data, the file size must be considered along with image quality. The proposed method typically results in a marked image with smaller file size than the methods that came before it (Table II). The tables show that the proposed method generally results in the shortest file size, but [14] appears to do so for some images. Bytes are used to determine a fisle's size. Due to the proposed method's use of the same HS-based embedding technique as the Huang et al method the discarded test images for the two approaches will be equivalent. The advantages of our bitstream expansion become more obvious at QF = 100, and the suggested technique consistently produces smaller enhanced file sizes than those of the Huang et al method. We have two main advantages: first, host quantified DCT coefficients are selected for embedding while taking frequencies into account; second, an improved block selection approach is employed.

TABLE I. COMPARISON OF PSNR (DB) WITH AN 8000 AND 16000 BITS PAYLOAD

Image	8000 bits			16000 bits		
	***Method* [14]**	***Method* [3]**	***Proposed***	***Method* [14]**	***Method* [3]**	***Proposed***
Lena	45.24	45.53	46.3	39.71	40.13	40.84
F16	44.24	45.03	45.8	38.26	39.15	39.87
Baboon	42.49	42.83	43.77	36.95	37.92	38.54

TABLE II. AN INCREASE IN FILE SIZE (IN BYTES) WITH 8000 BITS AND 16000 BITS PAYLOAD

Image	8000 bits			16000 bits		
	***Method* [14]**	***Method* [3]**	***Proposed***	***Method* [14]**	***Method* [3]**	***Proposed***
Lena	1305	1174	1222	2261	2149	2128
F16	1169	1130	1125	2220	2141	2136
Baboon	1286	1188	1546	2633	2575	2493

IV. CONCLUSION

This study offers a JPEG image reversible data hiding technique based on AC coefficient DCT and human visual characteristics. Prior to embedding, block order is carried out, and sections that are suitable for embedding are selected based on the distortion sum of the AC coefficients in a section to have the best coefficients for RDH. HVS features may be used to choose hidden information embedding zones that strike a good compromise between the resilience and quality of the tagged picture. The proposed technique has demonstrated imperceptibility in experimental outcomes. Future research will make use of additional perceptual features and more sophisticated perceptual models.

ACKNOWLEDGMENT

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