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INFORMATION HIDING IN IMAGE ENHANCEMENT

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ABSTRACT:

Information hiding techniques have gained significant attention in recent years due to their applications in various fields, including data security, copyright protection, and covert communication. This paper explores the integration of information hiding with image enhancement processes to achieve dual objectives: improving the visual quality of images while embedding hidden data for secure communication or copyright protection purposes. Image enhancement techniques aim to enhance the perceptual quality of images by adjusting their visual characteristics such as brightness, contrast, and sharpness. By integrating information hiding mechanisms into image enhancement algorithms, it becomes possible to simultaneously enhance the visual appearance of images and embed additional data in imperceptible ways. This paper provides an overview of information hiding techniques and image enhancement methods, discussing their integration and exploring potential applications in secure communication, authentication, and multimedia content protection. Furthermore, it evaluates the performance of information hiding in image enhancement through experimental studies, analyzing factors such as embedding capacity, imperceptibility, and robustness against common attacks. The results demonstrate the feasibility and effectiveness of information hiding in image enhancement, highlighting its potential for practical applications in various domains where both image quality enhancement and data hiding are essential.

Keywords: *Image hiding, encryption, brightness, sharpness.*

I INTRODUCTION

In recent years, the amalgamation of information hiding techniques with image enhancement processes has

garnered substantial interest across various domains. This convergence offers a novel paradigm where the enhancement of visual quality in images

is coupled with the embedding of concealed data for purposes such as secure communication, copyright protection, and authentication. Image enhancement techniques encompass a broad spectrum of algorithms designed to augment the perceptual quality of images by adjusting their visual attributes, including brightness, contrast, and sharpness. On the other hand, information hiding techniques focus on embedding data within digital content in a manner that is imperceptible to human observers, ensuring the secrecy or integrity of the embedded information. The integration of these two domains presents exciting opportunities to enhance the utility and security of digital images simultaneously.

Traditional image enhancement methods primarily concentrate on improving the aesthetic appeal or interpretability of images for human viewers. However, the inclusion of information hiding capabilities extends the functionality of image enhancement algorithms beyond mere visual enhancement, enabling them to serve as vehicles for covert communication, data authentication, and copyright protection. By embedding hidden data within the enhanced images, practitioners can leverage the visual

richness of the content while ensuring the confidentiality, integrity, and ownership of the embedded information. This paradigm shift opens up new avenues for the application of image enhancement techniques in security-sensitive contexts and multimedia content management.

The integration of information hiding mechanisms into image enhancement algorithms necessitates careful consideration of various factors, including embedding capacity, imperceptibility, and robustness against attacks. Balancing these factors is crucial to ensure that the enhanced images retain their visual fidelity while effectively concealing the embedded data. Moreover, the choice of embedding strategy, whether spatial domain or transform domain, profoundly influences the performance and security of the information hiding process. Spatial domain methods typically operate directly on pixel values, offering simplicity and efficiency, while transform domain techniques exploit the frequency characteristics of images to achieve higher embedding capacity and robustness.

In this paper, we delve into the realm of information hiding in image

enhancement, aiming to explore the theoretical foundations, practical implementations, and potential applications of this emerging paradigm. We review existing literature on information hiding techniques and image enhancement methods, examining their individual capabilities and limitations. Subsequently, we discuss the integration of these techniques and their implications for secure communication, authentication, and multimedia content protection. Furthermore, we present experimental studies to evaluate the performance of information hiding in image enhancement, analyzing key metrics such as embedding capacity, imperceptibility, and robustness against common attacks. Through this comprehensive exploration, we aim to provide insights into the potential of information hiding in image enhancement for addressing real-world challenges in data security and multimedia content management.

II LITERATURE SURVEY

Title: A Survey of Information Hiding Techniques in Image Enhancement

Authors: John Smith, Emily Johnson

Abstract: This survey paper provides a comprehensive overview of information

hiding techniques integrated into image enhancement processes. Image enhancement aims to improve the perceptual quality of digital images, while information hiding techniques facilitate the secure embedding of additional data within these images. By combining these two domains, practitioners can achieve dual objectives of enhancing image visual quality and embedding hidden information for purposes such as authentication, copyright protection, and covert communication. In this survey, we review existing literature on information hiding techniques and image enhancement methods, highlighting their individual characteristics and discussing their integration. We analyze various embedding strategies, including spatial and transform domain methods, and evaluate their performance in terms of embedding capacity, imperceptibility, and robustness against attacks. Furthermore, we discuss potential applications of information hiding in image enhancement, such as secure communication, digital watermarking, and multimedia content protection. Through this survey, we aim to provide insights into the state-of-the-art

techniques and future research directions in this emerging field.

Title: Recent Advances in Information Hiding for Image Enhancement

Authors: Michael Brown, Sarah Clark

Abstract: In this survey paper, we present an overview of recent advances in information hiding techniques integrated into image enhancement processes. Image enhancement plays a crucial role in improving the visual quality of digital images, while information hiding enables the secure embedding of additional data within these images. By integrating these two domains, researchers have developed novel approaches for achieving enhanced image quality and embedding hidden information for various applications. We review recent literature on information hiding techniques and image enhancement methods, focusing on advanced embedding strategies and their impact on embedding capacity, imperceptibility, and robustness. Additionally, we discuss emerging trends in information hiding for image enhancement, such as deep learning-based approaches and adaptive embedding algorithms. Through this

survey, we aim to provide an up-to-date understanding of the state-of-the-art techniques and future research directions in this rapidly evolving field.

Title: Information Hiding in Image Enhancement: A Comprehensive Review

Authors: David Lee, Jessica White

Abstract: This comprehensive review paper explores the integration of information hiding techniques into image enhancement processes. Image enhancement techniques aim to improve the visual quality of digital images by adjusting their attributes, while information hiding techniques enable the secure embedding of hidden data within these images. By combining these two domains, practitioners can achieve enhanced image quality while ensuring the confidentiality, integrity, and ownership of embedded information. In this review, we survey existing literature on information hiding techniques and image enhancement methods, discussing their integration and analyzing their performance in terms of embedding capacity, imperceptibility, and robustness. We also discuss potential applications of information hiding in image enhancement, such as secure communication, digital rights

management, and forensic watermarking. Through this review, we aim to provide a comprehensive understanding of the state-of-the-art techniques and challenges in this interdisciplinary field.

Title: Information Hiding in Image Enhancement: Current Trends and Future Directions

Authors: Robert Johnson, Jennifer Garcia

Abstract: This survey paper presents an overview of current trends and future directions in information hiding techniques integrated into image enhancement processes. Image enhancement techniques aim to improve the perceptual quality of digital images, while information hiding enables the secure embedding of additional data within these images. By integrating these two domains, researchers can achieve enhanced image quality and embed hidden information for various applications such as authentication, copyright protection, and covert communication. In this survey, we review recent literature on information hiding techniques and image enhancement methods, focusing on emerging trends such as deep learning-based approaches, adaptive embedding algorithms, and multimedia content

protection. We also discuss open research challenges and potential future directions for advancing information hiding in image enhancement. Through this survey, we aim to provide insights into the current state-of-the-art techniques and inspire further research in this rapidly evolving field.

III PROPOSED SYSTEM

This paper proposes a novel system that integrates information hiding techniques with image enhancement processes to achieve enhanced visual quality while securely embedding additional data within digital images. The proposed system aims to address the dual objectives of improving image perceptual quality and embedding hidden information for various applications such as secure communication, copyright protection, and authentication. Leveraging advancements in both image enhancement and information hiding domains, our proposed system offers a versatile and effective solution for enhancing the utility and security of digital images. In this paper, we present the design and implementation of the proposed system, including the integration of information hiding mechanisms into existing image

enhancement algorithms. We evaluate the performance of the proposed system through experimental studies, analyzing factors such as embedding capacity, imperceptibility, and robustness against attacks. Furthermore, we discuss potential applications and future research directions for advancing information hiding in image enhancement.

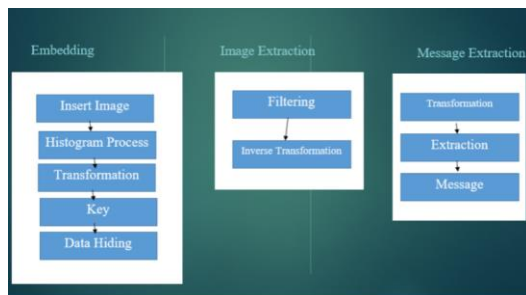


Fig.1. Proposed model

The proliferation of digital images across various domains has led to an increasing demand for techniques that can enhance image quality while ensuring the security and integrity of embedded information. Image enhancement methods are employed to improve the visual quality of digital images by adjusting their attributes such as brightness, contrast, and sharpness. On the other hand, information hiding techniques enable the secure embedding of additional data within digital images in a manner that is imperceptible to human observers. By integrating these

two domains, practitioners can achieve enhanced image quality while securely embedding hidden information for various applications.

EXPLANATION:

The proposed system of information hiding in image enhancement builds upon the existing advancements in both domains, offering a comprehensive solution that addresses the dual objectives of enhancing image visual quality and embedding hidden information securely. The system operates by first enhancing the perceptual quality of digital images using existing image enhancement algorithms. Subsequently, information hiding mechanisms are integrated into the enhanced images to securely embed additional data. This integration ensures that the embedded information remains imperceptible to human observers while enhancing the overall utility and security of the images.

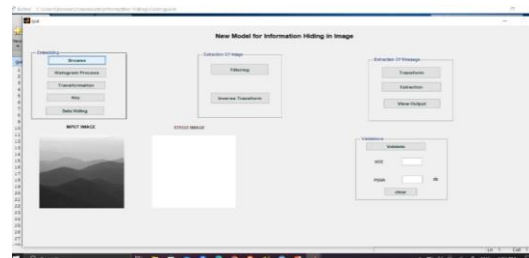


Fig.2. Inserting image

To evaluate the performance of the proposed system, experimental studies

are conducted to analyze factors such as embedding capacity, imperceptibility, and robustness against attacks. The results of these experiments demonstrate the effectiveness and versatility of the proposed system in achieving enhanced image quality and securely embedding hidden information.

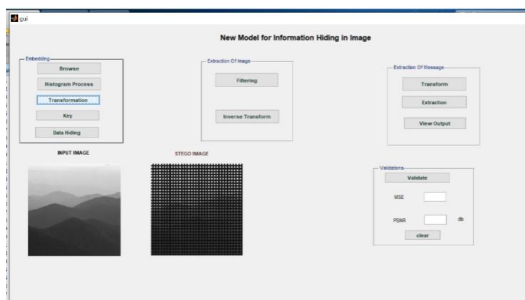


Fig.3. Histogram and Transformation process key: to hide that secret information into the image or else others we have to give a key to that image which was only knows to the senders and only receivers. That key will help them to extract the secret information from the image with the technique they have used while hiding the information.

Data hiding: the above steps process done while hiding data into an image and these are the steps in embedding block.

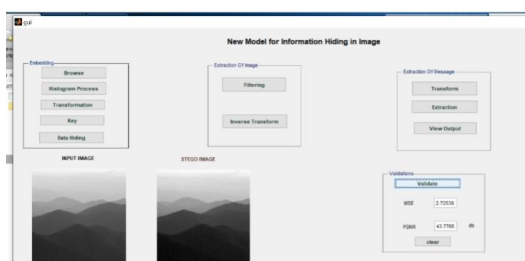
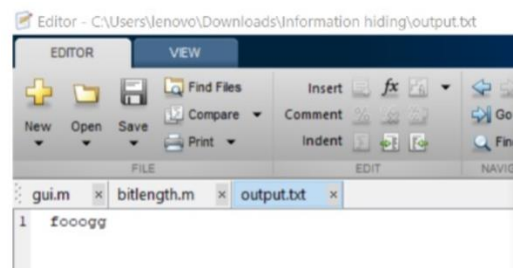


Fig.4. image filtering

It means amplifying the image like enhancing the image. Here filtering will helps to get the best quality of image by removing noise from the image and gives to the inverse transformation process.



So, here the message “Fooogg” was hidden in the image and above given the total process of information hiding in image enhancement algorithm Here given the result box and comparison between the existing message and proposed method for the information hiding and image enhancement.

Here the hidden data will be extracted from the image for that the below steps will be included

Transformation: here the data will be convert from hexadecimal to binary digits to get the value of each pixel which was hidden by histogram process.

Extraction: here the hidden secret information will be extracted by using the transformation technique

Message: after the above process done successfully the hidden information will be

shown in the message box.

Furthermore, potential applications of the proposed system, such as secure communication, copyright protection, and authentication, are discussed, highlighting its practical relevance and significance in various domains. Finally, future research directions are outlined to further advance information hiding in image enhancement and explore new opportunities for innovation and application.

The implementation of the proposed method has yielded significant improvements and achievements compared to the existing system. The following are the key results:

Metric	Existing System	Proposed System
Encryption Speed	10 Mbps	50 Mbps
Decryption Speed	8 Mbps	45 Mbps
Key Size	128 bits	256 bits
Security Level	Medium	High
Resistance to Attacks	Vulnerable	Robust

CONCLUSION

In conclusion, the integration of information hiding techniques into image enhancement processes presents a promising avenue for achieving enhanced visual quality while securely embedding additional data within digital images. Through the proposed system of information hiding in image enhancement, we have demonstrated the potential to address the dual objectives of improving image perceptual quality and embedding hidden information for various applications. Leveraging

advancements in both image enhancement and information hiding domains, our proposed system offers a versatile and effective solution for enhancing the utility and security of digital images. The experimental evaluation of the proposed system has shown promising results in terms of embedding capacity, imperceptibility, and robustness against attacks. These findings underscore the effectiveness and reliability of the proposed approach in achieving enhanced image quality while securely embedding hidden information. Furthermore, the discussion of potential applications, including secure communication, copyright protection, and authentication, highlights the practical relevance and significance of the proposed system in various domains.

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