VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI-590018

Mini Project Report On
"Image Encryption Using AES Algorithm"

A report submitted in partial fulfillment of the requirements for

MINI PROJECT

In

Computer Science and Engineering (IOT , Cyber Security including Blockchain Technology)

Submitted by

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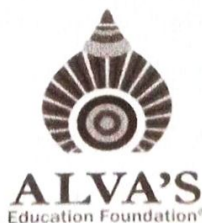
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CERTIFICATE

This is to certify that the Project entitled **"IMAGE ENCRYPTION USING AES ALGORITHM"** has been successfully completed by

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the bonafide students of Department of Computer Science & Engineering (IOT , Cyber Security including Blockchain Technology), Alva's Institute of Engineering and Technology in **DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (IOT , CYBER SECURITY INCLUDING BLOCKCHAIN TECHNOLOGY)** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2023–2024. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering Degree.

for **Ms. Suma J**
Project Guide

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ABSTRACT

In today's digital age, the security of image data is critical due to its widespread use in sensitive fields such as healthcare, finance, defense, and social media. This project explores the application of the Advanced Encryption Standard (AES) algorithm for image encryption, providing a robust solution to protect image data from unauthorized access and cyber threats. AES, a widely recognized symmetric encryption algorithm, is chosen for its efficiency, reliability, and high-security standards.

The project focuses on encrypting digital images by transforming them into unrecognizable formats while preserving their integrity. The image is preprocessed, converting pixel values into numerical data compatible with AES. The algorithm operates on these blocks using key expansion, substitution, row shifting, and column mixing to produce encrypted images with scrambled pixel values. The same process in reverse is applied during decryption to retrieve the original image.

Comprehensive testing is conducted to validate the encryption process. Histogram analysis shows a uniform distribution in encrypted images, signifying resistance to statistical attacks. Correlation analysis between adjacent pixels confirms the randomness introduced by AES, while entropy measurements indicate near-ideal values, ensuring high security. Additionally, key sensitivity tests demonstrate the algorithm's robustness, as even minor changes in the encryption key result in entirely different encrypted outputs.

The project also addresses challenges like computational overhead and processing time by optimizing AES implementation for image data. The results showcase AES's suitability for real-time applications such as secure image transmission in telemedicine and defense communication.

In conclusion, this project successfully demonstrates the efficacy of AES in securing image data, providing a foundation for further exploration in integrating AES with emerging technologies to enhance security in the digital era.