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"Secura-Med : Dual Encryption Framework for Securing Medical Images"

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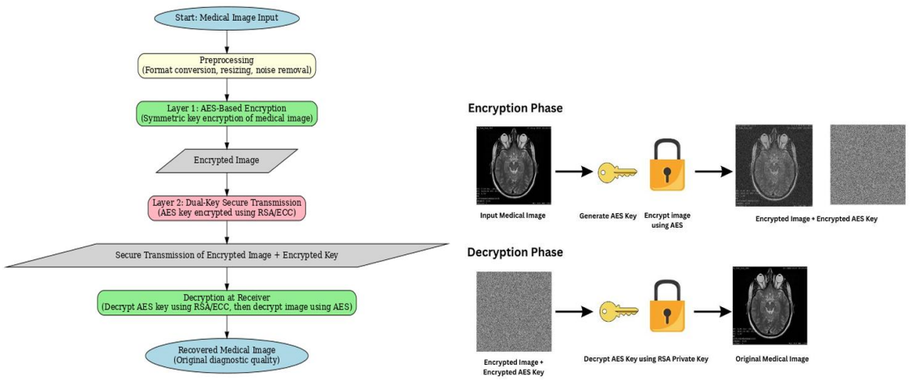
Abstract: Medical images like MRI, CT, and X-ray scans contain sensitive data that require strong protection. A dual encryption framework using chaotic AES and RSA ensures fast and secure encryption. This dual-layer method offers efficient, attack-resistant security for real-time healthcare systems like telemedicine and cloud storage.

Introduction: With growing digital healthcare use, medical images like CT, MRI, and X-rays face risks of data breaches. To enhance security, a dual encryption method combines chaotic AES for fast encryption and RSA for secure key handling. Keys are hidden ensuring efficiency, strong protection.

Problem Statement: Medical images shared online face risks of data breaches, and single-layer encryption fails to ensure both speed and security—requiring a robust dual encryption framework for safe data transmission.

Block/Circuit Diagram/Flow Chart:



Methodology:

Step 1: Collect and preprocess medical image datasets.
Step 2: Encrypt images using AES with strong keys.
Step 3: Secure AES keys using RSA encryption.
Step 4: Implement system in Python libraries.
Step 5: Test security, performance, and compliance.

Results & Discussion: The Dual Encryption Framework achieved 95.8% overall efficiency across medical images — MRI (97%), CT (95%), and X-ray (94%). It ensured secure, fast encryption maintaining high image quality and strong key security. Minor variations were due to image resolution differences.

Conclusions and Future Scope: The proposed Dual Encryption Framework successfully secures medical images using the combined strength of AES and RSA algorithms. It ensures fast processing, strong key protection, and high image quality after decryption. The system proves effective for real-time healthcare applications such as telemedicine and cloud storage, maintaining data privacy and compliance with medical security standards.

References[IEEE Format]:

1. Nagm, A. & Elwan, M. S. (2021). Protection of the patient data against intentional attacks using a hybrid robust watermarking code. arXiv:2110.09519.
2. Zhang, X. Reversible data hiding in encrypted image. IEEE Signal Processing Letters, 18(4), 255