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Digital Image Security on Elliptic Curve using Visual Cryptography

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In the modern digital landscape, images are integral to daily communication and operations, making their security a critical concern. While no encryption method can guarantee absolute security, some approaches offer significantly stronger protection than others. This paper presents a novel hybrid image encryption scheme that combines the strengths of Visual Cryptography (VC) and Elliptic Curve Cryptography (ECC). The proposed method begins by using Visual Cryptography to split a secret image into two distinct shares. One share functions as an encryption key, while the other is encrypted using ECC 128 bits curve parameters to produce a cipher image. Subsequently, both shares are merged into a single secured image file. The effectiveness of the encryption and decryption processes is rigorously evaluated through standard security analyses. Performance metrics such as the Number of Pixel Change Rate (NPCR), Unified Average Changing Intensity (UACI), histogram analysis, and processing speed are used to assess the scheme's robustness and efficiency.

Keywords: Digital Image, Visual Cryptography, Elliptic Curve Cryptography