Hyperchaotic Systems and Other Mathematical Constructs for Enhanced Image Cube Encryption

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Abstract. This research work introduces an encryption algorithm for image cubes, which is underpinned by hyperchaotic systems formulated from complex differential equations. The sensitivity to initial conditions, a fundamental aspect of chaos theory, has been expanded into the hyperchaotic domain to facilitate effective multidimensional encryption. The algorithm's complexity has been enhanced by the integration of Linear Feedback Shift Registers (LFSRs) and DNA coding sequences. Secure pseudorandom sequences are provided through the use of LFSRs, and additional cryptographic depth is introduced with DNA coding. This combination has resulted in a robust encryption mechanism that ensures the confidentiality of data and resilience against advanced computational threats. Superior performance in entropy, key sensitivity, and resistance to statistical attacks has been demonstrated by the proposed encryption approach, establishing its suitability for the protection of volumetric image data [1, 2].

Keywords: Chaos Theory; Cryptography; DNA Coding.

References

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