

基于新的组合混沌映射的图像加密算法

黄迎久¹，杜永兴²，石炜³

(1 内蒙古科技大学 工程训练中心, 内蒙古 包头 104010; 2 内蒙古科技大学 信息工程学院, 内蒙古 包头 014010; 3 内蒙古科技大学 机械工程学院, 内蒙古 包头 014010)

摘要: 文中根据污染动力系统定义, 将一维混沌映射 Logistic 和 Sine 重新组合为一个新的混沌映射, 通过单比特频率测试、游程测试以及离散傅里叶(谱)测试和 Lyapunov 指数等仿真测试, 表明新的组合混沌映射生成的序列值分布均匀、离散型强, 具有更为复杂的混沌特性; 将该混沌映射应用于图像加密算法中, 通过模拟测试, 加密图像的各项指标测试结果都非常接近于最佳期望值, 说明加密算法具有良好的抗攻击能力, 新构造的组合混沌映射在信息安全领域具有良好的应用前景.

关键词: 组合混沌映射; Logistic 映射; Sine 映射; 图像加密

Image encryption algorithm based on a

novel combinatorial chaotic mapping

HUANG Ying-jiu¹, DU Yong-xing², SHI Wei³

(1 Engineering & training center, Inner Mongolia University of Science & Technology, Baotou 014010, China;

2 College of Information Engineering, Inner Mongolia University of Science & Technology, Baotou 014010, China;

3 College of Mechanical Engineering, Inner Mongolia University of Science & Technology, Baotou 014010, China)

Abstract: According to the definition of polluting dynamical system, the one-dimensional chaotic mapping Logistic and Sine are reconstituted into a new chaotic mapping. Through single-bit frequency test, run-length test, discrete Fourier (spectrum) test and Lyapunov exponent simulation tests, it is shown that the sequence values generated by the new combined chaotic mapping are uniformly distributed and discrete. The chaotic mapping is applied to the image encryption algorithm. Through simulation test, the test results of each index of the encrypted image are very close to the best expected value, which shows that the encryption algorithm has a good anti-attack ability, and the new combined chaotic mapping has a good performance in the field of information security. Good application prospects.

Key words: combined chaotic map; Logistic mapping; Sine mapping; image encryption

作者简介:

黄迎久 男, (1969-), 副教授. 研究方向为非线性动力系统、计算机图像. E-mail: hyingiu@163.com.

杜永兴 男, (1980-), 博士, 副教授. 研究方向为微波技术与天线及数字信号处理.

石炜 男, (1971-), 博士, 副教授. 研究方向为机器视觉、机械诊断.