基于细胞神经网络超混沌特性的图像加密算法

魏　慧　1,2　，李国东　1,2

（1 新疆财经大学 统计与数据科学学院, 新疆 乌鲁木齐 830012；

2 新疆财经大学 新疆社会经济统计研究中心, 新疆 乌鲁木齐 830012)

摘　要： 针对图像传输安全问题，本文提出基于细胞神经网络 CNN 超混沌的特性结合一般形式的三次函数鲁棒映射和高维 Lorenz 系统对图像采取双扩散—置乱的加密操作.仿真结果表明本文设计的算法具有优良的加密效果，且密钥空间大、密文敏感性强、信息熵值 7.9994接近理想值，能有效抵抗统计攻击等.具有一定的运用价值.

关键词： CNN 超混沌；高维 Lorenz 系统；图像加密；三次函数鲁棒映射

Image encryption algorithm based on hyperchaotic characteristics of cellular neural networks

WEI Hui　1,2　, LI Guo-dong　1,2

（1 College of Statistics and Data Science, Xinjiang University of Finance and Economics, Urumqi 830012, China；2 Center for Social and Economic Statistics, Xinjiang University of Finance and Economics, Urumqi 830012,China）

Abstract： Images have become the main media active in the information age. There is no doubt about the importance of image encryption technology. In order to solve the problem of image transmission security, the proposed algorithm is based on the hyper chaotic features of cellular neural network CNN combined with the general form of cubic function robust mapping and high-dimensional Lorenz system to adopt double diffusion-scrambling encryption operation on images. The simulation results show that the algorithm designed in this paper has excellent encryption effect. Its key space is large, ciphertext sensitivity is strong, information entropy value is 7.9994 close to ideal value, and it can effectively resist statistical attacks. The algorithm in this paper has high security and certain application value.

Key words： CNN hyperchaos；high dimensional lorenz system；image encryption；robust mapping of cubic function

作者简介：

魏　慧 女，(1996-)，硕士研究生.研究方向为数据挖掘与图像处理.

李国东(通讯作者) 男，(1972-)，博士，教授，硕士生导师.研究方向为数据挖掘与图像处理.E-mail:lgdzhy@126.com.