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复数离散Hopfield网络盲检测64QAM信号

张昀*①② 张志涌②*

①(南京邮电大学通信与信息工程学院 南京 210003) ②(南京邮电大学自动化学院 南京 210003)

Blind Detection of 64QAM Signals with a Complex Discrete Hopfield Network

Zhang Yun①② Zhang Zhi-yong②*

①(College of Telecommunications and Information Engineering, Nanjing University of Posts and Telecommunications, Nanjing 210003, China)
②(College of Automation, Nanjing University of Posts and Telecommunications, Nanjing 210003, China)

摘要 针对复数多电平QAM信号的盲检测问题，该文提出了一个新的复数离散多电平Hopfield神经网络。该网络的实部、虚部各含一个多电平离散激励实函数。该文分析了经典两电平离散Hopfield神经网络能量函数的局限性，构造了一个新的复数多电平神经网的能量函数，并用此能量函数讨论了神经网的稳定性。当该神经网的权矩阵借助接收数据补投影算子构成时，该复数离散多电平Hopfield网络可有效地求解带整数约束的二次规划问题，从而实现QAM信号盲检测。仿真试验表明：该算法所需接收数据较短，就可到达全局真平衡点，计算难度大大降低，具有良好的快速性。

关键词： 信号处理 复数离散Hopfield神经网络 盲检测 QAM信号

Abstract： A novel algorithm based on Complex Discrete Hopfield Neural Network (CDHNN) is proposed to detect blindly multi-valued QAM signals in this paper. A multi-valued discrete activation function is constructed in both of the real part and imaginary part of CDHNN. Limitation for the energy function of the classic binary-valued discrete Hopfield neural network is analyzed in this paper and a new energy function for CDHNN is also constructed. Further more the stability for multi-valued CDHNN is also proved in the paper. While the weighted matrix of CDHNN is constructed by the complementary projection operator of received signals, the problem of quadratic optimization with integer constraints can successfully solved with the CDHNN, and the QAM signals are blindly detected. Simulation results show that the algorithm reaches the real equilibrium points with shorter received signals and show high speed to detect blindly multi-valued signals.

Keywords： Signal processing Complex Discrete Hopfield Neural Network (CDHNN) Blind detection QAM signal

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通讯作者: 张昀 Email: y021001@njupt.edu.cn

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