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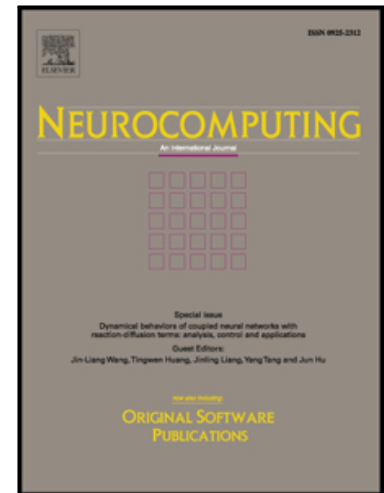
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# Steganalysis of Joint Codeword Quantization Index Modulation Steganography Based on Codeword Bayesian Network

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## Abstract

Quantization Index Modulation Steganography (QIMS) is an important category of steganography methods for low-bit-rate compressed speech. Early QIMS utilized independent codewords for embedding. Recently, new Joint Codeword QIMS (JC-QIMS) methods have been proposed. Such methods have higher embedding efficiency and steganography security than Independent Codeword QIMS (IC-QIMS) methods. Current steganalysis methods can detect IC-QIMS effectively, but the detection accuracy for JC-QIMS is unsatisfactory, especially at low embedding rates. To improve this accuracy, a novel steganalysis method based on a newly developed Codeword Bayesian Network (CBN) is proposed. The CBN is constructed based on the probability distribution and the steganography-sensitive transition relationships of codewords. The network parameters are learned by utilizing the Dirichlet distribution as the prior distribution. Extensive experiments are conducted with multiple embedding rates, multiple speech lengths and different network complexities. The experimental results demonstrate that the proposed method outperforms the state-of-the-art QIM steganalysis method against JC-QIMS. In particular, our algorithm achieves good detection results even at relatively low embedding rates. Moreover, it is proved that our method is also effective for the steganalysis of IC-QIMS.

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