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Random neural network decoder for error correcting codes

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Abstract:

This paper presents a novel random neural network (RNN) based soft decision decoder for block codes. One advantage of the proposed decoder over conventional serial algebraic decoders is that noisy codewords arriving in non-binary form can be corrected without first rounding them to binary form. Another advantage is that the RNN, after being trained, has a simple hardware realization that is ideal for implementation as a VLSI chip. The proposed decoder is tested on Hamming linear codes and the results are compared with that of the optimum soft decision decoder and the conventional hard decision decoder. Extensive simulations show that the RNN based decoder reduces the error probability to zero in the range of the error correcting capacity of the used code. On the other hand, it is much better than the hard decision decoder for codewords corrupted with more errors.

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