GEDU501: Scientific Writing **POSLEC**

Name: Date:

Methods Reading Worksheet

Identifying Moves in Your Reading

Instructions

1. *Insert information from one research article read in the **Article Information** table.*
2. *Using the appropriate sections from one of the research articles you are reading, copy and paste 1~2 example sentences that perform the move described in the **Reading Table.***
3. *If the information is not available, put N/A (N/A or not applicable) in the example space. i.e. if "we" or "our" is not used in the methods you are reading, you can place N/A in that example space in the table.*

Article Information

Title	Pruning Neural Belief Propagation Decoders
Author (s)	Andreas Buchberger, Christian Hager, Henry D. Pfister, Laurent Schmalen, Alexandre Graell i Amat
Journal Title	2020 IEEE International Symposium on Information Theory (ISIT)
Year of Publishing	2020
Volume/Issue	
Pages	p. 5
Keywords / Search Terms	Pruning, Belief Propagation Algorithm, Decoder

Methods Reading Table

Methods & Experimentation (after background/related works)	
Moves	**Example from your article**
Review of research goals or Overview of procedure	In this paper, we introduce a method to tailor an overcomplete parity-check matrix to (neural) BP decoding using machine learning.
Headings for Methods / Experimentation Sections	1) In this paper, we introduce a pruning-based approach to selecting the best parity-check equations for each iteration of the BP decoder for short linear block codes. 2) Our pruning-based approach starts with a large overcomplete parity-check matrix under WBP decoding.
Reference to prior research methods	This fact has been exploited by using redundant parity-check matrices [5]-[9]. Kothiyal et al. combined reliability-based decoding (e.g., ordered-statistics decoding) and BP decoding in a scheme where the parity-check matrix is adapted to the outcome of the reliability based decoding at the expense of high complexity [6].
Explaining quality or care of method	We apply our method to different linear codes, BCH (63,45), BCH(63,36), BCH(127, 64) and BCH(127,99). Training was conducted using stochastic gradient descent with mini=batches. The training data is created by transmitting the zero codeword through an AWGN channel with varying SNRs ranging from 1dB to 8dB.
Limitations (boundaries of research) or difficulties in procedure	Not mention
Grammatical Features	**Example from your article**
Past Passive	As a loss function, the bitwise cross-entropy between the transmitted codeword and the VN output LLR of the final VN layer was used in [1], [2].
Reason for use	To explian that 'bitwise cross-entropy' was used in other researches.
Present Passiv (현재 수동)	While WBP decoding improves upon conventional BP decoding, its performance is still limited by the underlying parity-check matrix.
Reason for use	To explain that new method(WBP decoding) has not solved the limitation even though it has been applied.
Active	To this end, we prune a large overcomplete parity check matrix and allow it to consist of different parity-check equations in each iteration.
Reason for use	Explain the core(purpose) of a paper
Transition phrase used	1. After the optimization has converged, we find the index and the iteration of the lowest CN weight and set it to zero, i.e., we prune the corresponding parity check equation from W. 2. Also, a rate 0.5-LDPC code of length 128 performs within 1.5 dB of the ML performance, giving an improvement of 0.5dB over conventional BP.

Context phrase used	We consider the weights in the Tanner graph as an indication of the importance of the connected check nodes (CNs) to decoding and use them to prune unimportant CNs.
Additional features	**Example from your article**
Reference to an existing model or equation	This fact has been exploited by using redundant parity-check matrices [5]–[9]. Kothiyal et al. combined reliability-based decoding (e.g., ordered-statistics decoding) and BP decoding in a scheme where the parity check matrix is adapted to the outcome of the reliability based decoding at the expense of high complexity [5].
Use of I / my or We / our	We obtain significant performance gains while keeping the complexity practical.