Name: kimheeseo   Date: 2022.09.22

Introduction Reading Worksheet
Identifying Moves as a Group

Instructions

1. *Decide on key terms to search for an article in Google Scholar. Pick an article that has a clear Introduction and or background section. (You can use article you already read)*
2. *Verify your paper choice with the professor.*
3. *Insert information from one research article you will read in the **Article Information** table.*
4. *Using the introduction, background and/or a related 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.***
5. *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 introduction you are reading, you can place N/A in that example space in the table.*
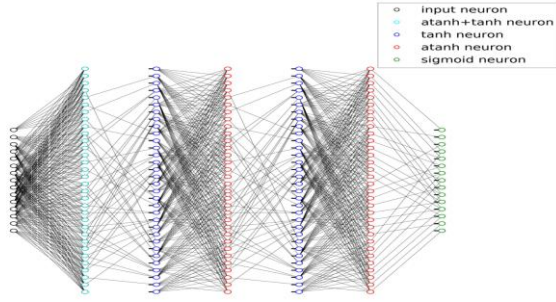
Article Information

Title	Learning to decode linear codes using deep learning
Author (s)	Eliya Nachmani; Yair Be'ery; David Burshtein
Journal Title	2016 54th Annual Allerton Conference on Communication, Control, and Computing (Allerton)
Year of Publishing	13 February 2017
Volume/Issue	
Pages	p.6
Keywords / Search Terms	weight, deep learning, belief propagation algorithm

Copy and paste the abstract right below here:

Introduction Reading Table

Introduction

Content	Example from your article
Importance of this research area	This paper is very important. It is first time, to apply deep learning to the field (channel coding).
Reference/citation in a sentence about prior research	Since this paper is the first to apply deep learning, there is no previous paper & research.
Showing a research knowledge gap	The picture of the structure of the neural network is wrong.

●Lack of info ●Incorrect prior research ●Unclear knowledge	 ○ input neuron ○ atanh+tanh neuron ○ tanh neuron ○ atanh neuron ○ sigmoid neuron
Purpose or aim of this research	implementation of deep learning techniques for the design of improved decoders (source sentence : We regard this work as a **first step** in the implementation of deep learning techniques for the design of improved decoders.)
Sentence that outlines paper's sections (e.g. methodology, results, discussion, conclusion)	A novel deep learning method for improving the belief propagation algorithm is proposed. : methodology.
Grammar / Tense	Example from your article
Use of I / my or We / our	Hence we are required to train the decoder using a huge collection of codewords from the code, and due to the exponential nature of the problem, this is infeasible, e.g., for a BCH(63,45) code we need a dataset of 2^{45} codewords.
Present Simple Tense	A well-known family of linear error correcting codes are the low-density parity-check (LDPC) codes [10].
Reason for verb tense use	Because it explains the definition about LDPC.
Present Perfect Tense	In recent years deep learning methods have demonstrated significant improvements in various tasks.
Reason for verb tense use	because deep learning is still being used in communication research's field.
Past Tense	*Additionally, deep learning combined with reinforcement learning techniques was able to beat human champions in challenging games such as Go [4].*
Reason for verb tense use	*Because beating AlphaGo was a long time ago.* (alpha go vs human's game(match) was a few years ago.)
Additional features	Example from your article
Citation and reference of prior research 1	Recall that this is a fundamental property of message passing algorithms [16].
Citation and reference of prior research 2	Note that Hinton [20] recommends to initialize the weights with normal distribution. In Figures 8 and 9 we plot the weights of the last hidden layer.
Vocabulary	From your article (erase the examples and put yours here)
Adjective/ descriptive	renowned [famous, widely used]

phrase #1	
Source sentence	The **renowned** BP decoder [10], [16] can be constructed from the Tanner graph, which is a graphical representation of some parity check matrix that describes the code.
Adjective/ descriptive phrase #2	**alternative** [selective]
Source sentence	Our **alternative** representation is a trellis in which the nodes in the hidden layers correspond to edges in the Tanner graph.
Noun #1	**Motivation** [enthusiasm for doing something]
Source sentence	The **motivation** behind the new proposed parameterized decoder is that by setting the weights properly, one can compensate for small cycles in the Tanner graph that represents the code.
Noun #2	**Implementation** [the act of starting to use a plan or system]
Source sentence	We regard this work as a first step in the **implementation** of deep learning techniques for the design of improved decoders.
Adverbs #1	**simultaneously** [happening or being done at exactly the same time]
Source sentence	Another notable property of the neural network decoder is that we learn the channel and the linear code **simultaneously**.
Adverbs #2	**Partially** [not completely] ↔ entirely
Source sentence	We believe that the BER improvement was achieved by properly weighting the messages, such that the effect of small cycles in the Tanner graph was **partially** compensated.
Verb #1	**Emphasize** [to show that something is very important or worth giving attention to]
Source sentence	It should be **emphasized** that the parity check matrices that we worked with were obtained from [19].
Verb #2	**Investigate** [to examine a crime, problem, statement, etc. carefully, especially to discover the truth]
Source sentence	Furthermore, we plan to **investigate** the connection between the parity check matrix and the deep neural network decoding capabilities.