Spring 2019 ECE 6521 Error Control Coding Homework 6

Assign date: 3/20/2019 Due date: 3/27/2019

1. Write a log-domain message passing decoder for LDPC code following the approach described on slides 51-52 of Dr. Costello's notes. Verify the correctness of your decoding program using the Example given in slide 53.

Please make sure that your decoder is general enough to decode any regular/irregular LDPC code, provided that a tanner graph corresponding to the LDPC code is given to you. Specifically, please follow the implementation suggested below:

var-degree[var]: This array contains the degree of each variable node.

node-degree[node]: This array contains the degree of each check node.

br[t]: This array contains the LLR on each edge/branch. The size of the array is the total number of edges on the tanner graph.

t=var-br[var][j]: t is the index of the j-th edge that var is connected to. When updating the message at the j-th edge of a variable node, you need to find t and then update br[t].

t=node-br[node][j]: t is the index of the j-th edge that node is connected to. When updating the message at the j-th edge of a check node, you need to find t and then update br[t].

Note that we can just keep updating or reuse br[t]. It is not necessary to distinguish messages going from variable node to check node, or from check node to variable node.

To test your decoder program, you can initialize var-degree[var], node-degree[node], var-br[var][j], node-br[node][j] based on the tanner graph given on slide 35, and then run your decoder to confirm that you obtain the same answer as shown on slide 53.