US 20220368349A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2022/0368349 A1**

Luo et al. (43) **Pub. Date: Nov. 17, 2022**

(54) **DECODERS AND SYSTEMS FOR DECODING ENCODED DATA USING NEURAL NETWORKS**

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(21) Appl. No.: **17/302,226**

(22) Filed: **Apr. 27, 2021**

Publication Classification

(51) **Int. Cl.**

H03M 13/01	(2006.01)
H03M 13/13	(2006.01)
H03M 13/11	(2006.01)
G06N 3/08	(2006.01)
G06N 3/04	(2006.01)

(52) **U.S. Cl.**

CPC ***H03M 13/01*** (2013.01); ***H03M 13/13*** (2013.01); ***H03M 13/1148*** (2013.01); ***H03M 13/1105*** (2013.01); ***G06N 3/08*** (2013.01); ***G06N 3/049*** (2013.01)

(57) **ABSTRACT**

Examples described herein utilize multi-layer neural networks, such as multi-layer recurrent neural networks to estimate message probability compute data based on encoded data (e.g., data encoded using one or more encoding techniques). The neural networks and/or recurrent neural networks may have nonlinear mapping and distributed processing capabilities which may be advantageous in many systems employing a neural network or recurrent neural network to estimate message probability compute data for a message probability compute (MPC) decoder. In this manner, neural networks or recurrent neural networks described herein may be used to implement aspects of error correction coding (ECC) decoders, e.g., an MPC decoder that iteratively decodes encoded data.