~~BLOCK-WISE CONTENT-ADAPTIVE ONLINE TRAINING IN NEURAL IMAGE COMPRESSION~~METHOD AND APPARATUS FOR VIDEO DECODING, AND STORAGE MEDIUM

INCORPORATION BY REFERENCE

[0001] This present application claims the benefit of priority to U.S. Patent Application No. 17/729,978, “BLOCK-WISE CONTENT-ADAPTIVE ONLINE TRAINING IN NEURAL IMAGE” filed on April 26, 2022, which claims the benefit of priority to U.S. Provisional Application No. 63/182,366, "Block-wise Content-Adaptive Online Training in Neural Image Compression" filed on April 30, 2021. ~~The disclosures of the prior applications are hereby incorporated by reference in their entirety.~~

TECHNICAL FIELD

[0002] The present disclosure describes embodiments generally related to video coding.

BACKGROUND

[0003] The background description provided herein is for the purpose of generally presenting the context of the disclosure. Work of the presently named inventors, to the extent the work is described in this background section, as well as aspects of the description that may not otherwise qualify as prior art at the time of filing, are neither expressly nor impliedly admitted as prior art against the present disclosure.

[0004] Video coding and decoding can be performed using inter-picture prediction with motion compensation. Uncompressed digital image and/or video can include a series of pictures, each picture having a spatial dimension of, for example, 1920 x 1080 luminance samples and associated chrominance samples. The series of pictures can have a fixed or variable picture rate (informally also known as frame rate), of, for example 60 pictures per second or 60 Hz. Uncompressed image and/or video has specific bitrate requirements. For example, 1080p60 4:2:0 video at 8 bit per sample (1920x1080 luminance sample resolution at 60 Hz frame rate) requires close to 1.5 Gbit/s bandwidth. An hour of such video requires more than 600 GBytes of storage space.

[0005] One purpose of video coding and decoding can be the reduction of redundancy in the input image and/or video signal, through compression. Compression can help reduce the aforementioned bandwidth and/or storage space requirements, in some cases by two orders of magnitude or more. Although the descriptions herein use video encoding/decoding as illustrative examples, the same techniques can be applied to image encoding/decoding in similar fashion without departing from the spirit of the present disclosure. Both lossless

GSM: Global System for Mobile communications

LTE: Long-Term Evolution

CANBus: Controller Area Network Bus

USB: Universal Serial Bus

PCI: Peripheral Component Interconnect

FPGA: Field Programmable Gate Areas

SSD: solid-state drive

IC: Integrated Circuit

CU: Coding Unit

NIC: Neural Image Compression

R-D: Rate-Distortion

E2E: End to End

ANN: Artificial Neural Network

DNN: Deep Neural Network

CNN: Convolution Neural Network

[0274] While this disclosure has described several exemplary embodiments, there are alterations, permutations, and various substitute equivalents, which fall within the scope of the disclosure. ~~It will thus be appreciated that those skilled in the art will be able to devise numerous systems and methods which, although not explicitly shown or described herein, embody the principles of the disclosure and are thus within the spirit and scope thereof.~~

WHAT IS CLAIMED IS:

1. A method for video decoding in a video decoder, comprising:

decoding first neural network update information in a coded bitstream for a first neural network in the video decoder, the first neural network being configured with first pretrained parameters, the first neural network update information corresponding to a first block in an image to be reconstructed and indicating a first replacement parameter corresponding to a first pretrained parameter in the first pretrained parameters (S2010);

updating the first neural network in the video decoder based on the first replacement parameter (S2030); and

decoding the first block based on the updated first neural network for the first block (S2040).

2. The method of claim 1, wherein

the first neural network update information further indicates one or more replacement parameters for one or more remaining neural networks in the video decoder, and

the updating further includes updating the one or more remaining neural networks based on the one or more replacement parameters.

3. The method of claim 1, further comprising:

decoding second neural network update information in the coded bitstream for a second neural network in the video decoder, the second neural network being configured with second pretrained parameters, the second neural network update information corresponding to a second block in the image to be reconstructed and indicating a second replacement parameter corresponding to a second pretrained parameter in the second pretrained parameters, the second neural network being different from the first neural network;

updating the second neural network in the video decoder based on the second replacement parameter; and

decoding the second block based on the updated second neural network for the second block.

4. The method of claim 3, wherein

the first pretrained parameter is a one of a pretrained weight coefficient and a pretrained bias term.

5. The method of claim 4, wherein

the second pretrained parameter is another one of the pretrained weight coefficient and the pretrained bias term.

6. The method of claim 1, further comprising:

decoding a second block in the coded bitstream based on the updated first neural network for the first block.

7. The method of claim 1, wherein

the first neural network update information indicates a difference between the first replacement parameter and the first pretrained parameter, and

the method further includes determining the first replacement parameter according to a sum of the difference and the first pretrained parameter.

8. The method of claim 3, wherein

the decoding the first neural network update information includes decoding the first neural network update information based on one of a variation of a Lempel–Ziv–Markov chain algorithm (LZMA2) and a bzip2 algorithm.

9. The method of claim 8, wherein

the decoding the second neural network update information includes decoding the second neural network update information based on another one of the LZMA2 and the bzip2 algorithm.

10. An apparatus for video decoding, comprising

processing circuitry configured to:

decode first neural network update information in a coded bitstream for a first neural network in a video decoder, the first neural network being configured with first pretrained parameters, the first neural network update information corresponding to a

first block in an image to be reconstructed and indicating a first replacement parameter corresponding to a first pretrained parameter in the first pretrained parameters;

update the first neural network in the video decoder based on the first replacement parameter; and

decode the first block based on the updated first neural network for the first block.

11. The apparatus of claim 10, wherein

the first neural network update information further indicates one or more replacement parameters for one or more remaining neural networks in the video decoder, and

the processing circuitry is configured to update the one or more remaining neural networks based on the one or more replacement parameters.

12. The apparatus of claim 10, wherein the processing circuitry is configured to:

decode second neural network update information in the coded bitstream for a second neural network in the video decoder, the second neural network being configured with second pretrained parameters, the second neural network update information corresponding to a second block in the image to be reconstructed and indicating a second replacement parameter corresponding to a second pretrained parameter in the second pretrained parameters, the second neural network being different from the first neural network;

update the second neural network in the video decoder based on the second replacement parameter; and

decode the second block based on the updated second neural network for the second block.

~~13. The apparatus of claim 12, wherein~~

~~the first pretrained parameter is a one of a pretrained weight coefficient and a pretrained bias term.~~

~~14. The apparatus of claim 13, wherein~~

~~the second pretrained parameter is another one of the pretrained weight coefficient and the pretrained bias term.~~

~~15.~~13. The apparatus of claim 10, wherein the processing circuitry is configured to:

decode a second block in the coded bitstream based on the updated first neural network for the first block.

~~16.~~14. The apparatus of claim 10, wherein

the first neural network update information indicates a difference between the first replacement parameter and the first pretrained parameter, and

the processing circuitry is configured to determine the first replacement parameter according to a sum of the difference and the first pretrained parameter.

~~17. The apparatus of claim 12, wherein the processing circuitry is configured to:~~

~~decode the first neural network update information based on one of a variation of a Lempel–Ziv–Markov chain algorithm (LZMA2) and a bzip2 algorithm.~~

~~18. The apparatus of claim 17, wherein the processing circuitry is configured to:~~

~~decode the second neural network update information based on another one of the LZMA2 and the bzip2 algorithm.~~

~~19.~~ 15. A non-transitory computer-readable storage medium storing a program executable by at least one processor to perform the operations of the method according to any one of claims 1 to 9~~:~~.

~~decoding first neural network update information in a coded bitstream for a first neural network in a video decoder, the first neural network being configured with first pretrained parameters, the first neural network update information corresponding to a first block in an image to be reconstructed and indicating a first replacement parameter corresponding to a first pretrained parameter in the first pretrained parameters;~~

~~updating the first neural network in the video decoder based on the first replacement parameter; and~~

~~decoding the first block based on the updated first neural network for the first block.~~

~~20. The non-transitory computer-readable storage medium of claim 19, wherein~~

~~the first neural network update information further indicates one or more replacement parameters for one or more remaining neural networks in the video decoder, and~~

~~the program executable by the at least one processor performs updating the one or more remaining neural networks based on the one or more replacement parameters.~~