CLAIMS

What is claimed is:

1. An image encoding method, comprising:

obtaining a to-be-processed first image feature;

performing non-linear transformation processing on the first image feature to obtain a processed image feature, wherein the non-linear transformation processing sequentially comprises a first non-linear operation, convolution processing, and an element-wise multiplication operation; and

performing encoding based on the processed image feature to obtain a bitstream.

2. The method according to claim 1, wherein the performing non-linear transformation processing on the first image feature to obtain a processed image feature comprises:

performing the first non-linear operation on each feature value in the first image feature to obtain a second image feature;

performing the convolution processing on the second image feature to obtain a third image feature, wherein a plurality of feature values in the third image feature correspond to a plurality of feature values in the first image feature; and

performing the element-wise multiplication operation on the plurality of corresponding feature values in the first image feature and the third image feature to obtain the processed image feature.

3. The method according to claim 1, wherein the non-linear transformation processing further comprises an element-wise addition operation after the element-wise multiplication operation.

4. The method according to claim 3, wherein the performing non-linear transformation processing on the first image feature to obtain a processed image feature comprises:

performing the first non-linear operation on each feature value in the first image feature to obtain a second image feature;

performing the convolution processing on the second image feature to obtain a third image feature, wherein a plurality of feature values in the third image feature correspond to a plurality of feature values in the first image feature;

performing the element-wise multiplication operation on the plurality of corresponding feature values in the first image feature and the third image feature to obtain a fourth image feature, wherein a plurality of feature values in the fourth image feature correspond to the plurality of feature values in the first image feature; and

performing the element-wise addition operation on the plurality of corresponding feature values in the first image feature and the fourth image feature to obtain the processed image feature.

5. The method according to any one of claims 1 to 4, wherein the first non-linear operation comprises a rectified linear unit series, Sigmoid, Tanh, or piecewise linear mapping.

6. The method according to any one of claims 1 to 5, wherein the method further comprises:

constructing a non-linear transformation unit in a training phase, wherein the non-linear transformation unit in the training phase comprises a first non-linear operation layer, a convolution processing layer, an element-wise multiplication operation layer, and an element-wise addition operation layer; and

performing training based on pre-obtained training data to obtain a trained non-linear transformation unit, wherein the trained non-linear transformation unit is used to implement the non-linear transformation processing.

7. An image decoding method, comprising:

obtaining a to-be-processed first image feature;

performing non-linear transformation processing on the first image feature to obtain a processed image feature, wherein the non-linear transformation processing sequentially comprises a first non-linear operation, convolution processing, and an element-wise multiplication operation; and

obtaining a reconstructed image based on the processed image feature.

8. The method according to claim 7, wherein the performing non-linear transformation processing on the first image feature to obtain a processed image feature comprises:

performing the first non-linear operation on each feature value in the first image feature to obtain a second image feature;

performing the convolution processing on the second image feature to obtain a third image feature, wherein a plurality of feature values in the third image feature correspond to a plurality of feature values in the first image feature; and

performing the element-wise multiplication operation on the plurality of corresponding feature values in the first image feature and the third image feature to obtain the processed image feature.

9. The method according to claim 7, wherein the non-linear transformation processing further comprises an element-wise addition operation after the element-wise multiplication operation.

10. The method according to claim 9, wherein the performing non-linear transformation processing on the first image feature to obtain a processed image feature comprises:

performing the first non-linear operation on each feature value in the first image feature to obtain a second image feature;

performing the convolution processing on the second image feature to obtain a third image feature, wherein a plurality of feature values in the third image feature correspond to a plurality of

feature values in the first image feature;

performing the element-wise multiplication operation on the plurality of corresponding feature values in the first image feature and the third image feature to obtain a fourth image feature, wherein a plurality of feature values in the fourth image feature correspond to the plurality of feature values in the first image feature; and

performing the element-wise addition operation on the plurality of corresponding feature values in the first image feature and the fourth image feature to obtain the processed image feature.

11. The method according to any one of claims 7 to 10, wherein the first non-linear operation comprises a rectified linear unit series, Sigmoid, Tanh, or piecewise linear mapping.

12. The method according to any one of claims 7 to 11, wherein the method further comprises:

constructing a non-linear transformation unit in a training phase, wherein the non-linear transformation unit in the training phase comprises a first non-linear operation layer, a convolution processing layer, an element-wise multiplication operation layer, and an element-wise addition operation layer; and

performing training based on pre-obtained training data to obtain a trained non-linear transformation unit, wherein the trained non-linear transformation unit is used to implement the non-linear transformation processing.

13. An encoding apparatus, comprising:

an obtaining module, configured to obtain a to-be-processed first image feature;

a transformation module, configured to perform non-linear transformation processing on the first image feature to obtain a processed image feature, wherein the non-linear transformation processing sequentially comprises a first non-linear operation, convolution processing, and an element-wise multiplication operation; and

an encoding module, configured to perform encoding based on the processed image feature to obtain a bitstream.

14. A decoding apparatus, comprising:

an obtaining module, configured to obtain a to-be-processed first image feature;

a transformation module, configured to perform non-linear transformation processing on the first image feature to obtain a processed image feature, wherein the non-linear transformation processing comprises a first non-linear operation, convolution processing, and an element-wise multiplication operation; and

a reconstruction module, configured to obtain a reconstructed image based on the processed image feature.

15. An encoder, comprising:

one or more processors; and

a non-transitory computer-readable storage medium, coupled to the processor and storing a program for execution by the processor, which when executed by the processor, the program configures the decoder to perform the method according to any one of claims 1 to 6.

16. A decoder, comprising:

one or more processors; and

a non-transitory computer-readable storage medium, coupled to the processor and storing a program for execution by the processor, which when executed by the processor, the program configures the decoder to perform the method according to any one of claims 7 to 12.

17. A computer program product, comprising program code, wherein when the program code is executed on a computer or a processor, the computer program product is configured to perform the method according to any one of claims 1 to 12.

18. A computer-readable storage medium, comprising instructions, wherein when the instructions are run on a computer, the computer is enabled to perform the method according to any one of claims 1 to 12.

19. A bitstream storage apparatus, where the apparatus includes a receiver and at least one storage medium, the receiver is configured to receive a bitstream, and the at least one storage medium is configured to store the bitstream, wherein the bitstream is generated according to the method according to any one of claims 1 to 6.

20. A bitstream transmission apparatus, where the apparatus includes a transmitter and at least one storage medium, the at least one storage medium is configured to store a bitstream, and the transmitter is configured to send the bitstream, wherein the bitstream is generated according to the method according to any one of claims 1 to 6.

21. A bitstream distribution system comprising at least one storage medium and a streaming media device, the at least one storage medium is configured to store at least one bitstream, and the at least one bitstream includes a bitstream generated according to any one of the claims 1 to 8; the streaming media device is configured to obtain a target bitstream from the at least one storage medium and send the target bitstream to a terminal-side device.

22. A bitstream distribution system comprising:

a communication interface, configured to receive a request of a user for obtaining a target bitstream; and

a processor, configured to determine a storage location of the target bitstream in response to the request;

wherein the communication interface is further configured to send the storage location of the

target bitstream to the user;

where the target bitstream is generated according to the method according to any one of claims 1 to 6.