CLAIMS

1. A decoding method, comprising:

obtaining, by decoding a first bitstream of a current image block, a coefficient hyperparameter feature of each of stage sub-blocks in the current image block;

for each of the stage sub-blocks,

determining a probability distribution parameter based on the coefficient hyperparameter feature of the stage sub-block;

obtaining, by decoding a second bitstream of the current image block based on the probability distribution parameter, a residual feature of the stage sub-block;

determining a reconstructed feature of the stage sub-block based on the residual feature of the stage sub-block and a mean feature of the stage sub-block; and

determining a reconstructed image block corresponding to the current image block based on respective reconstructed features of the stage sub-blocks.

2. The method according to claim 1, wherein before determining the reconstructed feature of the stage sub-block based on the residual feature of the stage sub-block and the mean feature of the stage sub-block, the method further comprises:

for a first stage sub-block,

obtaining the mean feature of the stage sub-block through a mean prediction network and based on the coefficient hyperparameter feature of the stage sub-block, or,

obtaining a pre-configured default reference feature, and obtaining the mean feature of the stage sub-block through a mean prediction network and based on the coefficient hyperparameter feature of the stage sub-block and the default reference feature.

3. The method according to claim 1 or 2, wherein before determining the reconstructed feature of the stage sub-block based on the residual feature of the stage sub-block and the mean feature of the stage sub-block, the method further comprises:

for an i-th stage sub-block, wherein i is greater than 1,

obtaining a reference feature of the i-th stage sub-block based on reconstructed

features of preceding i-1 stage sub-blocks; and

obtaining the mean feature of the stage sub-block through a mean prediction network and based on the coefficient hyperparameter feature of the stage sub-block and the reference feature;

wherein the reference feature comprises:

all of the reconstructed features of the preceding i-1 stage sub-blocks; or,

a part of the reconstructed features of the preceding i-1 stage sub-blocks; or,

a reconstructed feature of an (i-1)-th stage sub-block.

4. The method according to claim 2 or 3, wherein the mean prediction network comprises a first prediction network, a second prediction network and a prediction fusion network; and obtaining the mean feature of the stage sub-block through the mean prediction network and based on the coefficient hyperparameter feature of the stage sub-block and the reference feature comprises:

obtaining a first prediction feature corresponding to the coefficient hyperparameter feature through the first prediction network;

obtaining a second prediction feature corresponding to the reference feature through the second prediction network; and

obtaining a concatenated feature by performing feature concatenation on the first prediction feature and the second prediction feature;

inputting the concatenated feature into the prediction fusion network; and

obtaining the mean feature of the stage sub-block by processing the concatenated feature through the prediction fusion network.

5. The method according to claim 4, wherein

obtaining the first prediction feature corresponding to the coefficient hyperparameter feature through the first prediction network comprises: obtaining the first prediction feature by performing feature enhancement operation and upsampling operation on the coefficient hyperparameter feature through the first prediction network; and

the feature enhancement operation comprises a convolution operation, or comprises a convolution operation and an activation operation;

the upsampling operation comprises a deconvolution operation, a cropping operation and an activation operation, or comprises a deconvolution operation, a cropping operation, an activation operation and a convolution operation.

6. The method according to claim 5, wherein the activation operation is a modified linear unit function (Relu) operation.

7. The method according to claim 4, wherein obtaining the second prediction feature corresponding to the reference feature through the second prediction network comprises:

performing feature concatenation on all reconstructed features in the reference feature along a channel dimension, and obtaining the second prediction feature by performing convolution operation on the concatenated feature; or,

performing feature summation on all reconstructed features in the reference feature, and obtaining the second prediction feature by performing convolution operation on the summed feature.

8. The method according to claim 4, wherein the obtaining the mean feature of the stage sub-block by processing the concatenated feature through the prediction fusion network comprises:

obtaining the mean feature of the stage sub-block by performing convolution operation and at least one fusion operation on the concatenated feature through the prediction fusion network,

wherein the fusion operation comprises an activation operation and a convolution operation.

9. The method according to claim 8, wherein the activation operation is a modified linear unit function (Relu) operation.

10. The method according to any one of claims 1 to 9, wherein after determining the reconstructed feature of the stage sub-block based on the residual feature of the stage sub-block and the mean feature of the stage sub-block, the method further comprises:

obtaining an enhanced reconstructed feature by performing feature enhancement on the reconstructed feature of the stage sub-block,

wherein the enhanced reconstructed feature is used to determine a mean feature of a stage sub-block, and the enhanced reconstructed feature is used to determine the reconstructed image block.

11. The method according to any one of claims 1 to 9, wherein determining the reconstructed image block corresponding to the current image block based on the respective reconstructed features of the stage sub-blocks comprises:

obtaining an aggregated feature by performing feature aggregation on the respective reconstructed features of the stage sub-blocks; and obtaining the reconstructed image block corresponding to the current image block by inputting the aggregated feature into a synthesis transform network; or,

obtaining an aggregated feature by performing feature aggregation on the respective reconstructed features of the stage sub-blocks; obtaining partitioned features by partitioning the aggregated feature; obtaining respective partitioned reconstructed image blocks corresponding to the partitioned features by inputting each of the partitioned features into a synthesis transform network; and obtaining the reconstructed image block corresponding to the current image block by merging the respective partitioned reconstructed image blocks corresponding to the partitioned features; or,

obtaining respective partitioned reconstructed image blocks corresponding to the stage sub-blocks by inputting each of the respective reconstructed features of the stage sub-blocks into a synthesis transform network; and obtaining the reconstructed image block corresponding to the current image block by merging the respective partitioned reconstructed image blocks corresponding to the stage sub-blocks.

12. The method according to claim 11, wherein obtaining the aggregated feature by performing feature aggregation on the respective reconstructed features of the stage sub-blocks comprises:

obtaining the aggregated feature by aggregating the respective reconstructed features of the stage sub-blocks according to phase; or,

obtaining a plurality of phase-aggregated features by aggregating the respective reconstructed features of the stage sub-blocks according to phase, and obtaining the aggregated feature by concatenating the plurality of phase-aggregated features along a channel dimension.

13. The method according to claim 11, wherein obtaining the partitioned features by partitioning the aggregated feature comprises:

determining a target size of the partitioned features; and partitioning the aggregated feature into the partitioned features evenly in an order from top to bottom and left to right based on the target size, wherein a size of each of the partitioned features is the target size; or,

determining an actual partition size and an overlap size of the partitioned features, wherein the actual partition size is a partition size of the partitioned features excluding an overlapping portion, and the overlap size is a size of an overlapping portion between adjacent partitioned features; and partitioning the aggregated feature into the partitioned features based on the actual partition size and the overlap size, wherein a size of each of the partitioned features is the target size.

14. The method according to claim 13, wherein obtaining the reconstructed image block corresponding to the current image block by merging the respective partitioned reconstructed image blocks corresponding to the partitioned features comprises:

obtaining the reconstructed image block corresponding to the current image block by sorting the respective partitioned reconstructed image blocks corresponding to the partitioned features in an order from top to bottom and left to right and sequentially concatenating the sorted partitioned reconstructed image blocks; or,

determining an actual partition size and an overlap size of each of the respective partitioned reconstructed image blocks; sorting the respective partitioned reconstructed image blocks corresponding to the partitioned features in an order from top to bottom and left to right; obtaining the reconstructed image block corresponding to the current image block by sequentially concatenating the sorted partitioned reconstructed image blocks based on the actual partition size and the overlap size; wherein a non-overlapping portion of a partitioned

reconstructed image block has a size equal to the actual partition size of the partitioned reconstructed image block, and an overlapping portion between the partitioned reconstructed image block and an adjacent partitioned reconstructed image block has a size equal to the overlap size of the partitioned reconstructed image block;

for an overlapping portion between a left partitioned reconstructed image block and a right partitioned reconstructed image block, a value of the overlapping portion is a value of the left partitioned reconstructed image block, or, a value of the overlapping portion is a mean value of the left partitioned reconstructed image block and the right partitioned reconstructed image block; and

for an overlapping portion between an upper partitioned reconstructed image block and a lower partitioned reconstructed image block, a value of the overlapping portion is a value of the upper partitioned reconstructed image block, or, a value of the overlapping portion is a mean value of the upper partitioned reconstructed image block and the lower partitioned reconstructed image block.

15. The method according to any one of claims 11 to 14, wherein

obtaining the reconstructed image block corresponding to the current image block by inputting the aggregated feature into the synthesis transform network comprises:

obtaining a bit rate control parameter of the current image block by decoding an auxiliary bitstream corresponding to the current image block, and

obtaining the reconstructed image block corresponding to the current image block by inputting the bit rate control parameter and the aggregated feature into the synthesis transform network; or,

obtaining respective partitioned reconstructed image blocks corresponding to the partitioned features by inputting each of the partitioned features into the synthesis transform network comprises:

obtaining a bit rate control parameter of each of the partitioned features by decoding an auxiliary bitstream corresponding to the current image block, and

for each of the partitioned features, obtaining a partitioned reconstructed image block corresponding to the partitioned feature by inputting the partitioned feature and the bit rate control parameter of the partitioned feature into the synthesis transform network; or,

obtaining respective partitioned reconstructed image blocks corresponding to the stage sub-blocks by inputting each of the respective reconstructed features of the stage sub-blocks into the synthesis transform network comprises:

obtaining a bit rate control parameter of each of the stage sub-blocks by decoding an auxiliary bitstream corresponding to the current image block, and

for each of the stage sub-blocks, obtaining a partitioned reconstructed image block corresponding to the stage sub-block by inputting the reconstructed feature of the stage sub-block and the bit rate control parameter of the stage sub-block into the synthesis transform network.

16. The method according to claim 15, wherein

obtaining the reconstructed image block corresponding to the current image block by inputting the bit rate control parameter and the aggregated feature into the synthesis transform network comprises:

obtaining a first feature by processing the aggregated feature through the synthesis transform network;

obtaining a second feature by processing the bit rate control parameter through the synthesis transform network;

generating a third feature based on the first feature and the second feature; and

determining the reconstructed image block corresponding to the current image block based on the third feature; or,

obtaining the partitioned reconstructed image block corresponding to the partitioned feature by inputting the partitioned feature and the bit rate control parameter of the partitioned feature into the synthesis transform network comprises:

obtaining a first feature by processing the partitioned feature through the synthesis transform network;

obtaining a second feature by processing the bit rate control parameter of the partitioned feature through the synthesis transform network;

generating a third feature based on the first feature and the second feature; and

determining the partitioned reconstructed image block corresponding to the partitioned feature based on the third feature; or,

obtaining the partitioned reconstructed image block corresponding to the stage sub-block by inputting the reconstructed feature of the stage sub-block and the bit rate control parameter of the stage sub-block into the synthesis transform network comprises:

obtaining a first feature by processing the reconstructed feature of the stage sub-block through the synthesis transform network;

obtaining a second feature by processing the bit rate control parameter of the stage sub-block through the synthesis transform network;

generating a third feature based on the first feature and the second feature; and

determining the partitioned reconstructed image block corresponding to the stage sub-block based on the third feature.

17. A coding method, comprising:

obtaining, by inputting a current image block into an analysis transform network, a feature block corresponding to the current image block;

splitting the feature block into to-be-coded features of a plurality of stage sub-blocks;

for each of the stage sub-blocks corresponding to the current image block,

obtaining a coefficient hyperparameter feature of the stage sub-block;

coding the coefficient hyperparameter feature of the stage sub-block into a first bitstream of the current image block;

determining a residual feature of the stage sub-block based on the to-be-coded feature of the stage sub-block and a mean feature of the stage sub-block;

determining a probability distribution parameter based on the coefficient hyperparameter feature of the stage sub-block; and

coding the residual feature of the stage sub-block into a second bitstream of the current image block based on the probability distribution parameter.

18. A decoding method, comprising:

obtaining, by decoding a first bitstream of a current image block, a coefficient hyperparameter feature of the current image block;

determining a probability distribution parameter based on the coefficient hyperparameter feature;

obtaining, by decoding a second bitstream of the current image block based on the probability distribution parameter, a residual feature of the current image block;

determining a reconstructed feature of the current image block based on the residual feature;

obtaining, by decoding an auxiliary bitstream corresponding to the current image block, a bit rate control parameter of the current image block; and

obtaining; by inputting the reconstructed feature and the bit rate control parameter into a synthesis transform network, a reconstructed image block corresponding to the current image block.

19. The method according to claim 18, wherein obtaining; by inputting the reconstructed feature and the bit rate control parameter into the synthesis transform network, the reconstructed image block corresponding to the current image block comprises:

obtaining a first feature by processing the reconstructed feature through the synthesis transform network;

obtaining a second feature by processing the bit rate control parameter through the synthesis transform network;

generating a third feature based on the first feature and the second feature; and

determining the reconstructed image block corresponding to the current image block based on the third feature.

20. A decoding apparatus, comprising:

a decoding module, configured to obtain, by decoding a first bitstream of a current image block, a coefficient hyperparameter feature of each of stage sub-blocks in the current image block; for each of the stage sub-blocks, determine a probability distribution parameter based

on the coefficient hyperparameter feature of the stage sub-block, and obtain, by decoding a second bitstream of the current image block based on the probability distribution parameter, a residual feature of the stage sub-block; and

a determination module, configured to determine a reconstructed feature of the stage sub-block based on the residual feature of the stage sub-block and a mean feature of the stage sub-block; and determine a reconstructed image block corresponding to the current image block based on respective reconstructed features of the stage sub-blocks.

21. A coding apparatus, comprising:

an acquisition module, configured to obtain, by inputting a current image block into an analysis transform network, a feature block corresponding to the current image block; and split the feature block into to-be-coded features of a plurality of stage sub-blocks;

a coding module, configured to, for each of the stage sub-blocks corresponding to the current image block, obtain a coefficient hyperparameter feature of the stage sub-block, and code the coefficient hyperparameter feature of the stage sub-block into a first bitstream of the current image block;

a determination module, configured to determine a residual feature of the stage sub-block based on the to-be-coded feature of the stage sub-block and a mean feature of the stage sub-block; and

the coding module is further configured to determine a probability distribution parameter based on the coefficient hyperparameter feature of the stage sub-block, and code the residual feature of the stage sub-block into a second bitstream of the current image block based on the probability distribution parameter.

22. A decoding device, comprising at least one processor and a machine-readable storage medium, wherein the machine-readable storage medium stores machine executable instructions executable by the at least one processor,

and the at least one processor is configured to execute the machine-executable instructions to perform the methods according to any one of claims 1 to 16.

23. A coding device, comprising at least one processor and a machine-readable storage medium, wherein the machine-readable storage medium stores machine executable instructions executable by the at least one processor,

and the at least one processor is configured to execute the machine-executable instructions to perform the methods according to claim 17.

24. A machine-readable storage medium, wherein a plurality of computer instructions are stored on the machine-readable storage medium, and when the computer instructions are executed by at least one processor, cause the at least one processor to perform the method according to any one of claims 1 to 16; or when the computer instructions are executed by at least one processor, cause the at least one processor to perform the method according to claim 17.

25. A computer application program, wherein when the computer application program is executed by at least one processor, cause the at least one processor to perform the method according to any one of claims 1 to 16; or when the computer application program is executed by at least one processor, cause the at least one processor to perform the method according to claim 17.