WHAT IS CLAIMED IS:

1. A video transcoding method, comprising:

decoding a source video stream to obtain a first video frame and decoding information, and inserting watermark information into the first video frame to generate a second video frame;

determining types of macroblocks in the second video frame based on the watermark information and the decoding information;

for each macroblock, determining target encoding parameters required for encoding the macroblock based on the type and a rate distortion optimization algorithm; and

performing macroblock encoding according to the target encoding parameters for each macroblock, to generate a transcoded target video stream;

wherein determining target encoding parameters required for encoding the macroblock based on the type and a rate distortion optimization algorithm comprises:

determining reference encoding pixels of the macroblock based on the type;

performing RDO algorithm processing on the decoding information and the reference encoding pixels of the macroblock to generate at least one set of candidate encoding parameters for the macroblock and a RDO cost corresponding to each set of candidate encoding parameters;

determining the target encoding parameters required for encoding the macroblock from the at least one set of candidate encoding parameters based on RDO costs;

wherein determining the reference encoding pixels of the macroblock based on the type of the macroblock further comprises:

for a non-first type of macroblock, determining reconstructed pixels before deblocking filtering of a decoder as the reference encoded pixels;

for a first type of macroblock, determining a first region of pixels not modified by the watermark information and a second region of pixels modified by the watermark information in the first type of macroblock, wherein the reference encoding pixels of the first region are the reconstructed pixels before the deblocking filtering of the decoder, the reference encoding pixels of the second region are pixels currently input by an encoder, and the pixels currently input are pixels modified by the watermark information;

wherein the first type of macroblock is configured to indicate being related with the watermark information.

2. The method according to claim 1, wherein determining the target encoding parameters required for encoding the macroblock from at least one set of candidate encoding parameters based on the RDO costs, comprises:

in response to the type of the macroblock being the non-first type, selecting a set of candidate encoding parameters corresponding to a minimum RDO cost as the target encoding parameters for the macroblock.

3. The method according to claim 1, further comprising:

in response to the type of the macroblock being a second type and the minimum RDO cost being greater than a preset threshold, calling a native RDO algorithm of the encoder to obtain a native RDO cost and native encoding parameters for the macroblock, wherein the second type indicates that there is a dependency relationship between the macroblock and the macroblock carrying the watermark information;

if the minimum RDO cost is less than or equal to the native RDO cost, determining a set of candidate encoding parameters corresponding to the minimum RDO cost as the target encoding parameters for the macroblock;

if the minimum RDO cost is greater than the native RDO cost, determining the native encoding parameters as the target encoding parameters for the macroblock.

4. The method according to claim 2, further comprising:

in response to the type of the macroblock being the first type, calling a native RDO algorithm of the encoder to generate native encoding parameters for the macroblock, and determining the native encoding parameters as the target encoding parameters for the macroblock.

5. The method according to claim 1, wherein performing macroblock encoding according to the target encoding parameters for each macroblock to generate the transcoded target video stream, comprises:

performing the macroblock encoding on the macroblocks based on the target encoding parameters for each macroblock to generate target encoded data corresponding to the second video frame, and generating the target video stream based on the target encoded data of each frame.

6. The method according to claim 1, wherein determining the types of macroblocks in the second video frame based on the watermark information and the decoding information, comprises:

obtaining modified pixels of the second video frame when the watermark information is inserted into the second video frame, and determining the type of the macroblock containing

the modified pixels as the first type;

for any remaining block, determining whether the any remaining macroblock is dependent on the first type of macroblock based on the decoding information of the any remaining macroblock;

determining the type of any macroblock that is dependent on the first type of macroblock as a second type, and determining the type of any macroblock that is not dependent on the first type of macroblock as a third type.

7. The method according to claim 1, wherein before performing the macroblock encoding according to the target encoding parameters for each macroblock, further comprising:

in response to inconsistency in size between encoded data of the target video and encoded data of the source video, determining a priority order for adjusting quantization values of the macroblocks based on the types of the macroblocks;

adjusting the quantization values of respective types of macroblocks in the priority order, and quantizing the macroblocks according to adjusted quantization values.

8. A video transcoding apparatus, comprising:

a decoding module, configured to decode a source video stream to obtain a first video frame and decoding information, and inserting watermark information into the first video frame to generate a second video frame;

a macroblock type obtaining module, configured to determine types of macroblocks in the second video frame based on the watermark information and the decoding information;

a parameter obtaining module, configured to, for each macroblock, determine target encoding parameters required for encoding the macroblock based on the type and a rate distortion optimization algorithm; and

an encoding module, configured to perform macroblock encoding according to the target encoding parameters for each macroblock, to generate a transcoded target video stream;

wherein the parameter obtaining module comprises:

an encoding pixel obtaining module, configured to determine reference encoding pixels of the macroblock based on the type;

a candidate parameter obtaining module, configured to perform RDO algorithm processing on the decoding information and the reference encoding pixels of the macroblock to generate at least one set of candidate encoding parameters for the macroblock and a RDO cost corresponding to each set of candidate encoding parameters;

a target parameter obtaining module, configured to determine the target encoding

parameters required for encoding the macroblock from the at least one set of candidate encoding parameters based on RDO costs;

wherein the encoding pixel obtaining module is further configured to:

for a non-first type of macroblock, determine reconstructed pixels before deblocking filtering of a decoder as the reference encoded pixels;

for a first type of macroblock, determine a first region of pixels not modified by the watermark information and a second region of pixels modified by the watermark information in the first type of macroblock, wherein the reference encoding pixels of the first region are the reconstructed pixels before the deblocking filtering of the decoder, the reference encoding pixels of the second region are pixels currently input by an encoder, and the pixels currently input are pixels modified by the watermark information;

wherein the first type of macroblock is configured to indicate being related with the watermark information.

9. The apparatus according to claim 8, wherein the parameter obtaining module is further configured to:

in response to the type of the macroblock being the non-first type, select a set of candidate encoding parameters corresponding to a minimum RDO cost as the target encoding parameters for the macroblock.

10. The apparatus according to claim 8, wherein the target parameter obtaining module is further configured to:

in response to the type of the macroblock being a second type and the minimum RDO cost being greater than a preset threshold, call a native RDO algorithm of the encoder to obtain a native RDO cost and native encoding parameters for the macroblock, wherein the second type indicates that there is a dependency relationship between the macroblock and the macroblock carrying the watermark information;

if the minimum RDO cost is less than or equal to the native RDO cost, determine a set of candidate encoding parameters corresponding to the minimum RDO cost as the target encoding parameters for the macroblock;

if the minimum RDO cost is greater than the native RDO cost, determine the native encoding parameters as the target encoding parameters for the macroblock.

11. The apparatus according to claim 9, wherein the target parameter obtaining module is further configured to:

in response to the type of the macroblock being the first type, call a native RDO algorithm of the encoder to generate native encoding parameters for the macroblock, and

determine the native encoding parameters as the target encoding parameters for the macroblock.

12. The apparatus according to claim 8, wherein the encoding module is further configured to:

perform the macroblock encoding on the macroblocks based on the target encoding parameters for each macroblock to generate target encoded data corresponding to the second video frame, and generate the target video stream based on the target encoded data of each frame.

13. The apparatus according to claim 8, wherein the macroblock type obtaining module is further configured to:

obtain modified pixels of the second video frame when the watermark information is inserted into the second video frame, and determine the type of the macroblock containing the modified pixels as the first type;

for any remaining block, determine whether the any remaining macroblock is dependent on the first type of macroblock based on the decoding information of the any remaining macroblock;

determine the type of any macroblock that is dependent on the first type of macroblock as a second type, and determine the type of any macroblock that is not dependent on the first type of macroblock as a third type.

14. The apparatus according to claim 8, wherein the encoding module is further configured to:

in response to inconsistency in size between encoded data of the target video and encoded data of the source video, determine a priority order for adjusting quantization values of the macroblocks based on the types of the macroblocks;

adjust the quantization values of respective types of macroblocks in the priority order, and quantize the macroblocks according to adjusted quantization values.

15. An electronic device, comprising:

at least one processor;

a memory in communication connection with the at least one processor,

wherein the memory is stored with instructions executable by the at least one processor, which when executed by the at least one processor, enable the at least one processor to perform the method according to any of claims 1-7.

16. A non-transitory computer readable storage medium stored with computer instructions, wherein the computer instructions are configured to cause a computer to perform

the method according to any of claims 1-7.

17. A computer program product, comprising a computer program, which when executed by a processor, implements the method according to any of claims 1-7.