CLAIMS

What is claimed is:

1. A method for acquiring video coding compression quality, comprising:

acquiring video stream information, wherein the video stream information comprises a video frame type, a video frame size, a frame rate and a bit rate;

calculating video content complexity according to the video stream information, wherein the video content complexity comprises temporal complexity, or space complexity, or both the temporal complexity and the space complexity; and

calculating video coding compression quality according to the bit rate, the frame rate and the video content complexity.

2. The method according to claim 1, wherein the acquiring video stream information comprises:

acquiring the video frame type, the video frame size and the frame rate;

acquiring the total data volume of a video stream within a predetermined time period; and

determining the bit rate according to a ratio of the total data volume of the video stream to the predetermined time period.

3. The method according to claim 2, wherein the total data volume of the video stream is a sum of the data volume of received video stream and the data volume of lost video stream.

4. The method according to any one of claims 1 to 3, wherein,

when the video content complexity comprises temporal complexity, the calculating video content complexity according to the video stream information comprises:

calculating an average size of I frames within the predetermined time period according to the video frame type and the video frame size; and

determining the temporal complexity according to a ratio of the bit rate to the average size of the I frames; and/or

when the video content complexity comprises space complexity, the calculating video content complexity according to the video stream information comprises:

calculating an average size of P frames within the predetermined time period according to the video frame type and the video frame size; and

determining the space complexity according to a ratio of the bit rate to the average size of the P frames.

5. The method according to claim 4, wherein the temporal complexity is specifically:

$$TCC = Min\left(\sqrt{\left(\frac{BR}{ABI}\right)/a_0}, 1\right),$$

wherein TCC is the temporal complexity, BR is the bit rate, ABI is the average size of I frames, and a0 is a constant.

6. The method according to any one of claims 1 to 3, wherein the video stream information further comprises a video frame quantization parameter;

when the video content complexity comprises temporal complexity, the calculating video content complexity according to the video stream information comprises:

calculating the number of bits of each pixel of P frames in a case of the video frame quantization parameter according to the video frame type; and

calculating the temporal complexity according to the number of bits of each pixel of the P frames and a first parametric value corresponding to the video frame quantization parameter;

when the video content complexity comprises space complexity, the calculating video content complexity according to the video stream information comprises:

calculating the number of bits of each pixel of I frames in a case of the video frame quantization parameter according to the video frame type; and

calculating the space complexity according to the number of bits of each pixel of the I frames and a second parametric value corresponding to the video frame quantization parameter.

7. The method according to any one of claims 1 to 6, wherein before calculating video coding compression quality according to the bit rate, the frame rate and the video content complexity, the method further comprises:

calculating a modified bit rate according to the bit rate and the frame rate;

the calculating video coding compression quality according to the bit rate, the frame rate

and the video content complexity comprises:

calculating the video coding compression quality according to the modified bit rate, the frame rate and the video content complexity.

8. The method according to claim 7, wherein the calculating a modified bit rate according to the bit rate and the frame rate comprises:

determining a smaller value between the acquired frame rate and a reference frame rate; and

determining the modified bit rate according to a ratio of the bit rate to the smaller value.

9. The method according to claim 8, wherein the modified bit rate is specifically:

$$MBR = \frac{BR}{Min(fps,30)} \cdot 30 ,$$

wherein MBR is the modified bit rate, BR is the bit rate, fps is the frame rate, and 30 is the reference frame rate.

10. The method according to any one of claims 7 to 9, wherein the calculating the video coding compression quality according to the modified bit rate, the frame rate and the video content complexity comprises:

calculating a video coding compression distortion according to the modified bit rate, the video content complexity and a video quality assessment parameter; and

calculating the video coding compression quality according to the video coding compression distortion and the frame rate.

11. The method according to claim 10, wherein when the video content complexity comprises temporal complexity only, the video coding compression distortion is specifically:

$$VD_c = \frac{MOS_{max} - MOS_{min}}{1 + \left(\frac{MBR}{a_1 \cdot TCC + a_2} \right)^{(a_3 \cdot TCC + a_4)}} ,$$

wherein VDc is the video coding compression distortion, MOS is the video quality assessment parameter, MOS_{max} is a maximum value of the video quality assessment parameter, MOS_{min} is a minimum value of the video quality assessment parameter, MBR is the modified bit rate, TCC is the temporal complexity, and a_1, a_2, a_3 and a_4 are constants.

12. The method according to claim 10 or 11, wherein the calculating the video coding

compression quality according to the video coding compression distortion and the frame rate comprises:

when the frame rate is greater than or equal to 24, using a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion as the video coding compression quality; or

when the frame rate is less than or equal to 24, modifying, based on the video content complexity and the frame rate, a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion, and using the modified result as the video coding compression quality.

13. The method according to claim 12, wherein the video coding compression quality is specifically:

$$VMOS_c = \begin{cases} MOS_{\max} - VD_c & , fps \geq 24 \\ (MOS_{\max} - VD_c) \cdot \left(1 + a_5 \cdot TCC - b_5 \cdot TCC \log\left(\frac{1000}{fps}\right)\right) & , fps < 24 \end{cases}$$

14. An apparatus for acquiring video coding compression quality, comprising:

an information acquiring unit, configured to acquire video stream information, wherein the video stream information comprises a video frame type, a video frame size, a frame rate and a bit rate;

a complexity calculating unit, configured to calculate video content complexity according to the video stream information acquired by the information acquiring unit, wherein the video content complexity comprises temporal complexity, space complexity, or both the temporal complexity and the space complexity; and

a quality evaluating unit, configured to calculate video coding compression quality according to the bit rate and the frame rate acquired by the information acquiring unit, and the video content complexity acquired by the complexity calculating unit.

15. The apparatus according to claim 14, wherein the information acquiring unit comprises:

a bit rate acquiring subunit, configured to acquire the total data volume of a video stream within a predetermined time period; and determine the bit rate according to a ratio of the total data volume of the video stream to the predetermined time period.

16. The apparatus according to claim 14 or 15, wherein the complexity calculating unit comprises:

a first time subunit, configured to, when the video content complexity comprises the temporal complexity, calculate an average size of I frames within the predetermined time period according to the video frame type and video frame size, and determine the temporal complexity according to a ratio of the bit rate to the average size of the I frames; and/or a first space subunit, configured to, when the video content complexity comprises the space complexity, calculate an average size of P frames within the predetermined time period according to the video frame type and the video frame size, and determine the space complexity according to a ratio of the bit rate and the average size of the P frames.

17. The apparatus according to claim 14 or 15, wherein the complexity calculating unit comprises:

a second time subunit, configured to, when the video stream information acquired by the information acquiring unit further comprises a video frame quantization parameter and the video content complexity comprises temporal complexity, calculate the number of bits of each pixel of P frames in a case of the video frame quantization parameter according to the video frame type, and calculate the temporal complexity according to the number of bits of each pixel of the P frames and a first parametric value corresponding to the video frame quantization parameter; and

a second space subunit, configured to, when the video stream information acquired by the information acquiring unit further comprises the video frame quantization parameter and the video content complexity comprises space complexity, calculate the number of bits of each pixel of I frames in a case of the video frame quantization parameter according to the video frame type; and calculate the space complexity according to the number of bits of each pixel of the I frames and a second parametric value corresponding to the video frame quantization parameter.

18. The apparatus according to any one of claims 14 to 17, further comprising:

a bit rate modifying unit, configured to calculate a modified bit rate according to the bit rate and the frame rate before the quality evaluating unit determines the video coding compression quality according to the bit rate, the frame rate and the video content complexity;

and

the quality evaluating unit is specifically configured to calculate the video coding compression quality according to the modified bit rate acquired by the bit rate modifying unit, the frame rate and the video content complexity.

19. The apparatus according to claim 18, wherein the bit rate modifying unit comprises:

a comparing subunit, configured to determine a smaller value between the frame rate acquired by the information acquiring unit and a reference frame rate; and

a calculating subunit, configured to determine the modified bit rate according to a ratio of the bit rate to the smaller value.

20. The apparatus according to claim 18 or 19, wherein the quality evaluating unit comprises:

a distortion calculating subunit, configured to calculate a video coding compression distortion according to the modified bit rate acquired by the bit rate modifying unit, the video content complexity and a video quality assessment parameter; and

an evaluating subunit, configured to calculate the video coding compression quality according to the video coding compression distortion and the frame rate.

21. The apparatus according to claim 20, wherein

the evaluating subunit is specifically configured to, when the frame rate is greater than or equal to 24, use a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion as the video coding compression quality; or when the frame rate is less than or equal to 24, modify, based on the video content complexity and the frame rate, a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion, and use the modified result as the video coding compression quality.

22. A terminal, comprising a first transceiver and a first processor, wherein

the first transceiver is configured to receive a video stream; and

the first processor is configured to: acquire video stream information from the video stream received by the first transceiver, wherein the video stream information comprises a video frame type, a video frame size, a frame rate and a bit rate; calculate video content complexity according to the video stream information, wherein the video content complexity

comprises temporal complexity or space complexity or both the temporal complexity and the space complexity; and calculate video coding compression quality according to the bit rate, the frame rate and the video content complexity.

23. A terminal, comprising a second transceiver and a second processor, wherein

the second transceiver is configured to send a video stream; and

the second processor is configured to: acquire video stream information from the video stream sent by the second transceiver, wherein the video stream information comprises a video frame type, a video frame size, a frame rate and a bit rate; calculate video content complexity according to the video stream information, wherein the video content complexity comprises temporal complexity, or space complexity, or both the temporal complexity and the space complexity; and calculate video coding compression quality according to the bit rate, the frame rate and the video content complexity.

24. A server, located on a network side and comprising a third transceiver and a third processor, wherein

the third transceiver is configured to transmit a video stream from a transmit end to a receive end; and

the third processor is configured to acquire video stream information from the video stream transmitted by the third transceiver, wherein the video stream information comprises a video frame type, a video frame size, a frame rate and a bit rate; calculate video content complexity according to the video stream information, wherein the video content complexity comprises temporal complexity or space complexity or both the temporal complexity and the space complexity; and calculate video coding compression quality according to the bit rate, the frame rate and the video content complexity.

[CLAIMS]

1. A method for acquiring video coding compression quality, comprising:

acquiring video stream information, wherein the video stream information comprises a video frame type, a video frame size, a frame rate and a bit rate;

calculating video content complexity according to the video stream information, wherein the video content complexity comprises temporal complexity, or space complexity, or both the temporal complexity and the space complexity; and

calculating video coding compression quality according to the bit rate, the frame rate and the video content complexity;

wherein before calculating video coding compression quality according to the bit rate, the frame rate and the video content complexity, the method further comprises:

calculating a modified bit rate according to the bit rate and the frame rate;

the calculating video coding compression quality according to the bit rate, the frame rate and the video content complexity comprises:

calculating the video coding compression quality according to the modified bit rate, the frame rate and the video content complexity;

wherein the calculating a modified bit rate according to the bit rate and the frame rate comprises:

determining a smaller value between the acquired frame rate and a reference frame rate; and

determining the modified bit rate according to a ratio of the bit rate to the smaller value.

2. The method according to claim 1, wherein the acquiring video stream information comprises:

acquiring the video frame type, the video frame size and the frame rate;

acquiring the total data volume of a video stream within a predetermined time period; and

determining the bit rate according to a ratio of the total data volume of the video stream to the predetermined time period.

3. The method according to claim 2, wherein the total data volume of the video stream is a sum of the data volume of received video stream and the data volume of lost video stream.

4. The method according to claim 2, wherein,

when the video content complexity comprises temporal complexity, the calculating video content complexity according to the video stream information comprises:

calculating an average size of I frames within the predetermined time period according to the video frame type and the video frame size; and

determining the temporal complexity according to a ratio of the bit rate to the average size of the I frames; and/or

when the video content complexity comprises space complexity, the calculating video content complexity according to the video stream information comprises:

calculating an average size of P frames within the predetermined time period according to the video frame type and the video frame size; and

determining the space complexity according to a ratio of the bit rate to the average size of the P frames.

5. The method according to claim 4, wherein the temporal complexity is specifically:

$$TCC = Min\left(\sqrt{\left(\frac{BR}{ABI}\right)/a_0}, 1\right),$$

wherein TCC is the temporal complexity, BR is the bit rate, ABI is the average size of I frames, and a0 is a constant.

6. The method according to claim 1, wherein the video stream information further comprises a video frame quantization parameter;

when the video content complexity comprises temporal complexity, the calculating video content complexity according to the video stream information comprises:

calculating the number of bits of each pixel of P frames in a case of the video frame quantization parameter according to the video frame type; and

calculating the temporal complexity according to the number of bits of each pixel of the P frames and a first parametric value corresponding to the video frame quantization parameter;

when the video content complexity comprises space complexity, the calculating video content complexity according to the video stream information comprises:

calculating the number of bits of each pixel of I frames in a case of the video frame quantization parameter according to the video frame type; and

calculating the space complexity according to the number of bits of each pixel of the I frames and a second parametric value corresponding to the video frame quantization parameter.

7. The method according to claim 1, wherein the modified bit rate is specifically:

$$MBR = \frac{BR}{Min(fps,30)} \cdot 30$$

,

wherein MBR is the modified bit rate, BR is the bit rate, fps is the frame rate, and 30 is the reference frame rate.

8. The method according to claim 1, wherein the calculating the video coding compression quality according to the modified bit rate, the frame rate and the video content complexity comprises:

calculating a video coding compression distortion according to the modified bit rate, the video content complexity and a video quality assessment parameter; and

calculating the video coding compression quality according to the video coding compression distortion and the frame rate.

9. The method according to claim 8, wherein when the video content complexity comprises temporal complexity only, the video coding compression distortion is specifically:

$$VD_c = \frac{MOS_{\max} - MOS_{\min}}{1 + \left(\frac{MBR}{a_1 \cdot TCC + a_2} \right)^{(a_3 \cdot TCC + a_4)}}$$

,

wherein VDc is the video coding compression distortion, MOS is the video quality assessment parameter, MOS_{max} is a maximum value of the video quality assessment parameter, MOS_{min} is a minimum value of the video quality assessment parameter, MBR is the modified bit rate, TCC is the temporal complexity, and a_1, a_2, a_3 and a_4 are constants.

10. The method according to claim 8, wherein the calculating the video coding compression quality according to the video coding compression distortion and the frame rate comprises:

when the frame rate is greater than or equal to 24, using a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion as the video coding compression quality; or

when the frame rate is less than or equal to 24, modifying, based on the video content complexity and the frame rate, a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion, and using the modified result as the video coding compression quality.

11. The method according to claim 10, wherein the video coding compression quality is specifically:

$$VMOS_c = \begin{cases} MOS_{\max} - VD_c & , fps \geq 24 \\ (MOS_{\max} - VD_c) \cdot \left(1 + a_5 \cdot TCC - b_5 \cdot TCC \cdot \log\left(\frac{1000}{fps} \right) \right) & , fps < 24 \end{cases}$$

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12. An apparatus for acquiring video coding compression quality, comprising:

an information acquiring unit, configured to acquire video stream information, wherein the video stream information comprises a video frame type, a video frame size, a frame rate and a bit rate;

a bit rate modifying unit, configured to calculate a modified bit rate according to the bit rate and the frame rate before a quality evaluating unit determines the video coding compression quality according to the bit rate, the frame rate and video content complexity; and

wherein the bit rate modifying unit comprises:

a comparing subunit, configured to determine a smaller value between the frame rate acquired by the information acquiring unit and a reference frame rate; and

a calculating subunit(1042), configured to determine the modified bit rate according to a ratio of the bit rate to the smaller value;

a complexity calculating unit, configured to calculate video content complexity according to the video stream information acquired by the information acquiring unit, wherein the video content complexity comprises temporal complexity, space complexity, or both the temporal complexity and the space complexity; and

a quality evaluating unit, configured to calculate video coding compression quality according to the modified bit rate acquired by the bit rate modifying unit, and the video content complexity acquired by the complexity calculating unit, the quality evaluating unit is specifically configured to calculate the video coding compression quality according to the modified bit rate acquired by the bit rate modifying unit, the frame rate and the video content complexity.

13. The apparatus according to claim 12, wherein the information acquiring unit comprises:

a bit rate acquiring subunit, configured to acquire the total data volume of a video stream within a predetermined time period; and determine the bit rate according to a ratio of the total data volume of the video stream to the predetermined time period.

14. The apparatus according to claim 13, wherein the complexity calculating unit comprises:

a first time subunit, configured to, when the video content complexity comprises the temporal complexity, calculate an average size of I frames within the predetermined time period according to the video frame type and video frame size, and determine the temporal complexity according to a ratio of the bit rate to the average size of the I frames; and/or a first space subunit, configured to, when the video content complexity comprises the space complexity, calculate an average size of P frames within the predetermined time period according to the video frame type and the video frame size, and determine the space complexity according to a ratio of the bit rate and the average size of the P frames.

15. The apparatus according to claim 12, wherein the complexity calculating unit comprises:

a second time subunit, configured to, when the video stream information acquired by the information acquiring unit further comprises a video frame quantization parameter and the video content complexity comprises temporal complexity, calculate the number of bits of each pixel of P frames in a case of the video frame quantization parameter according to the video frame type, and calculate the temporal complexity according to the number of bits of each pixel of the P frames and a first parametric value corresponding to the video frame quantization parameter; and

a second space subunit, configured to, when the video stream information acquired by the information acquiring unit further comprises the video frame quantization parameter and the video content complexity comprises space complexity, calculate the number of bits of each pixel of I frames in a case of the video frame quantization parameter according to the video frame type; and calculate the space complexity according to the number of bits of each pixel of the I frames and a second parametric value corresponding to the video frame quantization parameter.

16. The apparatus according to claim 12, wherein the quality evaluating unit comprises:

a distortion calculating subunit, configured to calculate a video coding compression distortion according to the modified bit rate acquired by the bit rate modifying unit, the video content complexity and a video quality assessment parameter; and

an evaluating subunit, configured to calculate the video coding compression quality according to the video coding compression distortion and the frame rate.

17. The apparatus according to claim 16, wherein

the evaluating subunit is specifically configured to, when the frame rate is greater than or equal to 24, use a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion as the video coding compression quality; or when the frame rate is less than or equal to 24, modify, based on the video content complexity and the frame rate, a difference between the maximum value of the video quality assessment parameter and the video coding compression distortion, and use the modified result as the video coding compression quality.