Amended Set of Claims 1 to 33

1. A method of entropy coding video data, the method comprising:

when an absolute value of an x-component of a motion vector difference value for a current block is greater than zero, and when an absolute value of a y-component of the motion vector difference value for the current block is greater than zero, entropy coding information representative of a motion vector difference value, wherein entropy coding the information representative of the motion vector difference value comprises:

interleaving information representative of whether the absolute value of the x-component of a motion vector difference value for the current block of video data is greater than zero, and information representative of whether the absolute value of the y-component of the motion vector difference value is greater than zero; and

interleaving information representative of the absolute value of the x-component of the motion vector difference value, information representative of the absolute value of the y-component of the motion vector difference value,

a sign of the x-component of the motion vector difference value, and a sign of the y-component of the motion vector difference value.

2. The method of claim, 1, wherein entropy coding comprises context-adaptive binary arithmetic coding (CABAC) encoding, the method further comprising:

calculating a motion vector for the current block of video data; and

calculating the motion vector difference value as a difference between the motion vector for the current block of video data and a motion vector predictor determined for the current block of video data.

3. The method of claim 1, wherein entropy coding comprises context-adaptive binary arithmetic coding (CABAC) decoding, the method further comprising:

determining a motion vector predictor for the current block of video data; and

calculating a motion vector for the current block of video data as a sum of the motion vector difference value and the motion vector predictor.

ation: 01.05.2013 21:46:52 - 01.05.2013 21:57:02. This page 21 of
Received at the EPO on May 01, 2013 21:57:02. Page 21 of 37

4. The method of claim 1, further comprising:

coding a value representative of whether a motion vector of the current block of video data has a first sub-pixel precision or a second sub-pixel precision, wherein the second sub-pixel precision is greater than the first sub-pixel precision; and

when the motion vector has the second sub-pixel precision, when the x-component of the motion vector difference value is not equal to zero, and when the y-component of the motion vector difference value is not equal to zero, wherein coding information representative of the absolute value of the x-component of the motion vector difference value and coding information representative of the absolute value of the y-component of the motion vector difference value comprises coding a jointly coded value representative of both the x-component of the motion vector difference value and the y-component of the motion vector difference value.

5. The method of claim 4, further comprising determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, comprising:

determining a threshold value associated with the motion vector; and

determining that the motion vector has the first sub-pixel precision when both the x-component of the motion vector difference value and the y-component of the motion vector difference value are greater than the threshold.

6. The method of claim 5, wherein determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprises, when at least one of the x-component of the motion vector difference value and the y-component of the motion vector difference value is less than or equal to the threshold, determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision based on a value of a motion vector resolution flag.

7. The method of claim 4, wherein coding the value representative of whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprises coding a value for a motion vector resolution flag.

8. The method of claim 1,

wherein coding information representative of the absolute value of the x-component of the motion vector difference values comprises coding the absolute value of the x-component of the motion vector difference values as mvd_x/2 – 1, wherein mvd_x comprises the x-component of the motion vector difference value; and

wherein coding information representative of the absolute value of the y-component of the motion vector difference values comprises coding the absolute value of the y-component of the motion vector difference values as mvd_y/2 – 1, wherein mvd_y comprises the y-component of the motion vector difference value.

9. An apparatus for entropy coding video data, the apparatus comprising a video entropy coder configured to: when an absolute value of an x-component of a motion vector difference value is greater than zero and when an absolute value of a y-component of the motion vector is greater than zero, entropy code information representative of a motion vector difference value, wherein to entropy code the information representative of the motion vector difference values, the apparatus for entropy coding is configured to: interleave information representative of whether an absolute value of the x-component of the motion vector difference value for a current block of video data is greater than zero; and information representative of whether the absolute value of the y-component of the motion vector difference value is greater than zero; and interleave information representative of the absolute value of the x-component of the motion vector difference value, information representative of the absolute value of the y-component of the motion vector difference value, a sign of the x-component of the motion vector difference value, and a sign of the y-component of the motion vector difference value.

10. The apparatus of claim 9, wherein the video entropy coder comprises a context-adaptive binary arithmetic coding (CABAC) video encoder, and wherein the CABAC video encoder is further configured to calculate a motion vector for the current block of video data and calculate the motion vector difference value as a difference between the motion vector for the current block of video data and a motion vector predictor determined for the current block of video data.

11. The apparatus of claim 9, wherein the video entropy coder comprises a context-adaptive binary arithmetic coding (CABAC) video decoder, and wherein the CABAC video decoder is further configured to determine a motion vector predictor for the current block of video data and calculate a motion vector for the current block of video data as a sum of the motion vector difference value and the motion vector predictor.

12. The apparatus of claim 9, wherein the video coder is configured to code a value representative of whether a motion vector of the current block of video data has a first sub-pixel precision or a second sub-pixel precision, wherein the second sub-pixel precision is greater than the first sub-pixel precision, and wherein the video coder is configured to code a jointly coded value representative of both the x-component of the motion vector difference value and the y-component of the motion vector difference value when the motion vector has the second sub-pixel precision, when the x-component of the motion vector difference value is not equal to zero, and when the y-component of the motion vector difference value is not equal to zero.

13. The apparatus of claim 12, wherein to determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, the video coder is configured to determine a threshold value associated with the motion vector, and determine that the motion vector has the first sub-pixel precision when both the x-component of the motion vector difference value and the y-component of the motion vector difference value are greater than the threshold.

14. The apparatus of claim 13, wherein to determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, the video coder is configured to, when at least one of the x-component of the motion vector difference value and the y-component of the motion vector difference value is less than or equal to the threshold, determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision based on a value of a motion vector resolution flag.

15. The apparatus of claim 12, wherein to determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, the video coder is configured to determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision based on a value of a motion vector resolution flag.

16. The apparatus of claim 9,

wherein to code information representative of the absolute value of the x-component of the motion vector difference values, the video coder is configured to code the absolute value of the x-component of the motion vector difference values as mvd_x/2 – 1, wherein mvd_x comprises the x-component of the motion vector difference value; and

wherein to code information representative of the absolute value of the y-component of the motion vector difference values, the video coder is configured to code the absolute value of the y-component of the motion vector difference values as mvd_y/2 – 1, wherein mvd_y comprises the y-component of the motion vector difference value.

17. The apparatus of claim 9, wherein the apparatus comprises at least one of:

an integrated circuit;

a microprocessor; and

a wireless communication device that includes the video coder.

18. An apparatus for entropy coding video data, the apparatus comprising:

means for entropy coding information representative of a motion vector difference value when the absolute value of the x-component of the motion vector difference value is greater than zero and when the absolute value of the y-component of the motion vector difference value is greater than zero, wherein the means for entropy coding the information representative of the motion vector difference value comprises:

means for interleaving information representative of whether an absolute value of an x-component of a motion vector difference value for a current block of video data is greater than zero and information representative of whether an absolute value of a y-component of the motion vector difference value is greater than zero;

means for interleaving information representative of the absolute value of the x-component of the motion vector difference value, information representative of the absolute value of the y-component of the motion vector difference value,

a sign of the x-component of the motion vector difference value, and a sign of the y-component of the motion vector difference value.

19. The apparatus of claim 18, wherein the means for entropy coding comprises means for context-adaptive binary arithmetic coding (CABAC) encoding, the apparatus further comprising:

means for calculating a motion vector for the current block of video data; and

means for calculating the motion vector difference value as a difference between the motion vector for the current block of video data and a motion vector predictor determined for the current block of video data.

20. The apparatus of claim 18, wherein the means for entropy coding comprises means for context-adaptive binary arithmetic coding (CABAC) decoding, the apparatus further comprising:

means for determining a motion vector predictor for the current block of video data; and

means for calculating a motion vector for the current block of video data as a sum of the motion vector difference value and the motion vector predictor.

21. The apparatus of claim 18, further comprising:

means for coding a value representative of whether a motion vector of the current block of video data has a first sub-pixel precision or a second sub-pixel precision, wherein the second sub-pixel precision is greater than the first sub-pixel precision; and

means for coding a jointly coded value representative of both the x-component of the motion vector difference value and the y-component of the motion vector difference value when the motion vector has the second sub-pixel precision, when the x-component of the motion vector difference value is not equal to zero, and when the y-component of the motion vector difference value is not equal to zero.

22. The apparatus of claim 21, further comprising means for determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, comprising:

means for determining a threshold value associated with the motion vector; and

means for determining that the motion vector has the first sub-pixel precision when both the x-component of the motion vector difference value and the y-component of the motion vector difference value are greater than the threshold.

23. The apparatus of claim 22, wherein the means for determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprises means for determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision based on a value of a motion vector resolution flag when at least one of the x-component of the motion vector difference value and the y-component of the motion vector difference value is less than or equal the threshold.

24. The apparatus of claim 21, wherein the means for coding the value representative of whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprises means for coding a value for a motion vector resolution flag.

25. The apparatus of claim 18,

wherein the means for coding information representative of the absolute value of the x-component of the motion vector difference values comprises means for coding the absolute value of the x-component of the motion vector difference values as mvd_x/2 – 1, wherein mvd_x comprises the x-component of the motion vector difference value; and

wherein the means for coding information representative of the absolute value of the y-component of the motion vector difference values comprises means for coding the absolute value of the y-component of the motion vector difference values as mvd_y/2 – 1, wherein mvd_y comprises the y-component of the motion vector difference value.

26. A computer program product comprising a computer-readable storage medium having stored thereon instructions that, when executed, cause one or more processors of a device for coding video data to:

when an absolute value of an x-component of a motion vector difference value is greater than zero and an absolute value of a y-component of the motion vector difference value is greater than zero, entropy code information representative of a motion vector difference value, wherein the instructions that cause the one or more processors to entropy code the information representative of the motion vector difference value cause the one or more processors to:

interleave information representative of whether the absolute value of the x-component of the motion vector difference value for the current block of video data is greater than zero, and information representative of whether the absolute value of the y-component of the motion vector difference value is greater than zero; and

interleave information representative of the absolute value of the x-component of the motion vector difference value, information representative of the absolute value of the y-component of the motion vector difference value,

a sign of the x-component of the motion vector difference value, and a sign of the y-component of the motion vector difference value.

27. The computer program product of claim 26, wherein the instructions that cause the one or more processors to entropy code comprise instructions that, when executed, cause the one or more processors to context-adaptive binary arithmetic coding (CABAC) encode, further comprising instructions that cause the one or more processors to:

calculate a motion vector for the current block of video data; and

calculate the motion vector difference value as a difference between the motion vector for the current block of video data and a motion vector predictor determined for the current block of video data.

28. The computer program product of claim 26, wherein the instructions that cause the one or more processors to entropy code comprise instructions that, when executed, cause the one or more processors to context-adaptive binary arithmetic coding (CABAC) decode, further comprising instructions that cause the one or more processors to:

determine a motion vector predictor for the current block of video data; and

calculate a motion vector for the current block of video data as a sum of the motion vector difference value and the motion vector predictor.

29. The computer program product of claim 26, further comprising instructions that cause the one or more programmable processors to:

code a value representative of whether a motion vector of the current block of video data has a first sub-pixel precision or a second sub-pixel precision, wherein the second sub-pixel precision is greater than the first sub-pixel precision; and

wherein the instructions that cause the one or more processors to code information representative of the absolute value of the x-component of the motion vector difference value and code information representative of the absolute value of the y-component of the motion vector difference value comprise instructions that, when executed, cause the one or more processors to jointly code a value representative of both the x-component of the motion vector difference value and the y-component of the motion vector difference value when the motion vector has the second sub-pixel precision, when the x-component of the motion vector difference value is not equal to zero, and when the y-component of the motion vector difference value is not equal to zero.

30. The computer program product of claim 29, further comprising instructions that cause the one or more programmable processors to determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, comprising instructions that cause the one or more programmable processors to:

determine a threshold value associated with the motion vector; and

determine that the motion vector has the first sub-pixel precision when both the x-component of the motion vector difference value and the y-component of the motion vector difference value are greater than the threshold.

31. The computer programmable product of claim 30, wherein the instructions that cause the one or more programmable processors to determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprise instructions that, when executed, cause the one or more programmable processors to, when at least one of the x-component of the motion vector difference value and the y-component of the motion vector difference value is less than or equal to the threshold, determine whether the motion vector has the first sub-pixel precision or the second sub-pixel precision based on a value of a motion vector resolution flag.

32. The computer programmable product of claim 29, wherein the instructions that cause the one or more programmable processors to code the value representative of whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprise instructions that, when executed, cause the one or more programmable processors to code a value for a motion vector resolution flag.

33. The computer programmable product of claim 26,

wherein the instructions that cause the one or more programmable processor to code information representative of the absolute value of the x-component of the motion vector difference values comprise instructions that, when executed, cause the one or more processors to code the absolute value of the x-component of the motion vector difference values as mvd_x/2 – 1, wherein mvd_x comprises the x-component of the motion vector difference value; and

wherein the instructions that cause the one or more processors to code information representative of the absolute value of the y-component of the motion vector difference values comprise instructions that cause the one or more processors to code the absolute value of the y-component of the motion vector difference values as mvd_y/2 – 1, wherein mvd_y comprises the y-component of the motion vector difference value.

Claims

1. A method (220; 320) of entropy coding video data, the method comprising:

when an absolute value of an x-component of a motion vector difference value for a current block is greater than zero (226; 326), and when an absolute value of a y-component of the motion vector difference value for the current block is greater than zero (228; 328), entropy coding information representative of a motion vector difference value, wherein entropy coding the information representative of the motion vector difference value comprises:

interleaving information representative of whether the absolute value of the x-component of a motion vector difference value for the current block of video data is greater than zero, and information representative of whether the absolute value of the y-component of the motion vector difference value is greater than zero; and interleaving information representative of the absolute value of the x-component of the motion vector difference value, information representative of the absolute value of the y-component of the motion vector difference value,
a sign of the x-component of the motion vector difference value (230; 330), and a sign of the y-component of the motion vector difference value (232; 332).

2. The method of claim, 1, wherein entropy coding comprises context-adaptive binary arithmetic coding, CABAC, encoding, the method further comprising:

calculating a motion vector for the current block of video data; and
calculating (156) the motion vector difference value as a difference between the motion vector for the current block of video data and a motion vector predictor determined for the current block of video data.

3. The method of claim 1, wherein entropy coding comprises context-adaptive binary arithmetic coding, CABAC, decoding, the method further comprising:

determining (286) a motion vector predictor for the current block of video data; and
calculating (288) a motion vector for the current block of video data as a sum of the motion vector difference value and the motion vector predictor.

4. The method of claim 1, further comprising:

coding a value representative of whether a motion vector of the current block of video data has a first sub-pixel precision or a second sub-pixel precision, wherein the second sub-pixel precision is greater than the first sub-pixel precision; and

when the motion vector has the second sub-pixel precision, when the x-component of the motion vector difference value is not equal to zero, and when the y-component of the motion vector difference value is not equal to zero, wherein coding information representative of the absolute value of the x-component of the motion vector difference value and coding information representative of the absolute value of the y-component of the motion vector difference value comprises coding a jointly coded value representative of both the x-component of the motion vector difference value and the y-component of the motion vector difference value.

5. The method of claim 4, further comprising determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, comprising:

determining a threshold value associated with the motion vector; and

determining that the motion vector has the first sub-pixel precision when both the x-component of the motion vector difference value and the y-component of the motion vector difference value are greater than the threshold.

6. The method of claim 5, wherein determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprises, when at least one of the x-component of the motion vector difference value and the y-component of the motion vector difference value is less than or equal to the threshold, determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision based on a value of a motion vector resolution flag.

7. The method of claim 1,

wherein coding information representative of the absolute value of the x-component of the motion vector difference values comprises coding the absolute value of the x-component of the motion vector difference values as mvd_x/2 - 1, wherein mvd_x comprises the x-component of the motion vector difference value; and

wherein coding information representative of the absolute value of the y-component of the motion vector difference values comprises coding the absolute value of the y-component of the motion vector difference values as mvd_y/2 - 1, wherein mvd_y comprises the y-component of the motion vector difference value.

8. An apparatus (56; 70) for entropy coding video data, the apparatus comprising:

means for entropy coding information representative of a motion vector difference value when the absolute value of the x-component of the motion vector difference value is greater than zero and when the absolute value of the y-component of the motion vector difference value is greater than zero, wherein the means for entropy coding the information representative of the motion vector difference value comprises:

means for interleaving information representative of whether an absolute value of an x-component of a motion vector difference value for a current block of video data is greater than zero and information representative of whether an absolute value of a y-component of the motion vector difference value is greater than zero;
means for interleaving information representative of the absolute value of the x-component of the motion vector difference value, information representative of the absolute value of the y-component of the motion vector difference value,
a sign of the x-component of the motion vector difference value, and a sign of the y-component of the motion vector difference value.

9. The apparatus of claim 8, wherein the means for entropy coding comprises means for context-adaptive binary arithmetic coding, CABAC, encoding, the apparatus further comprising:
means for calculating a motion vector for the current block of video data; and
means for calculating the motion vector difference value as a difference between the motion vector for the current block of video data and a motion vector predictor determined for the current block of video data.

10. The apparatus of claim 8, wherein the means for entropy coding comprises means for context-adaptive binary arithmetic coding, CABAC, decoding, the apparatus further comprising:

means for determining a motion vector predictor for the current block of video data; and
means for calculating a motion vector for the current block of video data as a sum of the motion vector difference value and the motion vector predictor.

11. The apparatus of claim 8, further comprising:

means for coding a value representative of whether a motion vector of the current block of video data has a first sub-pixel precision or a second sub-pixel precision, wherein the second sub-pixel precision is greater than the first sub-pixel precision; and
means for coding a jointly coded value representative of both the x-component of the motion vector difference value and the y-component of the motion vector difference value when the motion vector has the second sub-pixel precision, when the x-component of the motion vector difference value is not equal to zero, and when the y-component of the motion vector difference value is not equal to zero.

12. The apparatus of claim 11, further comprising means for determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision, comprising:

    means for determining a threshold value associated with the motion vector; and
    means for determining that the motion vector has the first sub-pixel precision when both the x-component of the motion vector difference value and the y-component of the motion vector difference value are greater than the threshold.

13. The apparatus of claim 12, wherein the means for determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision comprises means for determining whether the motion vector has the first sub-pixel precision or the second sub-pixel precision based on a value of a motion vector resolution flag when at least one of the x-component of the motion vector difference value and the y-component of the motion vector difference value is less than or equal the threshold.

14. The apparatus of claim 8,
    wherein the means for coding information representative of the absolute value of the x-component of the motion vector difference values comprises means for coding the absolute value of the x-component of the motion vector difference values as mvd_x/2 - 1, wherein mvd_x comprises the x-component of the motion vector difference value; and
    wherein the means for coding information representative of the absolute value of the y-component of the motion vector difference values comprises means for coding the absolute value of the y-component of the motion vector difference values as mvd_y/2-1, wherein mvd_y comprises the y-component of the motion vector difference value.

15. A computer program product comprising a computer-readable storage medium having stored thereon instructions that, when executed, cause one or more processors of a device for coding video data to carry out the method of any of claims 1 to 7.