Clean Version

Amended Set of Claims 1 to 37

1. A method of encoding video data, the method comprising:

selecting, based on one or more previously-encoded frames, a first set of support for a first sub-integer pixel of a full integer pixel;

applying an interpolation filter to the first set of support to calculate a value for the first sub-integer pixel;

selecting, based on the one or more previously-encoded frames, a second, different set of support for a second, different sub-integer pixel of the same full integer pixel;

applying the same interpolation filter to the second set of support to calculate a value for [[a]] the second sub-integer pixel, wherein the first and second sets of support comprise different combinations of full integer pixel positions; and

generating a prediction block based on at least one of the first and second sub-integer pixels.

2. The method of claim 1, wherein the interpolation filter is a first interpolation filter, the method further comprising applying a second, different interpolation filter to a third set of support to calculate a value for a third sub-integer pixel of the full integer pixel.

3. The method of claim 1, further comprising providing an indication of the interpolation filter used to calculate the value for the first sub-integer pixel.

4. The method of claim 1, further comprising providing indications of the first set of support and the second set of support.

5. The method of claim 4, further comprising providing the indications of the first set of support and the second set of support in at least one of a prediction unit level, a coding unit level, a slice level, a picture parameter set, or a sequence parameter set.

6. The method of claim 4, further comprising:

selecting the first and second sets of support from a plurality of pre-configured sets of support,

wherein the indications correspond to indexes into the plurality of pre-configured sets of support.

7. The method of claim 1, wherein the first set of support comprises at least one of: the values of four full integer pixel positions of the full integer pixel positions, the values of full integer pixel positions located around the one of the plurality of full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a diagonal direction around the one of the plurality of full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a horizontal direction around the one of the plurality of full integer pixel positions associated with the first sub-integer pixel, and the values of full integer pixel positions located in one of a vertical direction around the one of the plurality of full integer pixel positions associated with the first sub-integer pixel.

8. A device for encoding data, comprising a video encoder configured to:

select, based on one or more previously-encoded frames, a first set of support for a first sub-integer pixel of a full integer pixel;

apply an interpolation filter to the first set of support to calculate a value for the first sub-integer pixel;

select, based on the one or more previously-encoded frames, a second, different set of support for a second, different sub-integer pixel of the same full integer pixel;

apply the same interpolation filter to the second set of support to calculate a value for the second sub-integer pixel, wherein the first and second sets of support comprise different combinations of full integer pixel positions; and

generate a prediction block based on at least one of the first and second sub-integer pixels.

9. The device of claim 8, wherein the interpolation filter comprises a first interpolation filter, and the video encoder is further configured to apply a second, different interpolation filter to a third set of support to calculate a value for a third sub-integer pixel of the full integer pixel.

10. The device of claim 8, wherein the video encoder is configured to provide an indication of the interpolation filter used to calculate the value for the first sub-integer pixel.

11. The device of claim 8, wherein the video encoder is further configured to provide indications of the first set of support and the second set of support.

12. The device of claim 11, wherein the video encoder is configured to provide the indications of the first set of support and the second set of support in at least one of a prediction unit level, a coding unit level, a slice level, a picture parameter set, or a sequence parameter set.

13. The device of claim 8, wherein the video encoder is further configured to select the first and second sets of support from a plurality of pre-configured sets of support,

wherein the indications correspond to indexes into the plurality of pre-configured sets of support.

14. The device of claim 8, wherein the first set of support comprises at least one of: the values of four full integer pixel positions of the full integer pixel positions, the values of full integer pixel positions located around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a diagonal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a horizontal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, and the values of full integer pixel positions located in one of a vertical direction around the one of the full integer pixel positions associated with the first sub-integer pixel.

15. A computer-readable storage medium having stored thereon instructions that, when executed, cause a processor of a video encoding device to:

select, based on one or more previously-encoded frames, a first set of support for a first sub-integer pixel of a full integer pixel;

apply an interpolation filter to the first set of support to calculate a value for the first sub-integer pixel;

select, based on the one or more previously-encoded frames, a second, different set of support for a second, different sub-integer pixel of the same full integer pixel;

apply the same interpolation filter to the second set of support to calculate a value for the second sub-integer pixel, wherein the first and second sets of support comprise different combinations of full integer pixel positions; and

generate a prediction block based on at least one of the first and second sub-integer pixels.

16. The computer-readable storage medium of claim 15, wherein the interpolation filter is a first interpolation filter, and wherein the instructions further cause the video encoding device to apply a second, different interpolation filter to a third set of support to calculate a value for a third sub-integer pixel of the full integer pixel.

17. The computer-readable storage medium of claim 15, wherein the instructions further cause the video encoding device to provide indications of the first set of support and the second set of support.

18. The computer-readable storage medium of claim 17, wherein the instructions cause the video encoding device to provide the indications of the first set of support and the second set of support in at least one of a prediction unit level, a coding unit level, a slice level, a picture parameter set, or a sequence parameter set.

19. The computer-readable storage medium of claim 15, wherein the first set of support comprises at least one of: the values of four full integer pixel positions of the full integer pixel positions, the values of full integer pixel positions located around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a diagonal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a horizontal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, and the values of full integer pixel positions located in one of a vertical direction around the one of the full integer pixel positions associated with the first sub-integer pixel.

20. A device comprising:

means for selecting, based on one or more previously-encoded frames, a first set of support for a first sub-integer pixel of a full integer pixel;

means for applying an interpolation filter to the first set of support to calculate a value for the first sub-integer pixel;

means for selecting, based on the one or more previously-encoded frames, a second, different set of support for a second, different sub-integer pixel of the same full integer pixel;

means for applying the same interpolation filter to the second set of support to calculate a value for the second sub-integer pixel, wherein the first and second sets of support comprise different combinations of full integer pixel positions; and

means for generating a prediction block based on at least one of the first and second sub-integer pixels.

21. The device of claim 20, wherein the interpolation filter is a first interpolation filter, the device further comprising means for applying a second, different interpolation filter to a third set of support to calculate a value for a third sub-integer pixel of the full integer pixel.

22. The device of claim 20, further comprising means for providing indications of the first set of support and the second set of support,.

wherein the indications of the first set of support the second set of support is provided in at least one of a prediction unit level, a coding unit level, a slice level, a picture parameter set, or sequence parameter set.

23. The device of claim 20, further comprising:

means for selecting the first and second sets of support from a plurality of pre-configured sets of support,

means for providing indications of the first set of support and the second set of support, the indications corresponding to indexes into the plurality of pre-configured sets of support.

24. A method of decoding video data, the method comprising:

determining, based on one or more previously-decoded frames, a set of support for a sub-integer pixel of a full integer pixel, the set of support comprising a combination of full integer pixel positions;

applying an interpolation filter to the set of support to calculate a value for the sub-integer pixel;

generating a prediction block based in part on the sub-integer pixel; and

applying a residual block to the prediction block to recreate an original block.

25. The method of claim 24, wherein the set of support is a first set of support, the sub-integer pixel is a first sub-integer pixel, and the integer pixel is a first integer pixel, the method further comprising:

determining, based on the one or more previously-decoded frames, a second set of support;

applying the interpolation filter to the second set of support to calculate the value of a second sub-integer pixel of a second integer pixel, wherein the prediction block is based in part on the first sub-integer pixel and the second sub-integer pixel.

26. The method of claim 25, wherein applying the interpolation filter to the second set of support comprises calculating the value for the second sub-integer pixel independently of calculating the value for the first sub-integer pixel.

27. The method of claim 24, wherein the set of support comprises at least one of the values of four full integer pixel positions of the full integer pixel positions, the values of full integer pixel positions located around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a diagonal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a horizontal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, and the values of full integer pixel positions located in one of a vertical direction around the one of the full integer pixel positions associated with the first sub-integer pixel.

28. A device for decoding data, comprising a video decoder configured to:

determine, based on one or more previously-decoded frames, a set of support for a sub-integer pixel of a full integer pixel, the set of support comprising a combination of full integer pixel positions;

apply an interpolation filter to the set of support to calculate a value for the sub-integer pixel;

generate a prediction block based in part on the sub-integer pixel; and

apply a residual block to the prediction block to recreate an original block.

29. The device of claim 28, wherein the set of support is a first set of support, the sub-integer pixel is a first sub-integer pixel, and the integer pixel is a first integer pixel, wherein the video decoder is further configured to:

determine, based on the one or more previously-decoded frames, a second set of support; and

apply the interpolation filter to the second set of support to calculate a value of a second sub-integer pixel of a second integer pixel, wherein the prediction block is based in part on the first sub-integer pixel and the second sub-integer pixel.

30. The device of claim 29, wherein the video decoder is configured to calculate the value for the second sub-integer pixel independently of calculating the value for the first sub-integer pixel.

31. The device of claim 27, wherein the set of support comprises at least one of the values of four full integer pixel positions of the full integer pixel positions, the values of full integer pixel positions located around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a diagonal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a horizontal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, and the values of full integer pixel positions located in one of a vertical direction around the one of the full integer pixel positions associated with the first sub-integer pixel.

32. A computer program product comprising a computer-readable storage medium having stored thereon instructions that, when executed, cause a processor of a video decoding device to:

determine, based on one or more previously-decoded frames, a set of support for a sub-integer pixel of a full integer pixel, the set of support comprising a combination of full integer pixel positions;

apply an interpolation filter to the set of support to calculate a value for the sub-integer pixel;

generate a prediction block based in part on the sub-integer pixel; and

apply a residual block to the prediction block to recreate an original block.

33. The computer program product of claim 32,

wherein the set of support is a first set of support the sub-integer pixel is a first sub-integer pixel, and the integer pixel is a first integer pixel, and

wherein the instructions further cause the video coding device to:

determine, based on the one or more previously-decoded frames, a second set of support; and

apply the interpolation filter to the second set of support to calculate a value of a second sub-integer pixel of a second integer pixel, wherein the prediction block is based in part on the first sub-integer pixel and the second sub-integer pixel.

34. The computer program product of claim 32, wherein the set of support comprises at least one of the values of four full integer pixel positions of the full integer pixel positions, the values of full integer pixel positions located around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a diagonal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a horizontal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, and the values of full integer pixel positions located in one of a vertical direction around the one of the full integer pixel positions associated with the first sub-integer pixel.

35. A device comprising:

means for determining, based on one or more previously-decoded frames, a set of support for a sub-integer pixel of an integer pixel;

means for applying an interpolation filter to the set of support to calculate a value for the sub-integer pixel;

means for generating a prediction block based in part on the sub-integer pixel; and

means for applying a residual block to the prediction block to recreate an original block.

36. The device of claim 35,

wherein the set of support is a first set of support the sub-integer pixel is a first sub-integer pixel, and the integer pixel is a first integer pixel, and further comprising:

means for determining, based on the one or more previously-decoded frames, a second set of support; and

means for applying an interpolation filter to the second set of support to calculate a value of a second sub-integer pixel, wherein the prediction block is based in part on the first sub-integer pixel and the second sub-integer pixel.

37. The device of claim 35, wherein the set of support comprises at least one of the values of four full integer pixel positions of the full integer pixel positions, the values of full integer pixel positions located around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a diagonal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, the values of full integer pixel positions located in one of a horizontal direction around the one of the full integer pixel positions associated with the first sub-integer pixel, and the values of full integer pixel positions located in one of a vertical direction around the one of the full integer pixel positions associated with the first sub-integer pixel.

CLAIMS

1. A method of decoding video data, the method including:

generating a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein generating the prediction block includes computing the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

applying a residual block to the prediction block to recreate an original block.

2. The method of claim 1, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

3. The method of claim 1 or 2, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

4. The method of any one of claims 1 to 3, further including:

selecting, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.

5. A method of encoding video data, the method including:

generating a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein generating the prediction block includes computing the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

subtracting the prediction block from a video block being encoded to generate a residual block.

6. The method of claim 5, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

7. The method of claim 5 or 6, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

8. The method of any one of claims 5 to 7, further including:

selecting, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.

9. A device for decoding video data, the device including:

a memory storing the video data; and

one or more processors configured to:

generate a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full

integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein as part of generating the prediction block, the one or more processors compute the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

apply a residual block to the prediction block to recreate an original block.

10. The device of claim 9, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

11. The device of claim 9 or 10, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

12. The device of any one of claims 9 to 11, wherein the one or more processors are configured to:

select, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.

13. A device for encoding video data, the device including:

a memory storing the video data; and

one or more processors configured to:

generate a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full

integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein as part of generating the prediction block, the one or more processors compute the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

subtract the prediction block from a video block being encoded to generate a residual block.

14. The device of claim 13, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

15. The device of claim 13 or 14, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

16. The device of any one of claims 13 to 15, wherein the one or more processors are configured to:

select, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.

17. A device for decoding video data, the device including:

means for generating a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein generating the prediction block includes computing the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

means for applying a residual block to the prediction block to recreate an original block.

18. The device of claim 17, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

19. The device of claim 17 or 18, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

20. The device of any one of claims 17 to 19, further including:

means for selecting, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.

21. A device for encoding video data, the device including:

means for generating a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein generating the prediction block includes computing the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

means for subtracting the prediction block from a video block being encoded to generate a residual block.

22. The device of claim 21, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

23. The device of claim 21 or 22, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

24. The device of any one of claims 21 to 23, further including:

means for selecting, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.

25. A computer program product including a computer-readable storage medium having stored thereon instructions that, when executed, cause a processor of a video decoding device to:

generate a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein generating the prediction block includes computing the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

apply a residual block to the prediction block to recreate an original block.

26. The computer program product of claim 25, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

27. The computer program product of claim 25 or 26, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

28. The computer program product of any one of claims 25 to 27, wherein the instructions further cause the processor to:

select, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.

29. A computer program product including a computer-readable storage medium having stored thereon instructions that, when executed, cause a processor of a video encoding device to:

generate a prediction block based on interpolated sub-integer pixel values,

a given sub-integer pixel value being one of the interpolated sub-integer pixel values,

a sub-integer pixel location of the given sub-integer pixel being one of fifteen different sub-integer pixel locations associated with a full integer pixel, each of the sub-integer pixel locations associated with the full integer pixel having a different set of filter support, and

wherein generating the prediction block includes computing the given sub-integer pixel value based on an interpolation filter and a set of filter support for the sub-integer pixel location; and

subtract the prediction block from a video block being encoded to generate a residual block.

30. The computer program product of claim 29, wherein, for each respective sub-integer pixel location of the sub-integer pixel locations associated with the full integer pixel, the set of filter support for the respective sub-integer pixel location has a horizontal or vertical shape.

31. The computer program product of claim 29 or 30, wherein each of the sub-integer pixel locations associated with the full integer pixel uses a different interpolation filter.

32. The computer program product of any one of claims 29 to 31, wherein the instructions further cause the processor to:

select, based on previously encoded frames, the set of filter support on which the given sub-integer pixel value is based.