Clean Version

Amended Set of Claims 1 to 48

1. A method of coding a plurality of transform coefficients associated with residual video data in a video coding process, the method comprising:

coding information indicating significant coefficients for the plurality of transform coefficients according to a scan order;

dividing the coded information into at least a first region and a second region, wherein the first region contains at least the DC component of the plurality of transform coefficients;

entropy coding the coded information in the first region according to a first set of contexts using context derivation criteria; and

entropy coding the coded information in the second region according to a second set of contexts using the same context derivation criteria as the first region.

2. The method of claim 1, wherein entropy coding is performed using context adaptive binary arithmetic coding (CABAC).

3. The method of claim 2, wherein the scan order has a diagonal scan pattern and an inverse direction.

4. The method of claim 1, wherein the context derivation criteria includes level information of causal neighbor transformation coefficients relative to a current transform coefficient.

5. The method of claim 1, wherein the second region contains the remaining plurality of transform coefficients not in the first region.

6. The method of claim 5, wherein the first region contains all transform coefficients within a region defined by x+y<T, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

ration: 07.01.2013 21:04:00 - 07.01.2013 21:18:55 This page 21 of AMENDED SHEET 2013 21:15:37
Received at the EPO on Jan 07, 2013 21:18:55. Page 21 of 27

Clean Version

7. The method of claim 6, wherein the threshold is based on a transform size.

8. The method of claim 5, wherein the first region contains all transform coefficients within a region defined by x<T and y<T, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

9. The method of claim 5, wherein the first region includes the DC component and the transform coefficients at positions (1,0) and (0,1).

10. The method of claim 1, wherein the first region contains only the DC component of the plurality of transform coefficients, and wherein the second region contains the remaining plurality of transform coefficients.

11. The method of claim 1, wherein the first set of contexts for each transform coefficient in the first region is based on the position of each transform coefficient in the first region, and wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of causal neighbors of each transform coefficient.

12. The method of claim 11, wherein the second set of contexts is further based on the position of each transform coefficient in the second region.

13. The method claim 12, wherein the second set of contexts for each transform coefficient in the second region is based on the coded level information of five causal neighbors of each transform coefficient.

14. The method of claim 13, wherein, if a causal neighbor is located outside of a transform block, the coded level information for the causal neighbor is assumed to be zero.

15. An apparatus configured to code a plurality of transform coefficients associated with residual video data in a video coding process, the apparatus comprising:

ition: 07.01 2013 21:04:00 - 07 01 2013 21:18:55 This page 22 of AMENDED SHEET 2013 21:16:10
Received at the EPO on Jan 07, 2013 21:18:55. Page 22 of 27

a video coding processor configured to:

code information indicating significant coefficients for the plurality of transform coefficients according to a scan order;

divide the coded information into a at least first region and a second region, wherein the first region contains at least the DC component of the plurality of transform coefficients;

entropy code the coded information in the first region according to a first set of contexts using context derivation criteria; and

entropy code the coded information in the second region according to a second set of contexts using the same context derivation criteria as the first region.

16. The apparatus of claim 15, wherein the video coding processor is configured to perform entropy coding using context adaptive binary arithmetic coding (CABAC).

17. The apparatus of claim 15, wherein the scan order has a diagonal scan pattern and an inverse direction.

18. The apparatus of claim 15, wherein the context derivation criteria includes level information of causal neighbor transformation coefficients relative to a current transform coefficient.

19. The apparatus of claim 15, wherein the second region contains the remaining plurality of transform coefficients not in the first region.

20. The apparatus of claim 19, wherein the first region contains all transform coefficients within a region defined by $x+y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

21. The apparatus of claim 20, wherein the threshold is based on a transform size.

ation: 07.01.2013 21:04:00 - 07.01.2013 21:18:55. This page 23 of AMENDED SHEET 2013 21:16:41
Received at the EPO on Jan 07, 2013 21:18:55. Page 23 of 27

Clean Version

22. The apparatus of claim 19, wherein the first region contains all transform coefficients within a region defined by x<T and y<T, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

23. The apparatus of claim 19, wherein the first region includes the DC component and the transform coefficients at positions (1,0) and (0,1).

24. The apparatus of claim 15, wherein the first region contains only the DC component of the plurality of transform coefficients, and wherein the second region contains the remaining plurality of transform coefficients.

25. The apparatus of claim 15, wherein the first set of contexts for each transform coefficient in the first region is based on the position of each transform coefficient in the first region, and wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of causal neighbors of each transform coefficient.

26. The apparatus of claim 25, wherein the second set of contexts is further based on the position of each transform coefficient in the second region.

27. The apparatus claim 26, wherein the second set of contexts for each transform coefficient in the second region is based on the coded level information of five causal neighbors of each transform coefficient.

28. The apparatus of claim 27, wherein, if a causal neighbor is located outside of a transform block, the coded level information for the causal neighbor is assumed to be zero.

29. An apparatus configured to code a plurality of transform coefficients associated with residual video data in a video coding process, the apparatus comprising:

means for coding information indicating significant coefficients for the plurality of transform coefficients according to a scan order;

ration: 07 01 2013 21:04:00 - 07.01.2013 21:18 55. This page 24 of AMENDED SHEET 2013 21:17:16
Received at the EPO on Jan 07, 2013 21:18:55. Page 24 of 27

means for dividing the coded information into at least a first region and a second region, wherein the first region contains at least the DC component of the plurality of transform coefficients;

means for entropy coding the coded information in the first region according to a first set of contexts using context derivation criteria; and

means for entropy coding the coded information in the second region according to a second set of contexts using the same context derivation criteria as the first region.

30. The apparatus of claim 29, wherein the means for entropy coding uses context adaptive binary arithmetic coding (CABAC).

31. The apparatus of claim 29, wherein the scan order has a diagonal scan pattern and an inverse direction.

32. The apparatus of claim 29, wherein the second region contains the remaining plurality of transform coefficients not in the first region.

33. The apparatus of claim 32, wherein the first region contains all transform coefficients within a region defined by $x+y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

34. The apparatus of claim 32, wherein the first region contains all transform coefficients within a region defined by $x<T$ and $y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

35. The apparatus of claim 32, wherein the first region includes the DC component and the transform coefficients at positions (1,0) and (0,1).

36. The apparatus of claim 29, wherein the first region contains only the DC component of the plurality of transform coefficients, and wherein the second region contains the remaining plurality of transform coefficients.

ration: 07.01.2013 21:04:00 - 07.01.2013 21:18:55 This page 25 of AMENDED SHEET 2013 21:17:49
Received at the EPO on Jan 07, 2013 21:18:55. Page 25 of 27

37. The apparatus of claim 29, wherein the first set of contexts for each transform coefficient in the first region is based on the position of each transform coefficient in the first region, and wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of causal neighbors of each transform coefficient.

38. The apparatus claim 37, wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of five causal neighbors of each transform coefficient.

39. A computer program product comprising a computer-readable storage medium having stored thereon instructions that, when executed, cause a processor of a device for coding a plurality of transform coefficients associated with residual video data in a video coding process to:

code information indicating significant coefficients for the plurality of transform coefficients according to a scan order;

divide the coded information into at least a first region and a second region, wherein the first region contains at least the DC component of the plurality of transform coefficients;

entropy code the coded information in the first region according to a first context using context derivation criteria; and

entropy code the coded information in the second region according to a second context using the same context derivation criteria as the first region.

40. The computer program product of claim 39, wherein the instructions cause a processor to perform entropy coding using context adaptive binary arithmetic coding (CABAC).

41. The computer program product of claim 39, wherein the scan order has a diagonal scan pattern and an inverse direction.

Clean Version

42. The computer program product of claim 39, wherein the second region contains the remaining plurality of transform coefficients not in the first region.

43. The computer program product of claim 42, wherein the first region contains all transform coefficients within a region defined by $x+y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

44. The computer program product of claim 42, wherein the first region contains all transform coefficients within a region defined by $x<T$ and $y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

45. The computer program product of claim 42, wherein the first region includes the DC component and the transform coefficients at positions (1,0) and (0,1).

46. The computer program product of claim 39, wherein the first region contains only the DC component of the plurality of transform coefficients, and wherein the second region contains the remaining plurality of transform coefficients.

47. The computer program product of claim 39, wherein the first set of contexts for each transform coefficient in the first region is based on the position of each transform coefficient in the first region, and wherein the second set of contexts for each transform coefficient in the second region is based on the coded level information of causal neighbors of each transform coefficient.

48. The computer program product claim 47, wherein the second set of contexts for each transform coefficient in the second region is based on the coded level information of five causal neighbors of each transform coefficient.

Claims

1. A method of coding a plurality of transform coefficients associated with residual video data in a video coding process, the method comprising:

coding information indicating significant coefficients for the plurality of transform coefficients according to a scan order;

dividing the coded information into at least a first region and a second region, wherein the first region contains at least the DC component of the plurality of transform coefficients;

entropy coding the coded information in the first region according to a first set of contexts and context derivation criteria, wherein the context derivation criteria is used to derive a first context from the first set of contexts; and

entropy coding the coded information in the second region according to a second set of contexts and the same context derivation criteria used to entropy code the coded information in the first region, wherein the context derivation criteria is used to derive a second context from the second set of contexts.

2. The method of claim 1, wherein entropy coding is performed using context adaptive binary arithmetic coding (CABAC).

3. The method of claim 2, wherein the scan order has a diagonal scan pattern and an inverse direction.

4. The method of claim 1, wherein the context derivation criteria includes level information of causal neighbor transformation coefficients relative to a current transform coefficient.

5. The method of claim 1, wherein the second region contains the remaining plurality of transform coefficients not in the first region.

6. The method of claim 5, wherein the first region contains all transform coefficients within a region defined by $x+y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

7. The method of claim 6, wherein the threshold is based on a transform size.

8. The method of claim 5, wherein the first region contains all transform coefficients within a region defined by x<T and y<T, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

9. The method of claim 5, wherein the first region includes the DC component and the transform coefficients at positions (1,0) and (0,1).

10. The method of claim 1, wherein the first region contains only the DC component of the plurality of transform coefficients, and wherein the second region contains the remaining plurality of transform coefficients.

11. The method of claim 1, wherein the first set of contexts for each transform coefficient in the first region is based on the position of each transform coefficient in the first region, and wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of causal neighbors of each transform coefficient.

12. The method of claim 11, wherein the second set of contexts is further based on the position of each transform coefficient in the second region.

13. The method claim 12, wherein the second set of contexts for each transform coefficient in the second region is based on the coded level information of five causal neighbors of each transform coefficient.

14. The method of claim 13, wherein, if a causal neighbor is located outside of a transform block, the coded level information for the causal neighbor is assumed to be zero.

15. An apparatus configured to code a plurality of transform coefficients associated with residual video data in a video coding process, the apparatus comprising:

a memory configured to store the plurality of transform coefficients; and

a video coding processor configured to:

code information indicating significant coefficients for the plurality of transform coefficients according to a scan order;

divide the coded information into a at least first region and a second region, wherein the first region contains at least the DC component of the plurality of transform coefficients;

entropy code the coded information in the first region according to a first set of contexts and context derivation criteria, wherein the context derivation criteria is used to derive a first context from the first set of contexts; and

entropy code the coded information in the second region according to a second set of contexts and the same context derivation criteria used to entropy code the coded information in the first region, wherein the context derivation criteria is used to derive a second context from the second set of contexts.

16. The apparatus of claim 15, wherein the video coding processor is configured to perform entropy coding using context adaptive binary arithmetic coding (CABAC).

17. The apparatus of claim 15, wherein the scan order has a diagonal scan pattern and an inverse direction.

18. The apparatus of claim 15, wherein the context derivation criteria includes level information of causal neighbor transformation coefficients relative to a current transform coefficient.

19. The apparatus of claim 15, wherein the second region contains the remaining plurality of transform coefficients not in the first region.

20. The apparatus of claim 19, wherein the first region contains all transform coefficients within a region defined by $x+y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

21. The apparatus of claim 20, wherein the threshold is based on a transform size.

22. The apparatus of claim 19, wherein the first region contains all transform coefficients within a region defined by x<T and y<T, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

23. The apparatus of claim 19, wherein the first region includes the DC component and the transform coefficients at positions (1,0) and (0,1).

24. The apparatus of claim 15, wherein the first region contains only the DC component of the plurality of transform coefficients, and wherein the second region contains the remaining plurality of transform coefficients.

25. The apparatus of claim 15, wherein the first set of contexts for each transform coefficient in the first region is based on the position of each transform coefficient in the first region, and wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of causal neighbors of each transform coefficient.

26. The apparatus of claim 25, wherein the second set of contexts is further based on the position of each transform coefficient in the second region.

27. The apparatus claim 26, wherein the second set of contexts for each transform coefficient in the second region is based on the coded level information of five causal neighbors of each transform coefficient.

28. The apparatus of claim 27, wherein, if a causal neighbor is located outside of a transform block, the coded level information for the causal neighbor is assumed to be zero.

29. An apparatus configured to code a plurality of transform coefficients associated with residual video data in a video coding process, the apparatus comprising:

means for coding information indicating significant coefficients for the plurality of transform coefficients according to a scan order;

means for dividing the coded information into at least a first region and a second region, wherein the first region contains at least the DC component of the plurality of transform coefficients;

means for entropy coding the coded information in the first region according to a first set of contexts and context derivation criteria, wherein the context derivation criteria is used to derive a first context from the first set of contexts; and

means for entropy coding the coded information in the second region according to a second set of contexts and the same context derivation criteria used to entropy code the coded information in the first region, wherein the context derivation criteria is used to derive a second context from the second set of contexts.

30. The apparatus of claim 29, wherein the means for entropy coding uses context adaptive binary arithmetic coding (CABAC).

31. The apparatus of claim 29, wherein the scan order has a diagonal scan pattern and an inverse direction.

32. The apparatus of claim 29, wherein the second region contains the remaining plurality of transform coefficients not in the first region.

33. The apparatus of claim 32, wherein the first region contains all transform coefficients within a region defined by $x+y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

34. The apparatus of claim 32, wherein the first region contains all transform coefficients within a region defined by $x<T$ and $y<T$, where x is the horizontal position of the transform coefficient, y is the vertical position of the transform coefficient, and T is a threshold.

35. The apparatus of claim 32, wherein the first region includes the DC component and the transform coefficients at positions (1,0) and (0,1).

36. The apparatus of claim 29, wherein the first region contains only the DC component of the plurality of transform coefficients, and wherein the second region contains the remaining plurality of transform coefficients.

37. The apparatus of claim 29, wherein the first set of contexts for each transform coefficient in the first region is based on the position of each transform coefficient in the first region, and wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of causal neighbors of each transform coefficient.

38. The apparatus claim 37, wherein the second set of contexts for each transform coefficient in the second region is based on the coded information of five causal neighbors of each transform coefficient.

39. A non-transitory computer-readable storage medium having stored thereon instructions that, when executed, cause one or more processors to perform a method according to any one of claims 1 to 14.